

Desktop INSIGHT

Glaze
Chemistry
Software



Macintosh

Universal: x86-64 or M1

Windows

x86-64

Linux

x86-64 or ARM-64

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Where Do I Start?

If you are new to glaze chemistry or INSIGHT you might be intimidated. The best place to start is the tutorial videos at digitalfire.com/videos.

Insight-Live.com

Desktop Insight is intended for students learning glaze chemistry (on desktop computers only). But, at Digitalfire, we have moved on! An account at <http://insight-live.com> is the next generation (many more capabilities, login from any internet-connected device).

This program is not connected to insight-live.com (recipes entered here will not appear there unless you do an export here and import there). Do not enter large number of recipes here, use [insight-live](http://insight-live.com) instead.

Can you import your desktop version data into your account at Insight-live.com? Yes. To find how search for the word “import” in the Help panel.

Your account at [Insight-live](http://Insight-live.com) enables maintenance of your recipes, test results, firing schedules, pictures, materials, projects, etc. You can also do the chemistry. Research. Link, share and publish. Much more.

Contacting Digitalfire Corp

Click *Contact* at the top of page within your Insight-live.com account.

Follow/Like Tony Hansen on Facebook: <http://www.facebook.com/insightlive>

On Twitter: <https://twitter.com/digitalfirecorp>

He posts regularly and only about practical aspects of taking control of your glazes and clay bodies.

Your 'Ceramic' Responsibility

We use a dragon to symbolize attitudes and human nature that prevent us from getting control of our glazes. They then control us.

Are you a potter? When you or your company make ceramic ware you are likely dedicated to producing objects of beauty and function. At the same time you also bear responsibility (and liability) when making ware that will be used to prepare or serve food and must do your best to make it non-leachable, strong and hard, chip resistant, thermal shock resistant, non-crazed or shivered, scratch and mark resistant, blister and pinhole free, etc. Glaze chemistry is central to all of these and INSIGHT is meant, in part, to help you meet these challenges and the accountability that goes with them.



Are you a technician at a factory? Do not be lazy. Do not just trust your suppliers.

Work hard and keep good records. Learn your materials, how to do physical testing and about glaze chemistry. Digitalfire.com is full of resources to help you expand your knowledge.

Desktop Insight is Now Free!

INSIGHT no longer requires a key to run. It can be downloaded free within your account at <http://insight-live.com> (in the Files panel) or from the home page of <http://digitalfire.com>.

INSIGHT Site License

This no longer exists. Students having access to a group account at insight-live.com can download and install Insight free.

INSIGHT in Education

The user interface is the same on Macintosh, Windows and Linux, what you teach students on one is applicable to the other. Desktop INSIGHT is an excellent teaching tool to show students the basic principles of things like unity, analyses, LOI, target formulas, mole%, calculated thermal expansion, material substitution, adjustment of gloss/firing temperature, the chemistry of color, etc.

Insight-live.com is Better!

Desktop Insight is not the tool for creating a database of recipes (use your account at insight-live.com for that). It is a better solution than desktop Insight. From their phones or tablets students can have unprecedented calculation and documentation power and hit the ground running at the end of the term with all their data. Your department no longer even needs a computer!

Personal accounts are \$15 for 6 months and group accounts are \$178/yr.

Number Formats

In many parts of the world a comma is used as the decimal separator in numbers. INSIGHT periodically deduces what decimal separator your computer is using by simply asking it to convert ‘1.1’ to a character string (this is the only cross platform method we have found). If your computer answers ‘1’ INSIGHT assumes the period and characters following it were discarded as non-numeric and the decimal separator is therefore a comma. INSIGHT examines numbers you enter or ones it reads from files and replaces the foreign decimal separator with the valid one.

Date Format

INSIGHT has handled dates as simple character strings but with the advent of the recipe database recipe dates are stored as SQL dates. Enter as YYYY-MM-DD for proper interpretation.

Install

Windows: After downloading the zip archive file, open it and drag-and-drop the appropriate folder to your desktop (32 and 64 bit ones are included). Close the zip file. Open the folder you put on your desktop and find the INSIGHT application and double-click it. If Windows Smart-Screen presents a dialog complaining about us being from an unidentified developer, click the “More Info” link and click “Run Anyway”.

Mac: After downloading the zip archive file, open it and find the version folder appropriate to you (32 or 64 bit) and put that on your desktop (trash the rest). Open that folder and open the Insight app. If OSX complains that it cannot be opened because it is from an unidentified developer, right-click it and choose “Open”. The warning dialog will reappear, but it will have an “Open button” to override the warning. If you decide to keep Insight you can move its folder to the Applications folder and make a shortcut to start the app.

Linux: After downloading the zip archive file, open it and drag-and-drop the folder appropriate to you to your desktop (32 bit, 64 bit and ARM versions are included). Close the zip file and trash it. Open the folder you put on your desktop and find the Insight program and double-click it.

Troubleshooting

MDT Files

In the past it was possible to download a materials file for your part of the world. However this is no longer supported. You must maintain your own materials database. When you are ready it can be imported to your account at [Insight-live.com](https://insight-live.com).

Numbers in formula list disappear

If you open a target recipe the two formula columns will narrow and INSIGHT might not be able to squeeze the numbers in. Widen the *Recipe window* when this happens.

Insight FAQ

Please see the *Frequently Asked Questions* page for INSIGHT page at the [Digitalfire](https://digitalfire.com) website. For example, there are a number of features that INSIGHT does not have for good reason.

Startup, Shutdown Problems, Crashes

Please contact us with a description of what happened (contact link at the top of our home page). INSIGHT saves an XML image of all open recipes every time it refreshes the *Recipe window*. It erases this file at shut down. If this file is present at startup INSIGHT assumes a crash and restores the recipes from the image file.

Previous versions of Insight have stored the startup log and preferences file in the Preferences folder for the operating system. However it has become more difficult for users to find this folder in recent years (different operating systems keep it in different (and obscure) places and some deliberately attempt to hide it from non-technical users. So we have moved it where it is easy to locate, to the Insight data folder (where other Insight data is stored).

It is possible that if you update from an older version of Insight your existing preferences file may still be in the Preferences folder of your operating system. Thus, if you need to get at these files (e.g. to erase the preferences file to get a clean start) you will need to know how to find them. Googling this might be the quickest way if the information below is not right for your oper-

ating system version.

The Startup Log File

INSIGHT creates a log of its startup process in a file named *'insightlog.txt'* (in the Insight data folder). We may ask you to email this file to us when analyzing problems. In Windows, the Insight installer creates a menu item in the Insight group in the Start menu to view the contents of this file.

The Preferences File

It is named `INSIGHT_yyyy_Preferences.XML`.

Preferences Folder: Windows

Windows 7:

1. Open *My Computer*, you will see Windows Explorer.
2. At the top click *Organize*. Choose *Folder & Search Options*
3. Click on *View* tab. Under *Advanced Settings:Hidden Files and Folders* choose *Show*. *Apply* and *OK*.
4. Now open the C drive, then *Users*, then your user name, then *AppData* folder. Look for the newest `INSIGHT_201x_Preferences.XML` file.

For Windows 8-10: From the *Control Panel*, type "folder" in the *Search* box and select *Folder Options*. Proceed as for Windows 7.

Other versions of Windows have a similar process to view the hidden files and reveal the folder (but different location).

The Preferences Folder: OSX

Open `Users/YourUserName/library:preferences`

However OSX Lion starts the tradition to hide this folder. But there are still many ways to go there. The easiest is the *Go To Folder* command in the Finder's *Go* menu (Shift+Command+G). Type `~/Library` and click *Go* to view the folder in the current Finder window. Another way (which also works in Mountain Lion) is to hold down the *Option* key while clicking the *Go* menu; your Library folder appears.

The Preferences Folder: Linux

Go to `home/user`

Signals.txt File

On startup the first thing INSIGHT does is look for this file in the Insight data folder and scan it looking for certain setting. If this file is not present INSIGHT creates it with default settings. Open the signals.txt file for more information.

XML, Database File Interoperability

Macintosh, Windows and Linux versions use identical formats for all files stored. Everything is stored in SQLite database format or strict XML. Many tools are available to read and write both formats.

Use on a Network

While multiple computers running INSIGHT can open file system recipes from a common folder they cannot share the same SQLite local database. Also, each must have its own materials file. Use an account at Insight-live.com for multi-user access.

Opening Old Recipe Files

Let us know if INSIGHT cannot read an old recipe and email it to us. If you need to upgrade an old format MDT file to the new TMT format, try putting it in the folder with the new INSIGHT to see if it will open it. Otherwise email it to us and we can upgrade it for you or provide a conversion utility.

The INSIGHT Data Folder

If an empty or non-existent INSIGHT folder is found in your documents folder (home folder for Linux) the first time INSIGHT is run it creates starting materials, recipe and overrides files.

First Run

INSIGHT looks for the signals.txt file in its data folder. If it is not there it creates it with default values. It configures itself according to the settings found there.

If there is no Insight folder in your documents folder one is created.

The configuration (or preferences) file is opened (if present) and interpreted.

INSIGHT creates a logfile named InsightLog.txt (in your documents/insight folder) and writes status messages into this log during startup and operation (there is a menu choice within INSIGHT to view the log file).

The overrides file is read and interpreted.

Persistent recipes are read.

If INSIGHT attempts to read the materials definition file specified in preferences (by default STANDARD.XML in in your documents/insight folder). If not present a default one is created. It then reads it into memory.

INSIGHT attempts to open its SQLite format database, INSIGHT-DATA.DB (in your documents/insight folder). If not present it creates and opens it. In the past INSIGHT imported any recipes and pictures found in your Documents/Insight folder. It does not do this any more, you need to perform it manually.

Lessons Section

These lessons are intended to demonstrate program operation. In many places we deal with chemistry issues and draw conclusions that you may disagree with. Remember that factors taken very seriously in one branch of ceramics may mean little in another. For example, high boron and reactive glazes would not be used in industry because of their fickle nature and inability to fast-fire. However potters thrive on such and are willing to adjust their process to accommodate. Likewise, potters would find the narrow range of formulations that industry has developed for their streamlined processes far too restrictive. Glaze chemistry is as at home nursing and coaxing visual fickle pottery glazes to cooperate and as it is optimizing specialized high-tech ones in industry.

Many lessons are Digitalfire.com/videos

The Tutorial Videos section of our website has many videos to help you learn glaze chemistry and how to use INSIGHT at the same time. These step-by-step lessons take you through every aspect of using INSIGHT from downloading, installing and buying it to learning the mechanics of using it and dealing with a host of glaze adjustment, formulation and trouble shooting issues. Formerly the lessons were included in this manual and on the website, but it has become too difficult to maintain both. We have rewritten most of the videos so they will play on almost any computer made (and even iPod and iPhones and other portable devices that can play MP4 files).

Overview

Your Home Base

The *Recipe window* is where you will spend most of your time and it displays when INSIGHT starts. You enter, open, save, calculate and compare recipes here.

Recipe List

The *Recipe list* shows the materials and amounts for each ingredient (side-by-side if more than one recipe is open). Select a line to edit, use the *Edit Recipe Line area* to the left to change lines, drag lines to reorder, double-click a line to edit that material in the materials database. INSIGHT displays calculated chemistry in the *Recipe list* on the bottom right.

Windows Main Window

The screenshot shows the main window of the INSIGHT software, titled "G1214W Transparent Cone 6 (G1214W)". The window is divided into several sections:

- Edit Recipe Line:** Contains fields for "Line Label Override" (WOLLASTONITE), "Materials List Lookup" (WOLLASTONITE), "Amount" (10), "by" (1), and "Tolerance". There are checkboxes for "Phantom" and "Static", and an "Update" button.
- Recipe List:** A table with columns "S", "Line Label", "1", and "2". The data is as follows:

S	Line Label	1	2
	WOLLASTONITE	20.00	10.00
	FRIT 3134	20.00	25.00
	EPK Kaolin	20.00	25.00
	CUSTER FELDSPAR	20.00	
	SILICA	20.00	25.00
	F-4 FELDSPAR		15.00
- Chemistry:** Shows "Calculation Type" (RO Unity), "Reduction Fired" (checked), and "Materials Table" (STANDARD.XML). It includes a "COE Set" (INSIGHT) and a "Recipe Total" table:

Item	1	2
Formula Weight	333.41	410.81
Si:Al Ratio	9.45	8.64
SIB:Al Ratio	10.04	9.32
Thermal Expa...	6.97	6.58
Cost/lb - USA\$	0.08	
Calculated LOI	3.60	4.10
Imposed LOI	2.80	3.51
RecipeTotal	100.00	100.00
- Oxide:** A table showing oxide composition:

Oxide	1	2
CaO	0.76*	0.71*
MgO	0.02*	0.01*
K2O	0.08*	0.03*
Na2O	0.15*	0.25*
TiO2	0.00	0.00
Al2O3	0.37	0.50
B2O3	0.22	0.34
SiO2	3.50	4.35
Fe2O3	0.00	0.00

OSX Main Window

Edit Recipe Line

Line Label Override: WOLLASTONITE

Materials List Lookup: WOLLASTONITE MDT

Amount: 10 by Tolerance: 1

Phantom Static Update

Recipe List

S	Line Label	1	2
	WOLLASTONITE	20.00	10.00
	FRIT 3134	20.00	25.00
	EPK Kaolin	20.00	25.00
	CUSTER FELDSPAR	20.00	
	SILICA	20.00	25.00
	F-4 FELDSPAR		15.00

Chemistry | Recipe Details | Notes | Pictures

Calculation Type: 1 2 Reduction Fired .000 KNaO

Materials Table: LESSONS.TMT

COE Set: x 10-7 in/in/degree C - linear

Item	1	2	Oxide	1	2
Formula Weight	321.25	402.00	CaO	0.79*	0.73*
Si:Al Ratio	9.65	8.69	MgO	0.00*	0.00*
SiB:Al Ratio	10.27	9.37	K2O	0.07*	0.03*
Thermal Expans...	449.98	375.76	Na2O	0.14*	0.23*
Cost/lb	1.47	1.67	TiO2	0.00	0.00
Calculated LOI	2.79	3.51	Al2O3	0.35	0.49
Imposed LOI	2.80	3.51	B2O3	0.21	0.33
RecipeTotal	100.00	100.00	P2O5	0.00	0.00
			SiO2	3.35	4.24
			Fe2O3	0.00	0.01

Linux Main Window

Edit Recipe Line

Line Label Override: EPK Kaolin

Materials List Lookup: EPK Kaolin MDT

Amount: 25 by Tolerance: 1

Phantom Static Update

Recipe List

S	Line Label	1	2
	EPK Kaolin	20.00	25.00
	SILICA	20.00	25.00
	WOLLASTONITE	20.00	10.00
	FRIT 3134	20.00	25.00
	CUSTER FELDSPAR	20.00	
	F-4 FELDSPAR		15.00

Chemistry | Recipe Details | Notes | Pictures

Calculation Type: 1 2 Reduction Fired .000 KNaO

Materials Table: STANDARD.XML

COE Set: INSIGHT x 10-6 in/in/degree C - linear

Item	1	2	Oxide	1	2
Formula Wei...	334.02	411.14	CaO	0.76*	0.70*
Si:Al Ratio	9.46	8.64	MgO	0.02*	0.01*
SiB:Al Ratio	10.06	9.32	K2O	0.08*	0.04*
Thermal Exp...	6.97	6.59	Na2O	0.15*	0.24*
Cost/lb	0.10		P2O5	0.00*	0.00*
Calculated LOI	3.37	3.93	TiO2	0.00	0.00
			Al2O3	0.37	0.50

Edit Recipe Line area

Controls to update and edit the selected recipe line and its attributes.

Short Cut Buttons

Left of the *Recipe List* (documented fully in Recipe window section).



These appear if either recipe needs to be saved.

Lock a recipe from being edited.

Open and close recipes.

Open *Multi-Recipe Utilities* dialog to copy, move or add one recipe to the other.

Zero a line amount on the first click, then clear the material name on the second click if the other recipe does not have any of it.

Print a report.

Chemistry Tab

Contains controls to shape the calculation and data sources and displays the results of calculations.

Calculation Type: 1 2 Reduction Fired .000 KNaO

RO Unity:

Materials Table: STANDARD.XML

COE Set: INSIGHT x 10-6 in/in/degree C - linear

Item	1	2	Tar...
Formula Weight	333.41	410.81	
Si:Al Ratio	9.45	8.64	
SiB:Al Ratio	10.04	9.32	
Thermal Expa...	6.97	6.58	
Cost/lb - USA\$	0.08		
Calculated LOI	3.60	4.10	
Imposed LOI	2.80	3.51	
RecipeTotal	100.00	100.00	

Oxide	1	2	Tar...
CaO	0.76*	0.71*	0.0...
MgO	0.02*	0.01*	0.0...
KNaO	0.26*	0.51*	0.0...
TiO2	tr	tr	
Al2O3	0.37	0.50	0.38...
B2O3	0.22	0.34	0.0...
SiO2	3.50	4.35	3.0...
Fe2O3	tr	tr	
ZnO			0.0...
BaO			0.0...

Calculation Controls (left and along top)

Specify type of calculation, materials database, expansion number set, reduction firing, extra precision, combining K_2O and Na_2O , search for a material contributing the most of an oxide, open a target/limit formula.

Calculated Items List (center)

Displays the calculated recipe and formula properties. Double click a line for more information.

The Formula List (right)

Side-by-side calculated formulas for each recipe and optional target formula. Double click a line to view/edit associated oxide data.

Chemistry		Recipe Details		Notes	Pictures
Recipe File Name		Typecodes		Recipe File	
6.XML				7.XML	
Description		ST		Description	
G1214M Cone 6 Transparent Base Glaze				G1214W	
Location	Code	Date	Location		
	G1214M	9/8/00			
URL	Batch Size	0		URL	
http://www.ceramic-materials.com/ceremat/edi				http://v	

Recipe Details Tab

Enter information about the recipe, classify it with type codes and a code number, specify location of test specimens, etc.

Chemistry		Recipe Details		Notes	Pictures
<p>This recipe is known as the 20X5 and has been employed by thousands of potters around the world. Although the recipe appears "thrown together", this was the product much development effort that ended in an elegant solution. It is a middle-of-the-road compromise that achieves a balance properties and works well with most stains. It has also been an ideal starting point from which adjust to individual circumstances and from which to create other types of glazes.</p> <p>This recipe broke new ground in 1996 by</p>					
<p>An adjust were ma improve employ ; The web goes int recipe ar outline l into for</p>			<p>3% Cob blue 2% Chro browni</p>		

Notes Tab

Free form notes shown side-by-side.

Chemistry		Recipe Details		Notes	Pictures
					
<p>This shows the glaze at a variety of thickness and how it performs on thin sections at the edges of contours.</p>					

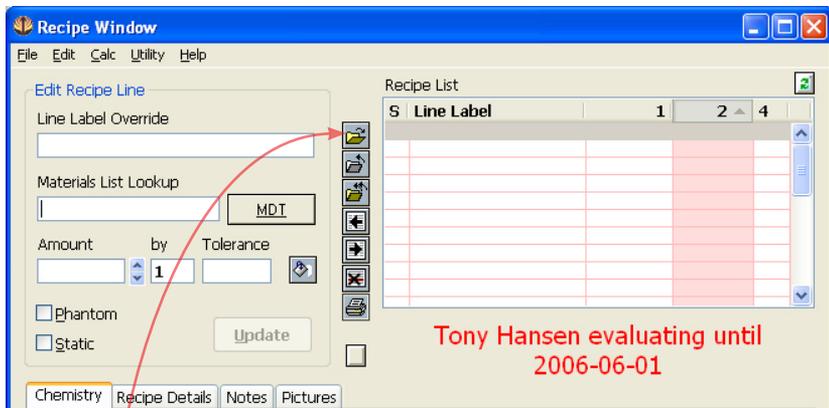
Pictures Tab

Drag and drop pictures and maintain notes specific to each picture.

Tour of INSIGHT

I have already launched INSIGHT and it has displayed an empty *Recipe window*. This is where most of the work is done.

I am using it during my trial period, thus a red banner under the *Recipe list* shows the expiry date of my key.



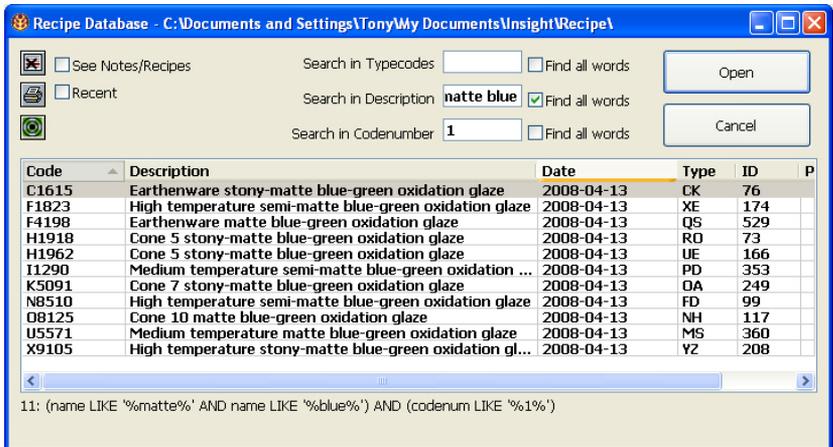
When you run INSIGHT for the first time it turns tooltips on (you can control this in the *Preferences dialog*). When this is on and you let the cursor dwell on a control, a tip pops up.

INSIGHT works the same on all platforms and can interchange all its files.

Before proceeding I am going to open a recipe by clicking the  button. This will display the *Recipe Database Window*.

Recipe Database Window (formerly Recipe Open Dialog)

It generates its list from the local SQLite database INSIGHT manages (depending on the data source, that is, which of the *File* menu *Open* options you chose) and displays columns for the code numbers, descriptions, dates, type codes, ID numbers and number of pictures in each recipe.



Sorting, Column Widths, Window Size

Click the column headers to sort the list.

Adjust column widths using the boundary lines in the title bar of the list.

This dialog is sizeable.

Searching

Search in Typecodes Find all words

Search in Description Find all words

Search in Codenumber Find all words

Enter search terms in any of the three blanks and INSIGHT will search as you press each key stroke. Use the 'Find all words' checkboxes if you enter more than one word in a blank and you want both to be found.

Use  to display only target recipes.

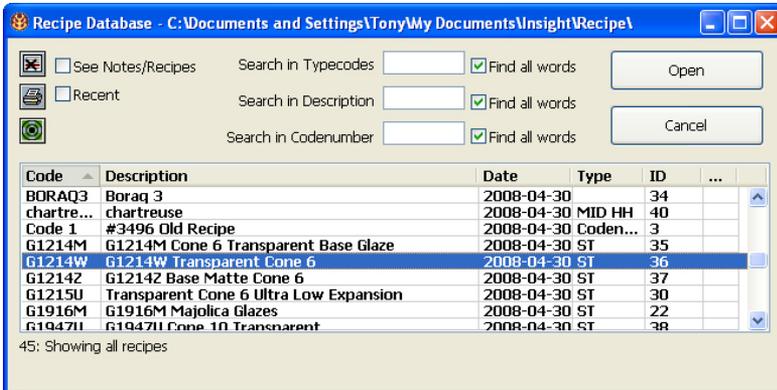
Use the *Recent* checkbox to display recently opened recipes.

Deleting Recipes

Delete a recipe file using .

See Notes/Recipes

Re-configure this dialog to show more detail for each recipe like this:



Open a Recipe

I will pick recipe G1214W and click the *Open* button.

G1214W Transparent Cone 6 (G1214W)

File Edit Calc Utility Help

Edit Recipe Line

Line Label Override
EPK Kaolin

Materials List Lookup
EPK Kaolin MDI

Amount by Tolerance
25 1

Phantom
 Static Update

Recipe List

S	Line Label	1	2	4
	EPK Kaolin	25.00	25.00	10.00
	SILICA	25.00		
	WOLLASTONITE			10.00
	FRIT 3134			25.00
	F-4 FELDSPAR			15.00

Tony Hansen evaluating until
2006-06-01

Chemistry Recipe Details Notes Pictures

Calculation Type 1 2 Reduction Fired .000 KNaO

RO Unity

RO Unity

Materials Table
STANDARD.XML

COE Set
INSIGHT x 10-6 in/in/degree C - linear

Item	1	2
Formula Weight		410.81
Si:Al Ratio		8.64
SiB:Al Ratio		9.32
Thermal Exp...		6.58
Cost/lb - USA\$		4.10
Calculated LOI		3.51
Imposed LOI		100.00

Oxide	1	2	Tar...
CaO		0.71*	0.0-...
MgO		0.01*	0.0-...
KNaO		0.28*	0.0-...
TiO2		tr	
Al2O3		0.50	0.38...
B2O3		0.34	0.0-...
SiO2		4.35	3.0-...
Fe2O3		tr	
ZnO			0.0-...
BaO			0.0-...

The recipe has been read and displayed in the *Recipe window*.

The materials and amounts appear in the *Recipe list* on the right.

This list can host side-by-side recipes. This one is opened in column 1. Multiple recipes share one material label column but each has its own amount column.

- You can select a recipe line by clicking it.
- You can move a line by dragging it.
- When you select a line, the *Edit Recipe Line Area* enables you to edit it.

The first column of the *Recipe list* displays line status characters (although this recipe does not show any).

Getting Information on a Material

- Now I am going to double-click the first line in the *Recipe list*.

Materials Definitions for file: STANDARD.XML (245 materials)

Utility Edit

EP Kaolin 

Alternate Names

Weight LOI Molecular Weight

Cost/lb-USA\$ Thermal Expansion

Type Number

Filter

Having

Formula % Analysis

BaO	<input type="text"/>	CoO	<input type="text"/>
CaO	0.010 0.2	Cr2O3	<input type="text"/>
Li2O	<input type="text"/>	Fe2O3	0.010 0.6
MgO	0.010 0.1	FeO	<input type="text"/>
K2O	0.010 0.3	MnO	<input type="text"/>
Na2O	<input type="text"/>	MnO2	<input type="text"/>
ZnO	<input type="text"/>	NiO	<input type="text"/>
SrO	<input type="text"/>	ZrO2	<input type="text"/>
F	<input type="text"/>		
P2O5	<input type="text"/>		
PbO	<input type="text"/>		
TiO2	0.010 0.3		
Al2O3	1.000 37.4		
B2O3	<input type="text"/>		
SiO2	2.080 45.8		

MDT

STANDARD.XML

The *Materials dialog* will display positioned on the material that I double-clicked.

This is where you customize INSIGHT with information about your own materials (if you are not maintaining your materials list as a CSV file in which case you maintain the materials externally using Microsoft Excel or a compatible spreadsheet).

INSIGHT shows the chemistry as well as other information about this material.

An interesting feature is the  button, it opens the page at the *Digitalfire Reference Library* website about this material (if you have level 2 INSIGHT). This web site is where Digitalfire concentrates all of its material information efforts. INSIGHT material tables are generated from the database at this site.

Now I will close this dialog by clicking the *Done* button.

Edit Recipe Line

Line Label Override

Materials List Lookup

Amount by Tolerance

Phantom
 Static



you to supply an amount of material based on how much of an oxide you need from it.

The *Tolerance* blank is only used for entering target or limit formulas.

The *Update* button saves changes to a line.

To enter a material into a recipe:

Materials List Lookup

Amount by Tolerance

Phantom
 Static

FRIT 3134	25.00
F-4 FELDSPAR	15.00

Tony Hansen evaluati
 2006-06-01

Select a recipe column and line and key enough of a name into the *Materials List Lookup* blank so INSIGHT can find it.

Key its amount and either click the *Update* button or press the *Enter* key.

To search for a material

Click a line, and then click the *MDT* button (Materials Definition Table, the materials database) to open the *Materials Dialog*. Use the search tools to find the material, then click the *Update Recipe Line* button to insert it into the recipe.

Notice that when I clicked the first line of the recipe the *Edit Recipe Line* area displayed its details.

The *Phantom* check box tells INSIGHT to ignore the chemistry information for a line when doing calculations. The *Static* checkbox signals INSIGHT not to alter the line amount during retotal operations.

The *Supply* button displays the *Supply Oxide Dialog* that enables



Using the button bar to bring up this dialog I clicked *Copy Right* to duplicate recipe 1 to recipe 2 (so columns 1 and 2 are the same).

The screenshot shows the 'Edit Recipe Line' dialog for 'EPK Kaolin'. The 'Recipe List' table is as follows:

S	Line Label	1	2
	EPK Kaolin	25.00	25.00
	SILICA	25.00	25.00
	WOLLASTONITE	10.00	10.00
	FRIT 3134	25.00	25.00
	F-4 FELDSPAR	15.00	15.00

The 'Other Calculated Items' table is as follows:

Item	1	2
Formula ...	99.39	410.81
Si:Al Ratio	8.64	8.64
SiB:Al Ratio	9.32	9.32
Thermal E ...	6.58	6.58
Cost		
Calculate ...	4.10	4.10
Imposed LOI	3.51	3.51
Recipe Total	100.00	100.00

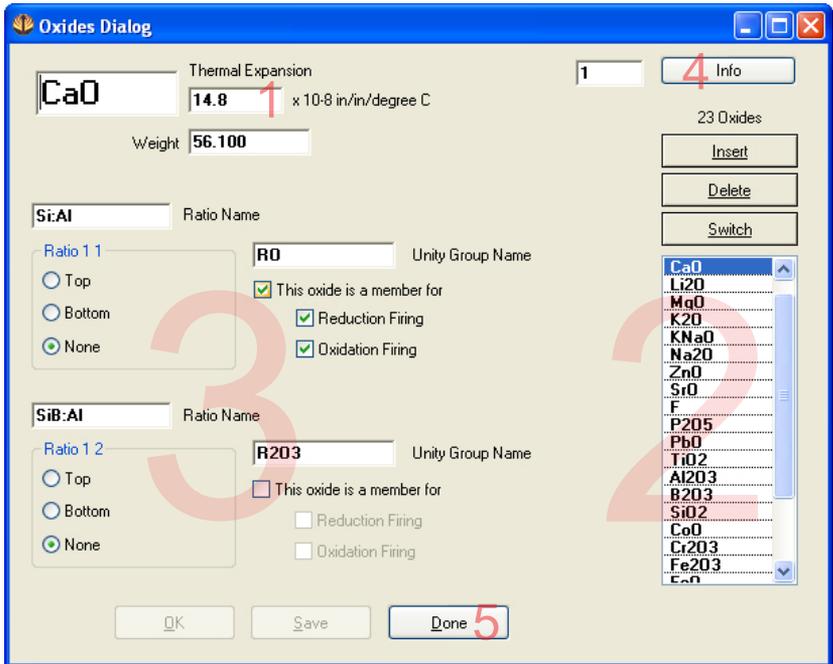
The 'Oxide' table is as follows:

Oxide	1	2
CaO	0.17	0.71*
MgO	0.00	0.01*
K2O	0.01	0.03*
Na2O	0.06	0.25*
TiO2	0.00	0.00
Al2O3	0.12	0.50
B2O3	0.08	0.34
SiO2	1.05	4.35
Fe2O3	0.00	0.00

INSIGHT displays formulas or analyses it calculates in the *Formula list* on the lower right. There is a direct relationship between these numbers and the fired properties of the glaze.

- 1 Switches to three decimals of accuracy.
- 2 Combine sodium and potassium totals.
- 3 Selects the recipe material contributing greatest amount of the oxide selected in the *Formula list*.

- Click formula lines to highlight them for reference.
- Double-click a formula line to display the *Oxides dialog*. I will double-click the CaO line now.



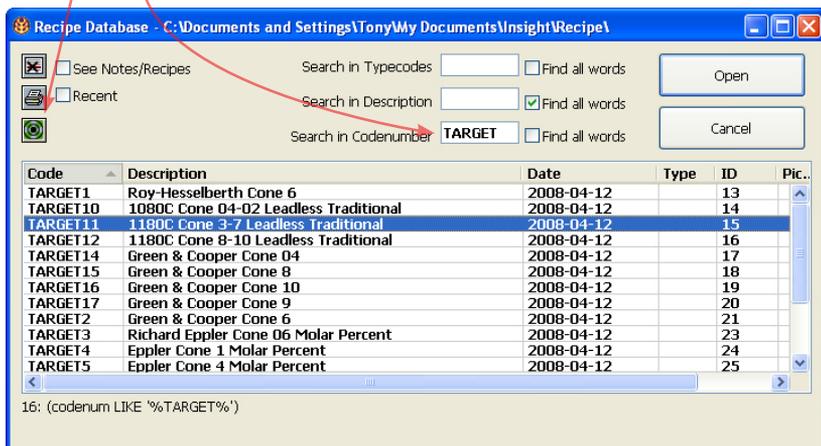
This dialog manages oxide data and has controls that shape the way calculations are done.

- 1 The thermal expansion for this oxide.
- 2 Insert, delete and find individual oxides.
- 3 These controls shape the results in ratio and unity calculations.
- 4 The *Info* button opens a page at the *Digitalfire Reference Library* website about this oxide, you can learn all about what it does in fired glazes.
- 5 I will press the *Done* button now. That will take us back to the *Recipe window*. Let's focus on the *Formula list* on the lower right.

This button opens a dialog where you can select a target or limit formula for display as a third column in the *Formula list*, right beside the other two. I am going to click it now.

This is the *Recipe Database Window* that we saw before. Why? Because in INSIGHT target or limit formulas can be composed and saved like a recipe.

INSIGHT has clicked the *Target filtering* button for me signaling it to put the word TARGET in the *Search in*



Codenumber blank and start the search automatically.

I found the line I want and have already selected it and will click the *Open* button.

The recipe has been opened but INSIGHT is not displaying the two formula columns, the target is squeezing them out.

Oxide	1	2	Target
CaO	0.3-0.6
MgO	0.1-0.2
K2O	
Na2O	
TiO2	
Al2O3	0.2-0.35
B2O3	0.3-0.5
P2O5	
SiO2	2.5-3.5
Fe2O3	

I will widen the INSIGHT *Recipe window* (e.g. by grabbing the bottom corner in Windows) and adjust the column widths by moving the vertical separator lines in the title bar. While I will also increase the window height so I can see more lines.

'tr' values in a formula means that there is a trace of the oxide, less than 0.00 but more than 0.000

Oxide	1	2	Target
CaO	0.73*	0.73*	0.0-0.55
MgO	tr*	tr*	0.0-0.32
K2O	0.03*	0.03*	
Na2O	0.23*	0.23*	
TiO2	tr	tr	
Al2O3	0.49	0.49	0.29-0.64
B2O3	0.33	0.33	0.0-0.35
P2O5	tr	tr	
SiO2	4.24	4.24	2.4-4.7
Fe2O3	tr	tr	

The target formula is easy to compare with the other two now.

Let's go back to the *Recipe window* again and examine some things along the lower part of it.

This is called the *Calculated items* list, it displays various calculated values like recipe totals, thermal expansion, cost, formula weight, and silica to alumina ratio.

If you double click a line in *Calculated items* list INSIGHT displays an alert telling you what that line is for.

The popup lists on the left enable you to:

- Specify the type of calculation you want for each recipe.
- Select a materials table for chemistry information lookup.
- Choose which set of thermal expansion (COE) numbers you would like to use.

The *Reduction Fired* checkboxes above the list are used to signal INSIGHT to treat iron as a flux for the respective recipe.

The *Chemistry* tab shows by default.

Chemistry | Recipe Details | Notes | Pictures

Calculation Type: No Units

Other Calculated Items:

Item Name	Quantity
1	2

Use the *Notes* tab to enter side-by-side notes about each recipe.

Chemistry | Recipe Details | Notes | Pictures

An adjustment to the 20X5 recipe. Changes were made to reduce thermal expansion, improve clarity, application properties, and employ a cleaner and more reliable feldspar. The web page associated with this recipe goes into detail about many aspects of the recipe and formula and acts as a good outline for the thought processes that

Use the *Recipe Details* tab to enter other kinds of information like description, location, typecodes, date, or a URL. Notice the side-by-side layout, you can see the notes from both recipes. When you save a recipe INSIGHT writes all of this information into the recipe database (a single file stored in the *INSIGHT Documents Folder*).

Chemistry | Recipe Details | Notes | Pictures

ID Num/File Name	Code	ID Num/File Name	Code
101	61214W	7	61214W
Description: 61214W Transparent Cone 6		Description: 61214W Transparent Cone 6	
Location	Typecodes	Date	Date
	ST	9/8/00	9/8/00
Go URL		Go URL	
http://www.ceramic-materials.com/ceremat/education/		http://www.ceramic-materials.com/ceremat/education/	

Chemistry | Recipe Details | Notes | Pictures

Ulexite Version

1

This shows the glaze at a variety of thickness and how it performs on thin sections at the edges of contours.

I have opened a recipe that does have a picture so you can see the *Pictures* tab better. You can drop up to nine JPG or PNG pictures here for each recipe and the buttons are used to view, add, remove or edit them. Notice that you can enter notes with each picture.

A typical session with INSIGHT will be to:

- 1 Enter or open a recipe.
- 2 Copy it to the right using this button.
- 3 Make changes to recipe 2 and observe the impact on the chemistry and calculated items it displays on the lower half of the window.

Of course you will need to develop a knowledge of what these oxides contribute to the fired glaze and how they interplay, and what materials you should use to source them.

The screenshot shows the INSIGHT software interface for a recipe titled "G1214W Transparent Cone 6 (Target: Roy-Hesselberth Cone 6)". The interface is divided into several sections:

- Recipe List:** A table showing the ingredients for the recipe. The ingredients listed are EPK Kaolin, SILICA, WOLLASTONITE, FRIT 3134, and F-4 FELDSPAR, each with a quantity of 25.00 or 15.00. A red arrow labeled '3' points to the 'F-4 FELDSPAR' entry.
- Materials List Lookup:** A section where 'EPK Kaolin' is entered. A red arrow labeled '1' points to this entry.
- Recipe List Toolbar:** A set of icons for managing the recipe list. A red arrow labeled '2' points to the copy icon.
- Chemistry:** A section showing calculation results. It includes a table for 'Item' and 'Oxide' with columns for '1', '2', and 'Target'.

Item	1	2	Target
Formula Weight	402.00	402.00	
Si:Al Ratio	8.69	8.69	
SIB:Al Ratio	9.37	9.37	
Thermal Expansi...	6.62	6.62	
Cost/lb - USAS	1.67	1.67	
Calculated LOI	3.51	3.51	
Imposed LOI	3.51	3.51	
RecipeTotal	100.00	100.00	

Oxide	1	2	Target
CaO	0.73 [±]	0.73 [±]	0.2-0.6
MgO	tr [±]	tr [±]	0.0-0.3
K2O	0.03 [±]	0.03 [±]	
Na2O	0.23 [±]	0.23 [±]	
TiO2	tr	tr	
Al2O3	0.49	0.49	0.25-0.5
B2O3	0.33	0.33	0.0-0.3
P2O5	tr	tr	
SiO2	4.24	4.24	2.5-4.0
Fe2O3	0.01	0.01	
KNaO			0.1-0.3
ZnO			0.0-0.2
SrO			0.0-0.2

We can help you with that at the Digitalfire website and in our Magic of Fire book.

Lessons Section

These have been moved to <http://digitalfire.com/videos>. These videos are a must-see for all beginners, both for INSIGHT and in glaze chemistry.

INSIGHT Video Tutorials - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://digitalfire.com/university/index.html

Work Email gmail SQL Admin Level1 Level2 WorkP translate Conjugate nettuts netvibes Admin Level2

Admin

Lessons

- Overview**
Overview of what INSIGHT does, how it works and how you typically use it, a tour of the main dialogs and controls
Download for [iPod](#), [iPhone](#). For best quality, watch now in an MP4 video player (e.g. Quicktime) for [640x480](#)
- Lesson 1A: Comparing a Theoretical and a Real-World Feldspar**
Entering recipes, materials and the materials database, theoretical materials, formulas, oxides, analyses, unity and non-unity
Download for [iPod](#), [iPhone](#). For best quality, watch now in an MP4 video player (e.g. Quicktime) for [640x480](#)
- Lesson 1B: Turning a feldspar into a glaze**
Target formulas, feldspar chemistry, thermal expansion, supplying oxides to a formula from a material, getting detailed material information at digitalfire.com and oxide and material level thinking that technicians employ to make formulation decisions
Download for [iPod](#), [iPhone](#). For best quality, watch now in an MP4 video player (e.g. Quicktime) for [640x480](#)
- Lesson 1C: Comparing Calcia Sourcing Materials**
LOI and study calcia contributing materials specifically, what makes frits such great sources of oxides, the concept of altern oxide, non-participant recipe materials and the digitalfire material information strategy
Download for [iPod](#), [iPhone](#). For best quality, watch now in an MP4 video player (e.g. Quicktime) for [640x480](#)
- Lesson 2: Turning a Glossy Glaze Into a Matte**
Learn the chemistry differences between glossy and matte glaze and convert a cone 6 glossy into a matte. This process wi many other issues
Download for [iPod](#), [iPhone](#). For best quality, watch now in an MP4 video player (e.g. Quicktime) for [640x480](#)
- Lesson 3: Dealing With the Root Cause of Crazing**
What is crazing, why glazes craze, thermal expansion, stress testing, researching, substituting KNaO, adding more SiO₂ a boron, the unique character of Li₂O, adding boron from frits and silica:alumina ratios
Download for [iPod](#), [iPhone](#). For best quality, watch now in an MP4 video player (e.g. Quicktime) for [640x480](#)
- Lesson 4: Building a Glaze From a Chemically Analyzed Native Material**
Having a native material analyzed, LOI measurement and imposition, lab analysis issues, assessing a materials chemistry percentage in a glaze, entering an analysis of native material, the advantages of using a native material, the advantages of using a native material.
Download for [iPod](#), [iPhone](#). For best quality, watch now in an MP4 video player (e.g. Quicktime) for [640x480](#)

Created by Camtasia Studio 6 - Mozilla Firefox

http://ceramic-materials.com/videos/SFS.html

Work Email gmail SQL Admin Level1 Level2 WorkP translate Conjugate nettuts netvibes Admin Level2

Admin

Done

Dealing With the Root Cause of Glaze Crazing

Conquer the Glaze Dragon

DIGITALFIRE CORPORATION

DIGITALFIRE INSIGHT

Transferring data from ceramic-materials.com...

Reference Section

Recipe Window

The resizable *Recipe window* is your ‘Home Base’.

The Title Bar



This shows status information (e.g. locations Insight is using to maintain recipe and material data).

The Recipe List

Please read the section on database and file system recipes in the Appendix.

S	Line Label	1	2	%	Lookup
	SILICA	25.00	30.00	25.00	SILICA
	EPK KAOLIN	25.00	26.00	25.00	EPK Kaolin
	WOLLASTONITE	10.00	3.00	10.00	Wollastonite
	FRIT 3134	25.00		25.00	FRIT 3134
	F-4 FELDSPAR	15.00		15.00	F-4 FELDSPAR
	3124		18.00	0.00	Frit 3124
	Turkish Ulexite		8.00	0.00	Turkish Ulexite

Two recipes cohabit the list. Its columns are persistently resizable:

- ① Status column: Special symbols appearing in this column signify the status of a line (see next page).
- ② Line Label: Both recipes share this column. This label will be used on recipe reports.
- ③ Amounts: Each recipe has its own amount column. Change the precision displayed using the *.000* checkbox below.
- ④ Lookup: This shows the name of the material from the materials database that INSIGHT is using for chemistry information (it is the value entered in the *Materials List Lookup* blank in the *Edit Recipe Line* area. This column will not be displayed if Ignore Line Label for Recipes or Hide Lookup column in Recipe List are checked in the Preferences *dialog*.
- ⑤ Recipe List Title: Shows the code number and name of the selected recipe.
- ⑥ Percent Column: This can be displayed by checking a box in the Preferences *dialog*. It respects the *.000* checkbox also.

Common operations:

- Click a line and the data for that recipe line appears in the *Edit Recipe Line area*.
- Click an amount column title-button to select a recipe.
- Double-click a line to go to its record in the *Materials dialog* (if you double-click a new line it will not work, you must select the line first, then double-click).
- Drag and drop lines to change recipe order.

By default clicking a line returns focus to the *Lookup blank* automatically (this can be changed in configuration).

Line Status Characters

The first column in the recipe list many contain status characters. Click the *S* column header to display a dialog explaining the codes.

G1214W Transparent	
S	Line Label
	SILICA
*	EPK Kaolin
=	WOLLASTONITE
	FRIT 3134
	F-4 FELDSPAR

! The unit for the line is invalid (not used at this time).

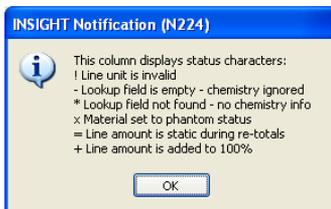
- No material lookup has been specified for this line so it does not contribute to the calculated chemistry.

* Same as above except the specified lookup material cannot be found.

x Line has been set to Phantom status.

= Line is Static status.

+ Material is an added material (e.g. a colorant).



Information Boxes

If you click the column headers (except the *1* and *2* headers which change the active recipe) information boxes will appear to explain the function of that column. These can be useful if you are demonstrating or teaching INSIGHT.



Buttons to the left of the recipe:



Split Save: Save recipe 1 or 2. If a recipe does not need to be saved its half is not visible. If a recipe is new the manner of saving depends on the mode (see *File Menu* section).

Lock Edit: Click the green button to turn it red and prevent changes to the recipe through the *Edit Recipe Line area* (changes resulting from other operations are permitted).

Open: Display the *Recipe Database window* or *File Open dialog* (depending on mode, see *File Menu* section).

Close: Close the selected recipe.

Close Both: Close both recipes.

Multi-Recipe Utilities: Displays a dialog to copy, move or add the selected recipe to the other. The *Copy* and *Paste* items in the *Edit menu* and *Duplicate* in the *File menu* perform similar functions to the *Copy button* here.

If you have Level 2 INSIGHT there will also be a *Copy to 4Sight Server* button (this sends the current recipe to 4Sight).

Delete: If the amount for the selected recipe is non-zero, INSIGHT zeroes the amount. If the amount for the other recipe is also zero the selected line will be deleted. If neither condition is true this button will be greyed.

Print: Create the last-used report type.



Dropping Files on the Recipe List

You can drop RCP, RCX or XML recipe files onto the recipe list for opening. However, remember that by default INSIGHT stores recipes in a database and only backs up recipes as files. Thus the first two times you do this INSIGHT will warn you about this and suggest switching off the database (in configuration) if you want to handle recipes as files only.

The screenshot shows a dialog box titled "Edit Recipe Line". It has several input fields and controls:

- Line Label Override:** A text box containing "WOLLASTONITE".
- Materials List Lookup:** A text box containing "WOLLASTONITE" and a button labeled "MDT".
- Amount:** A text box containing "20" and a spin button.
- Tolerance:** A text box containing "1" and a spin button.
- Phantom:** A checkbox that is currently unchecked.
- Static:** A checkbox that is currently unchecked.
- Update:** A button at the bottom left.

Edit Recipe Line Area

The controls in this area are designed to edit and create lines in the *Recipe List*.

Line Label

Enter a name for the material for the selected recipe line. This name will be used to label recipe lines on reports. If you press *<Enter>* when focus is here INSIGHT

will update the current recipe line as if you clicked the *Update* button. If this blank is empty and the *Materials Lookup* blank contains a character sequence, INSIGHT will copy it into the *Line Label* blank. Press the up or down arrow keys (while this blank has focus) to move the recipe line cursor. Material abbreviations defined in the *Materials dialog* do not expand here.

Materials List Lookup

INSIGHT uses the contents of this blank for look-up in the Materials Definition Table (MDT) to get chemistry information. If the search is successful, the contents of this blank are replaced by the complete material name (partial names are allowed during entry). INSIGHT does expand material abbreviations defined in the *Materials dialog* if you enter them here and press *<Enter>*. If a match is not found in the MDT INSIGHT will assign the phantom attribute (non participant) to the recipe line and display an asterisk in the status column in the *Recipe List*.

INSIGHT searches the MDT as follows:

- If the *Materials Lookup* blank contains a number in the form “#nnn”, the ‘#’ is discarded and nnn is range-checked to see if it falls within the record boundaries of the MDT. If it does, INSIGHT assumes you want the material at that record number. Otherwise;
- The materials names are ignore-case searched for an exact match;
- The alternate names are traversed and each is comma-split looking for an exact ignore-case match;
- The material names are searched for a partial match;
- The alternate names are searched for a partial match.

For example, if you type “tin” as a short form for “TIN OXIDE”, INSIGHT could find and display “WHITING” because INSIGHT failed to find Tin Oxide (it’s undefined), and “WHITING” contains

the letters “tin”. As another example, INSIGHT is more likely to find “PIONEER KAOLIN” if you type “pio” than “kao”. The latter would return generic “KAOLIN”, because it would probably appear first in the table.

While focus is on the *Materials Lookup* blank you can:

- Press <Tab> and focus will move to the *Amount blank*.
- Click the *Update button* and INSIGHT will search the MDT.
- Press the *Enter key* and INSIGHT will react as if you clicked the *Update button*.
- Press the up or down arrow keys (while this has focus) to move the recipe line cursor.

See notes for the *Update button* for information on how INSIGHT deals with the contents of the *Materials Lookup* and *Line Label* blanks.

When you click a line in the *Recipe List* INSIGHT immediately returns focus to *Lookup* (to increase recipe entry speed, this behavior can be changed in the *Preferences dialog*). Recipe-line-double-clicks to open the *Materials dialog* must thus be quick, try triple-clicking if necessary.

Amount

This blank is one of two ways to specify how much of a material you want (the other is the  *supply button*).

Key the amount of the material in weight units. All recipe material amounts are assumed to be in the **same units**.

It is not necessary for a recipe to total 100. Although INSIGHT retains many decimals of precision internally, it only displays figures to two digits of accuracy here.

This behaves like the *Materials Lookup blank* with respect to the up and down arrow keys, the *Enter key* and the *Update button*.

Increment/Decrement Arrows

These increment and decrement the number in the *Amount* blank by the value in the *By blank* and force a calculation. They are handy if you are fine-tuning a recipe to achieve a particular chemistry and you need to nudge

Amount	
<input type="text" value="20"/>	<input type="text" value="1"/>

the amount for the selected recipe line. If you Right Click either button (Control-click on Macintosh) the amount in the *By blank* will double or halve.

Tolerance

Use this when entering target formulas. If the target for an oxide is 0.2-0.4 then you would enter 0.3 for the *Amount* and 0.1 in this one. Save the target as any other recipe (we suggest using a code number in the form TARGETxx).

Added Checkbox

The material is added to the base recipe (e.g. a colorant, an opacifier). This status is remembered when you save the recipe. Along with the static setting, it determines how a retotal operation is performed.

MDT Button

Open the *Materials dialog*. It provides tools to find materials and enables you to select a material and click the *Update Recipe Line button* to paste it into the *Materials Lookup blank*.

Phantom and Static Check-Boxes

Individual materials in the *Recipe window* can be assigned *Normal*, *Static* and *Phantom* attributes to control the way they participate in calculations. Status characters display in front of recipe lines to signify each attribute, or combination of attributes:

Normal items have no status indicator.

- * **Phantom** materials appear in the recipe but have no effect on the calculated formula. This can be user-assigned (using the check box under the *Amount*) or assigned by INSIGHT because of failure to locate a material in the MDT.
- = **Static** materials remain unchanged when the recipe total is recalculated (We chose the “=” for static materials, because the intention is to maintain them equal to a certain percentage).
- + Materials that are **both** phantom and static. This is a plus sign because it indicates that the attribute is additive, a combination of the other two.

The four possible states of the *force phantom* and *static* check boxes produce the above status characters. Remember that phantom can be forced by the user (in the check box) or may result because

INSIGHT cannot find a material in the current MDT.

Static materials are useful: Many materials contribute to recipe slurry properties, opacification or coloration and are maintained at a specific percentage of the recipe total. Bentonite or gum, for example, may make a glaze suspend and harden better. The proportion is intended to be a certain percentage of the total recipe amount (the contribution to the chemistry of the fired glass is either ignored or rationalized for this type of ingredient). When a recipe is recalculated to total 100 the bentonite amount, for example, would normally change like the other ingredients. However, if the bentonite is set to static its amount will not change when the recipe is recalculated to 100. The non-statics will be re-totaled to 100 minus the bentonite amount (plus any other materials marked as static).

Phantom and Static are recipe-shared attributes

INSIGHT applies static and phantom to both open recipes (if you turn one on it is on for both recipes).

Phantom and Static are not persistent

The state of the static and phantom check boxes are non-persistent (they are not saved with recipes). This means that if, for example, you turn static and phantom on for one line and save a recipe, when you reopen it they will be turned off.

Static: This was intended as a non-persistent one-time operation done just before re-totaling a recipe. If this were saved for a recipe there is the danger of someone re-totaling it without noticing that a material is set to static; in a situation where the new total is less than the combined static amounts the other items in the recipe would be forced negative to satisfy the total. Likewise, different people opening a recipe would wonder why the retotal was not working as expected.

Phantom: This is typically set for one-time viewing of the chemistry effects of removing a material from a recipe. If a material was set permanently to have no impact on the calculated chemistry there is a good chance that later the same or a different user would not notice and make a recipe change decision based on an incorrect calculated chemistry. Also, since INSIGHT is built around the side-by-side recipe interface, this setting was intended to set phantom for both recipes at one time.

Update Button

Searches the materials table and updates the recipe line.

- If the *Lookup* is blank and the contents of the *Line Label* blank will be copied into it before the MDT search.
- If the *Line Label* is blank, the contents of the *Lookup* will be copied into it before the MDT search.
- If the *Lookup* is changed to a different material the *Line Label* will not be changed automatically if it is not empty, you must change it manually.

Press the *Enter* key when the *Label*, *Lookup* or *Amount* blanks have focus to perform the same function.

Supply Button

This provides an alternative way to specify an amount of a material for a recipe line (see lessons section for an example of its use). It displays the *Supply Oxide* dialog showing the material from the *Materials Lookup blank*. You can base the material amount on how much of one of its oxides is needed. If the selected recipe calculation type is not set to *No-Unity* or the *Materials Lookup blank* is empty an error dialog will appear.

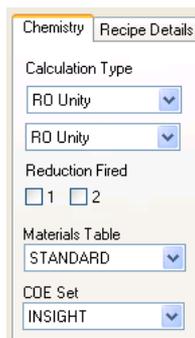
Chemistry Tab

These items relate the display and method of calculations.

Calculation Type

Determines the presentation of the *Formula List* for recipe.

“Unity” refers to the recalculation of a formula so that a subgroup of oxides add up to 1. A typical Seger formula will have the ‘RO’ group unified (check the lessons section, our Magic of Fire II book or our web site if you are unclear on unity, RO/R2O3 or the difference between formula and analysis).



Chemistry | Recipe Details

Calculation Type
 RO Unity ▾

RO Unity ▾

Reduction Fired
 1 2

Materials Table
 STANDARD ▾

COE Set
 INSIGHT ▾

Analysis

INSIGHT displays an analysis in the *Formula List* (analyses show oxides in a percent by weight format as opposed to formulas that show comparative numbers of molecules). The total of the analysis, plus the LOI, will be 100.

RO Unity, R2O3 Unity

INSIGHT does a formula calculation based on how unity is configured in the *Oxides dialog*. This dialog enables you to determine which oxides are members of the unity subgroup, what the name of each unity group is and under what conditions unity applies. We have set group names at “RO” and “R2O3” (you might like to change them to ‘Flux’ and ‘Alumina’).

Current unity settings are reflected by an asterisk after each oxide participating in unity (in the *Formula List*).

No Unity

INSIGHT produces a formula from the current recipe, but does no recalculation of the oxides. This results in different formula amounts for different recipe totals, whereas unity calculations maintain the formula despite differences in recipe totals. Non-unity calculations are valuable when doing formula to batch derivations.

Mole%

This is simply the percentage comparison of the number of oxide molecules in the formula. This differs from a percentage analysis calculation in that it compares numbers of molecules instead of their weights.

Reduction Fired Check boxes

If checked INSIGHT reacts by including any oxides in unity for which the *Reduction Firing* check box is checked in the *Oxides dialog*.

As shipped INSIGHT’s MDT specifies Fe_2O_3 as a flux in reduction (but not oxidation).

MDT Chooser Materials Table LESSONS

On start up INSIGHT scans all available MDT files in the *INSIGHT Documents Folder* and adds their names to this list. When you want to switch select the new one here.

COE Set

If the file *Overrides.XML* is present in the *INSIGHT Documents Folder* (as defined in the *Preferences dialog*) this will be enabled. Pick the set of thermal expansion figures you want to override the default ones in the materials database. See the section: *Material Data Override Strategy* for more information.

The Calculated Items List

It displays calculated items that are not a part of the analysis or formula. Column widths are adjustable and persistent.

Item	1	2
Formula Weight	333.41	285.61
Si:Al Ratio	9.45	5.69
SiB:Al Ratio	10.04	6.14
Thermal Expansion	6.97	6.97
Cost/lb - USA\$	0.08	
Calculated LOI	3.60	5.56
Imposed LOI	2.80	4.63
RecipeTotal	100.00	100.00

Double-click a line to find out more about it.

Formula Weight

This is the LOI-compensated formula weight that INSIGHT calculates. Thus it is the actual molecular weight (derived by accumulating the oxide weights times their percentage amounts) plus the LOI adjustment. For example, if a formula calculates to a weight of 200 and an LOI override has been set at 5%, then INSIGHT calculates the final weight as $200 / ((100-5) / 100)$, or, $100/.95 = 210.52$.

If INSIGHT calculates no LOI and no LOI override is entered, the formula weight displayed will equal the total calculated oxide weight.

If the calculation type is set to *Analysis*, INSIGHT will display 'n/a' here. This is because technically an analysis does not have a formula weight.

Si:Al Ratio

This is a ratio calculation INSIGHT does according to how it is set up in the *Oxides dialog*. In that dialog each oxide can be defined as being on the *Top* or *Bottom* of the ratio equation (part of the cumulative dividend or divisor), or as *non-participant*. You can also change the label of the equation.

As shipped, INSIGHT defines SiO_2 as *Top*, Al_2O_3 as *Bottom* and the name as Si:Al. Thus INSIGHT derives the Si:Al figure by dividing the formula amount for SiO_2 by the amount for Al_2O_3 .

This ratio is significant in stoneware glazes, for example, because high silica tends to produce glossy glazes when alumina is low and high alumina creates matte glazes when silica is low. It follows that the higher the Si:Al ratio the glossier a glaze will be. However we must recognize that this ratio is not a general or fool-proof measure of gloss. Validity of the Si:Al ratio assumes a transparent glaze that is melting well and relatively free of other mechanisms that create matteness (e.g. high magnesia or calcia in low fire). Also remember that very low alumina glazes are fluid and encourage crystal formation during cooling; if these crystals are small they can completely cover the surface and turn it matte.

SiB:Al Ratio

This works the same way as the first ratio. It simply provides you the opportunity to define a set of oxides for a different ratio. By default, the SiO_2 and B_2O_3 are accumulated for the top of the equation and their total is divided by the amount of Al_2O_3 . This ratio is helpful since B_2O_3 can be considered not only a flux but also a glass former in low temperature glazes; (the other ratio ignores this fact).

This ratio is not as clear an indicator of fired gloss as Si:Al because low fire glazes generally contain significant boron and thus operate by a 'different set of rules' than stoneware ones. For example, boron gloss glazes can take a lot more alumina into solution in the melt than stoneware glazes even though alumina is very refractory. It is not typical to make a high alumina matte at low fire, generally they

are made using high calcia or magnesia.

You may like to redefine this equation if you need to monitor oxide ratios for other purposes. For example, lead solubility and the ability of glazes to work with colorants can be predicted by certain ratios.

Expan

This is the ‘oxide level’ property that INSIGHT calculates. Thermal expansion refers to the amount by which a solid expands and contracts as it is heated and cooled. Glaze and body are attached to each other and must expand and contract together, if not one or the other will crack to relieve the stress. The thermal expansion of a glaze can be predicted by feeding the oxide proportions and their expansions into a simple additive equation. INSIGHT maintains the expansion for each oxide in the *Oxides dialog*. The calculation is done by simply adding these numbers in proportion to the amounts of the oxides in the analysis.

The property label is configurable, that is, you can edit its name on the *Overrides dialog* (from “Expan” to some other property you have data for). You can also change the amount for each oxide in the *Oxides dialog* and in the *Overrides Dialog*.

Real-world expansion numbers are extremely small and refer to the amount by which an item expands per degree rise in temperature. INSIGHT removes the decimal to produce a simple number that generally falls between 5 and 8. This number is relative only (not absolute). Thus if a glaze is crazing you need to adjust the formula to bring the expansion number down. If it is shivering do the opposite. The amount by which you change it comes with experience.

Cost/Kg US\$

This is the ‘material level’ property that INSIGHT calculates. It works like the above oxide level property except you configure its value for each material in the *Materials dialog* (or override these in the *Overrides/Typecodes dialog*). The property name is also set in the overrides dialog and is name/units-currency (e.g. Cost/kg-US\$).

Calculated LOI

The LOI that INSIGHT calculates from the mix of materials. INSIGHT does not take this number into account when calculating the weight.

Imposed LOI

INSIGHT is oriented towards displaying the formula of fired products. LOI has no meaning in this context. However the *Recipe List* can be used to add new materials to the MDT (by first keying their analyses into a recipe). It follows that you must be able to specify an LOI. INSIGHT respects this LOI value when calculating the weight.

The Formula List

Displays the calculated chemistry of both recipes. Trace amounts rounding to 0.00 or 0.000 show as 'tr'. Column widths are adjustable and persistent. When *Calculation Type* is set to Unity each participating oxide shows a trailing asterisk. When a target recipe is active a new column is added. Click column headers to select the recipe or column 3 to display the target name in the *Recipe window* title bar.

.000 KNaO  

Oxide	1 ▲	2	Target
CaO	0.76*		0.0-0.7
MgO	0.02*		0.0-0.34
KNaO	0.23*		0.0-0.3
TiO2	tr		
Al2O3	0.37		0.45-0.62
B2O3	0.22		0.0-0.22
SiO2	3.50		3.5-6.4
Fe2O3	tr		
ZnO			0.0-0.36
BaO			0.0-0.47

.000 KNaO Controls

Check .000 to display numbers to three decimals on screen and in reports.

If KNaO is checked INSIGHT combines formula amounts for Na₂O and K₂O in the *Formula List* (these oxides are supplied from complex materials and it is often impossible to target one without over or undershooting the other).

Clicking lines in the list

- Single-click a line to point to an oxide when demonstrating to others.
- Double-click a line to open the *Oxides dialog* for that oxide (*you do need to select the line first, then double-click it for the positioning to work properly*).

Finding a Supplier

Click this to move the recipe line cursor to the material that supplies the most of the selected oxide. This only works if the oxide is present in the calculated formula for the selected recipe. This feature is valuable in demonstrating concepts of material oxide contribution.

Open a Target or Limit Formula

Displays the *Recipe Database Window* preset to search for target formulas (other remembered searches are ignored). Opening an item puts it into an added column in *Formula List*. The *Recipe window* may widen to accommodate the extra column (window and column widths are adjustable and persistent).

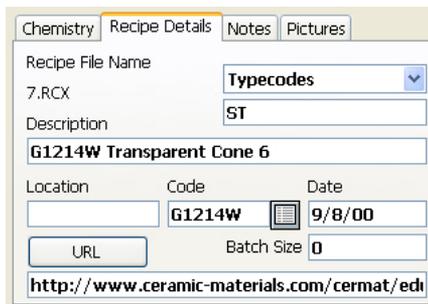
The target will be persistent from session-to-session. Click  to close the target formula.

Target recipes are created by entering a formula as a recipe and using the tolerance blank to specify the range.

The name of the target will show in the *Recipe window* title bar.

Recipe Details Tab

This tab displays the information from the recipe's database record. If you have tooltips turned off INSIGHT will display the full contents of a number of the blanks as a tooltip (eg. *Location*, *Code* and *Date*). This assists when the blank does not display all of the contents).



Chemistry Recipe Details Notes Pictures		
Recipe File Name	7.RCX	
	Typecodes	▼
Description	ST	
G1214W Transparent Cone 6		
Location	Code	Date
	G1214W	9/8/00
URL		Batch Size 0
http://www.ceramic-materials.com/ceremat/edi		

Recipe ID or File system File Name

For database recipes, this displays the ID number of the database record. For file system recipes it shows the filename.

Typecodes (Categories)

Pick codes from the list or enter manually (separated by spaces) to classify the recipe. While the *Code Number* provides a general way to classify recipes this typecode mechanism is better since it will hold many codes. Typecodes are defined in the *Overrides/Typecodes dialog* (available as the last choice in this popup menu).

INSIGHT enables you to display only recipes with a given typecode in the Recipe Database Window.

Description

This titles reports and identifies the recipe in the *Recipe Database window*.

Location

Enter the location(s) where test specimens are stored.

An organizational aspect of maintaining recipe and test records is a specimen storage system. This is the link between your computer records and the place where specimens are stored. Since you can ‘organize’ and find information easily on the computer, you do not need to organize your specimen storage beyond simple sequential numbering of shelves or boxes. Furthermore, it does not matter where a specimen is stored, as long as its location is recorded in INSIGHT. Typically a room-shelf-box system is used and a hyphenated code is keyed into the location blank. Or, test specimens are glued on numbered boards stored on shelves sequentially (in this case the board number is entered into the *Location* blank).

Code Number

A key organizational aspect of maintaining recipe and test records is an effective code numbering system. Enter your test number here and write it on test specimens to link them to recipes in the computer. This number should be unique so it can provide a non-ambiguous key to identify recipes. It is printed at the top of reports.

We suggest a number in the form ‘AnnnnA’ where the first digit denotes the group or type of test (e.g. P for Production run, G for glaze test, L for lab test, etc.). The next digits are the sequential number within the group (e.g. 1, 2, 3, etc.). The last digit is a variation on a series (e.g. G1214N would be the test N of the series G1214).

- Date** Enter birth date of the recipe.
- URL** Enter an internet URL where this recipe is documented. Click the *Go button* to open its recipe page.
- Batch Size** Total for reports

Notes Tab

Enter notes for each recipe. Size the *Recipe window* to get bigger notes boxes.

Picture Tab

INSIGHT will store up to nine JPG or PNG format pictures with each recipe.

Two ways to attach pictures to a recipe.

- Drop the picture file onto either side of the picture tab. Each picture holder will highlight when a jpg or png format file is about to be dropped onto it.
- Click the “+” *Add button* and a standard file dialog will appear so you can select a picture file to include in the current picture slot for the selected recipe.

Note: When adding pictures, avoid unusual characters in the file name (like quotes or punctuation). Also do not include any periods (except of course the period that is part of the extension e.g. “.jpg”).

Viewing the Pictures

The *Zoom*  button toggles between showing the image full size and shrinking it to fit (there are nopanning and zooming controls).

Full magnification images are displayed one screen dot per pixel regardless of the dots-per-inch setting in the image (thus a 144 dpi 1 inch image will display the same as a 72 dpi 2 inch image). Size the *Recipe window* to increase the dimensions of the image.



Use the *External View/Edit*  button to open the image in the image viewer/editor defined for your operating system (the same program that would open the image file if you double clicked it directly).

Other Features on the Pictures tab

Use the arrow buttons to view different pictures (the picture number is shown between the buttons)

Use the *Delete* “-” button to remove images (it erases the image file so there is no turning back).

Add title and notes and keywords to explain the picture. These can be searched in the recipe database window.

How INSIGHT manages picture storage

INSIGHT attaches pictures by copying the picture file into the *Recipe Files Folder* and renaming it. Historically it has patterned the copied file name after the recipe filename by adding a hyphen and a number. For example, if the recipe file name is “G2886B” then the first picture becomes “G2886B-1.JPG”, the second “G2886B-2.PNG”, etc.

Since the advent of the recipe database, the scheme for database recipes (those created and saved to database) has changed slightly. Picture are still stored as files. Each recipe in the database has a unique ID number (assigned by the database). The pictures for a recipe reside in the same folder but they are named according to the pattern: DB-xx-yy.jpg (or .png) where ‘xx’ is the ID number and ‘yy’ is the picture number. This matches the names of the XML backup recipes that are written during save to the database (DB-xx.XML). This scheme helps avoid picture ownership conflicts where an old recipe numbered file name could match the ID number of a database recipe. This means that an older version of INSIGHT can open the XML recipe and see the pictures.

Some things to note:

- Historically you could add a picture to a new recipe before saving it because new recipes were auto-assigned an ID number by INSIGHT (the picture file existed in the *Recipe Files Folder* before the recipe file itself). If you then quit INSIGHT without saving the recipe the picture was orphaned and appear in the empty

recipe next time you started INSIGHT. However, with the recipe database the situation is different. If a recipe has no ID number or file name, INSIGHT will not let you assign a picture.

If you use the *Copy button* (or the *Copy Recipe* and *Paste Recipe* menu items) to duplicate a recipe, pictures do not get copied since a picture file can belong to only one recipe.

- When you delete a picture its file is simply erased. The next time you add a picture to the same recipe the deleted picture name will be used first and the new one will assume that place in the list of pictures.

Other recommendations

- Learn how to use your photo editing program to inspect the dot size of images, to crop, to add on-picture labels, to set the desired magnification.

- Although any size image can be attached, in the interests of storage space, program speed and ease of backup, we recommend smaller images (1000 dots wide or less) or a size that will display without too much clipping using your preferred INSIGHT window size. Using your photo editing software, crop out the unneeded parts of the image. If you do not have image editing software, try the excellent online image editor, <http://pixlr.com>. Choose the *Advanced Editor*, then choose *Open Image From Computer*, then point it to the image file on your computer, use the cropping tool, then choose *Save* in the *File* menu to save it back to your computer.

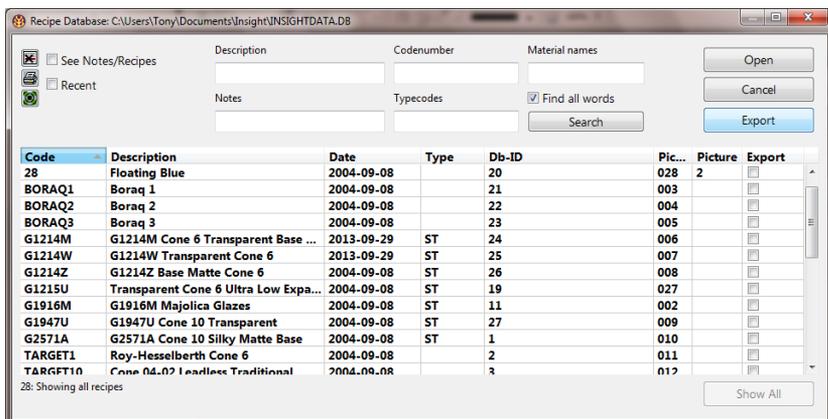
- Set the degree of compression in your JPG images lower to minimize storage space, for continuous tone images (without text or sudden changes in color) quality remains very high even for medium quality settings on most software.

- You can't transfer file system pictures from one recipe to the other (unless of course you bypass INSIGHT and manually rename the picture file to match the destination recipes file name).

- On OSX you can drag a picture and drop it on the desktop to make a clipping.

Recipe Database Window

(Formerly the *Recipe Open Dialog*) This dialog was redesigned for version 2008-6 in April 2008 when we introduced SQL database storage. It adds a lot of searching functions and is much faster and eliminates the need for a cache.



This resizable window is used to find and open database recipe files (those stored in the database; see the section on Database and File system Recipes).

To open this dialog:

- Use the *Open menu* item, or click  to the left of the *Recipe List*.

To open a recipe:

- Double click its line, or click the line and then click the *Open* button.

To find a recipe:

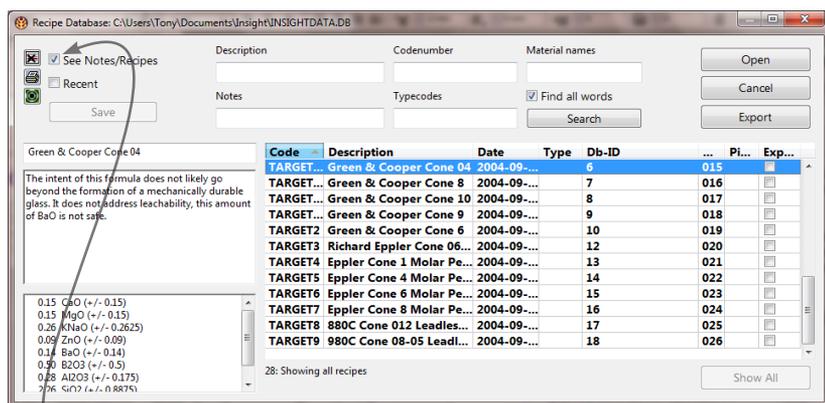
Key words or part-words into the *Typecodes*, *Description*, *Code Number*, *Notes* or *Material names* blanks. The search is live and fast and will be redone as you type each letter (the *Material names* blank is not live, you need click Search). If you do not check the *Find All Words* checkbox it finds any of the words. If you enter words to search in more than one of the blanks, the search only shows recipes that match all the searches.

Typecodes are setup in the *Overrides/Typecodes dialog* and assigned to recipes on the *Recipe Details* tab in the *Recipe window*. They provide a way to classify one recipe into a number of different categories.

Words in the search blanks are persistent, they will be remembered next time you open this window or click the *Show All* button.

The SQL Statement

INSIGHT creates an SQL search statement from what you enter in the search blank and displays it on the bottom of this window (this is informative if you know about SQL databases). Use the *Show All* button beside it to clear all the search fields in one step (the SQL statement will also clear).



Notes and Recipe View

Click the *See Notes/Recipes* checkbox to change the window to this alternate view where you can see more information about each recipe and edit names and notes.

- Click a line to preview its notes and recipe on the left.
- Change the notes or title of a recipe and use the *Save* button to record the changes.

Other Controls

Recent check box: Show recently opened recipes.



Click this to delete a recipe.



Click this to produce a report of the recipes shown in the list (use the search controls to shorten the list). INSIGHT uses the customizable *CustomRecipeListing.template* file to create the report.



View only target recipes (click this again or the *Show All* button to see them all).

Export Button

Export the checked recipes to a recipe library file (these can be read by Insight-live.com and also viewing (in Insight in the recipe library window). The checkboxes are in the last column, if they are not visible widen the window or adjust the columns to bring them into view. There is a *Check All* button at the bottom (if you want to export them all).

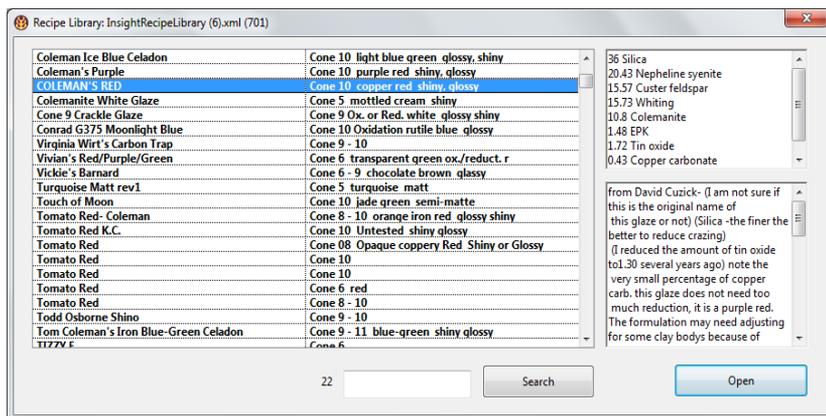
The List

Use the search controls provided to shorten the list. Sort (and group) by clicking column headers. If you adjust the widths of columns your changes will be remembered. The last *Picture* column indicates the presence of pictures for the recipe.

The columns match various blanks in the *Recipe Details* tab. The *Db-ID* is the database ID, a unique key assigned by the database when a recipe is created. INSIGHT also uses this key as the file name when creating a backup XML recipe file each time you save. The *Pic-ID* is used to link pictures to each recipe. Thus, if a recipe has a *Pic-ID* of 'DB-72', that means picture files will be named 'DB-72-x.jpg' (where *x* is the picture number). The *Db-ID* and *Pic-ID* will match when new recipes are created, but for imported recipes, the *Pic-ID* will match the original ID number. Notice also that where an old ID number was only digits INSIGHT left-pads with zeros (to make the list sort properly for that column).

Recipe Library Dialog

This resizable dialog appears when you open *XML Recipe Library File* from the *File menu*. Recipe libraries are exported at Insight-live.com. They have the same structure as a standard XML Insight



recipe file, except they contain multiple recipes (thousands are possible). Recipe libraries are read only, they are a good way to compare and investigate recipes without actually importing them into Insight. If you save the recipe after opening it it will be written to the SQLite database (or to a file if you choose to do that).

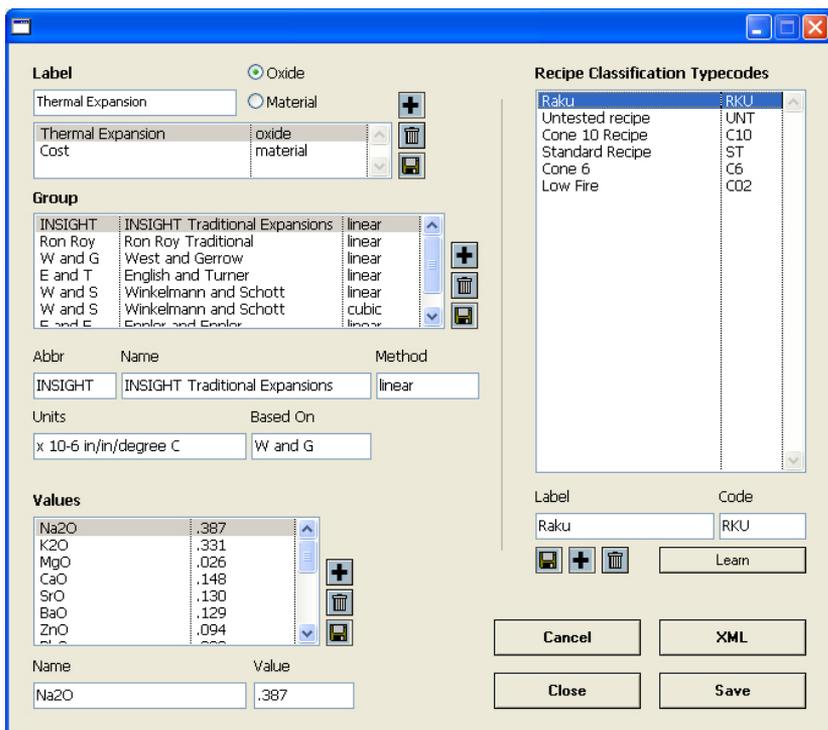
The title bar will show the file name of the recipe library file. As you click on any individual recipes (or move up and down with the arrow keys) a preview of the materials and amounts will appear on the upper right and the notes on the lower right. The search function will look for the phrase you type in the recipe title, description, notes and materials in the recipe (thus doing a very thorough search).

A good example of the usefulness of this feature is downloading reference batch '-1' at Insight-live.com (these are the recipes in the Clayart database). Some example searches might be:

- "Gerstley Borate" - more than 500 of the recipes have it!
- "terra cotta" for recipes that work on terra cotta bodies.
- "Copper red", "transparent".
- "Tom Coleman".

Overrides/Typecodes Dialog

This dialog is used to control the contents of the Overrides.XML file that INSIGHT reads. It looks for this file in the *INSIGHT Documents Folder* (as specified in the *Preferences dialog*). INSIGHT reads the overrides file (**unless you choose to ignore it in preferences**) after reading a materials database file (and optional override MDT file). Items maintained in this dialog thus override oxide expansion, material cost and recipe classification information found in the public database.



See the section on our materials database approach for related information.

There are two halves, the left is used to edit oxide and materials properties and the right side is used to edit and import recipe typecodes (used to classify recipes in the *Recipe window*).

Label Oxide Material

Thermal Expansion

Thermal Expansion	oxide
Cost	material

Group

INSIGHT	INSIGHT Traditional Expansions	linear
Ron Roy	Ron Roy Traditional	linear
W and G	West and Gerrow	linear
E and T	English and Turner	linear
W and S	Winkelmann and Schott	linear
W and S	Winkelmann and Schott	cubic
E and E	Enler and Enler	linear

Abbr	Name	Method
INSIGHT	INSIGHT Traditional Expansions	linear

Units: x 10⁻⁶ in/in/degree C Based On: W and G

Values

Na2O	.387
K2O	.331
MgO	.026
CaO	.148
SrO	.130
BaO	.129
ZnO	.094
SiO2	.088

Name	Value
Na2O	.387

Properties have a label with subsidiary groups that in turn have one or more value items. This dialog presents this as a three-level hierarchy. You can edit, add and remove items at any of these three levels using the blanks and buttons provided. When you select any item in the upper two lists the lower one(s) reconfigure accordingly.

As shipped INSIGHT defines only one oxide and one material property and you cannot add more (this will change in future).

Left Side

Thermal Expansion: We have included many sets of values (these vary because they are from different sources or measured differently) and each set is defined as a “Group” and the *abbreviation, name, method, units, based on* and *divisor* values are set accordingly. Within each group you can define thermal expansion values for individual oxides. The divisor is used to move the decimal right or left on the final calculated value.

We intend that you treat the calculated expansion values as relative (not absolute). There are many factors that affect how close they calculate to the actual. To be aware of the limitations and proper use, please check the Insight FAQ.

Label Oxide Material

Cost

Thermal Expansion	oxide	
Cost	material	

Group

Cost	Cost at Location 1	USA\$
------	--------------------	-------

Abbr: Cost Name: Cost at Location 1 Method: USA\$

Units: lb Based On: Mar 2006

Values

Custer Feldspar	0.40
Kaolin	0.35
Whiting	0.25

Name: Whiting Value: 0.25

Cost: We suggest using the *Method* blank for the currency, *Name* for the location at which the costs are valid and *Based On* for the date the cost group list was last edited. Most users will use one cost group, however if you are operating a number of locations you can setup different costs for each one.

Chemistry Recipe Details Notes Pictures

Calculation Type 1 2 Reduction Fired

RO Unity

Materials Table: STANDARD.XML

COE Set: INSIGHT x 10⁻⁶ in/in/degree C - linear

Item	1
Formula Wei...	345.67
Si:Al Ratio	6.87
SiB:Al Ratio	7.60
Thermal Exp...	7.68
Cost/lb	0.22
Calculated LOI	10.01
Imposed LOI	10.01

This is the *Chemistry* tab in the *Recipe window*. You can see the INSIGHT group of thermal expansion numbers are selected on the lower left and the *Cost/lb* and *Thermal Expansion* are being calculated in the calculated items list.

Recipe Classification Typecodes

Raku	RKU
Untested recipe	UNT
High Temperature	HF
Standard Shop Recipe	ST
Medium Temperature	MT
Low Temperature	LF

Label Code

High Temperature HF

Right Side

The *Overrides dialog* is also employed to set up the typecodes used to classify recipes (these are also stored in the Overrides XML file). In addition, they are an override in the sense that foreign typecodes may be stored in recipe files and this dialog will eventually provide an override mechanism to map them to local codes.

Use the *Save*, *Add* and *Delete* buttons to add, edit and delete codes. The *Learn* button is used to scan the recipe database and add any codes that are not already defined.

In the *Recipe Details* tab of the *Recipe window* you can use the pop-up *Typecodes* list to assign and remove typecodes for a recipe (they show in the blank immediately

below).

Chemistry **Recipe Details** Notes Pictures

Recipe File Name
28.XML

Description
Floating Blue

Typecodes
C6 ST

Buttons at the Bottom

XML: Launch the system web browser to view the OVERRIDES.XML file this dialog creates.

Cancel: Close this dialog and do not save any changes for this or subsequent sessions.

Close: Close this dialog and save the information until the

end of this session only.

Save: Close this dialog and save the change for this and subsequent sessions.

Enter Formula Dialog

Any existing recipe is completely replaced by the new analysis.

INSIGHT converts the formula to its equivalent analysis, calculates the formula weight, taking into account any LOI you may have set, then replaces the recipe in the current recipe area with that analysis.

To open this dialog select *Enter Formula* in the *Calc* menu.

Convert Formula to Analysis		
LOI	BaO	TiO2
0	CaO .65	P2O5
	PbO	--
	Li2O	B2O3
	MgO .05	Al2O3 .4
	K2O .15	SiO2 .4
	Na2O .1	
	ZnO .05	
	SrO	
	--	
	--	
	ZrO2	
	Fe2O3	
	MnO	

Formulas on the clipboard should be formatted with the oxide names followed by the amounts on each line.

Click *Paste* to interpret a formula on the clipboard.

To clear the blanks, click *Clear* (this dialog maintains values between invocations).

This function is also useful to insert a formula in one recipe area for a reference when doing a formula-to-recipe derivation in the other. For materials that have an LOI, this dialog can be used to create an analysis for insertion into the MDT.

Cautions

If the formula you are entering is intrinsically one kind of unity and the recipe area is set to use another, then the data inserted into the *Formula List* in the *Recipe window* will be different that the formula you enter.

If the formula you are entering is not or not quite unity (even if you set INSIGHT to a no-unity setting), the *Formula List* will differ from the formula you enter because INSIGHT recalculates the analysis to 100.

These factors are not serious however since the basic integrity of the formula is not in question, only its unity.

Up-to-date Materials Information Using XML

To learn more about XML visit XML.com on the internet. XML is changing the information world and major efforts are underway in all industries and sectors of government and business to standardize dialects of XML for information exchange.

Capturing constantly changing material information while providing users with the ability to customize parts of that material information is a real challenge. At Digitalfire we have maintained a ceramic database called 4Sight since 1990. It has always had much greater information storage capacity and flexibility than calculation-targeted INSIGHT. In recent years we have found a way to unify the two products using the internet. In 2001 we converted the old 4Sight DOS application into a webserver based product. That made it possible for the internet to be a link between the calculation world of INSIGHT and the information world of 4Sight.

Starting in 2002 we began focusing all material description efforts at <http://www.ceramicmaterials.info> (and [ceramicmaterials.com](http://www.ceramicmaterials.com)). We built this site using 4Sight Server. It complemented INSIGHT so that users could get detailed information on materials and oxides and generate a fresh materials file for their part of the world. In 2008 the content of this site was moved and expanded onto the [digitalfire.com](http://www.digitalfire.com) site (to share the same login) and called the *Digitalfire Reference Library*. There are 16 areas with thousands of inter and intra area interconnects. [Digitalfire.com](http://www.digitalfire.com) is now the home of the reference library.

INSIGHT also sends users to the *Digitalfire Reference Library* as appropriate when they ask for detailed property information about a material or oxide or when they click on oxide or material links in HTML reports.

INSIGHT can interpret XML format materials information from the web site on a material-by-material basis. This enables visitors to copy the XML text from a materials page and paste it into the XML box in the *Materials dialog* of INSIGHT (thus adding a material to INSIGHT's materials database). The information about each material at the web site is much more extensive than what INSIGHT can accommodate, however desktop INSIGHT only takes note of the portions of the material information that it needs

More About XML

XML is an elegant data format for storage and transfer of complex interrelated information. At Digitalfire we have developed an XML specification for the description of materials, recipes, oxides, tests, properties, etc. Since XML is just text, it can be included in the text of an e-mail.

and ignore the rest.

The INSIGHT installer includes a file named *Overrides.XML*. It defines overrides to information INSIGHT reads from the materials files and it is always read after a materials file is read. At this time it contains thermal expansion number sets, material costs and recipe typecodes. Expansion numbers replace existing ones as a set whereas materials costs replace existing ones on a one-to-one basis.

To view the information in the *Overrides.XML* file use the INSIGHT *Oxides/Materials Overrides* report. You can edit the information using the *Overrides/Typecodes dialog*.

We believe that this over ride strategy provides the best of both worlds. You can keep INSIGHT up-to-date with the latest information on materials while maintaining your own personal material cost amounts. The over rides file is not replaced during Windows update install of INSIGHT. Macintosh and Linux versions are installed manually, so leave the existing file intact if you have made changes.

The Materials Definition Table

The Materials Definition Table (MDT) is the central entity around which INSIGHT performs all calculations. It can hold 500 materials at this time.

The MDT is divided into two sections. The first lists the oxides supported and the second contains the materials whose chemistry is defined in terms of these oxides. The MDT defines both materials and oxides using the same format, thus it treats each oxide as if it were available as a powdered pure material (INSIGHT considers an analysis a ‘recipe of oxides’). The *Oxides dialog* is provided to maintain oxides in the first 50 records of the table and the *Materials dialog* is supplied to work on the remaining ones. Normally not all 50 oxide records will be used so there will be some room between the top of the oxides section and the bottom of the materials.

The MDT is a data structure that can be brought entirely into memory. While this limits the number of materials it can hold, it results in lightning-fast calculations (a priority of INSIGHT). The order in which materials occur is unimportant to INSIGHT’s search method. Regardless, INSIGHT can sort the table alphabetically each time you save it (unless you tell it otherwise in the *Preferences dialog*). We suggest you keep the number of materials to a minimum if you decide to maintain your own materials table.

If you need a listing of the MDT INSIGHT has a report for this purpose.

Please read the section “*Up-to-date Materials Information Using XML*” for more information. This section describes the strategy we are following to deal with the dilemma of keeping material information up-to-date automatically while still providing the ability to maintain location-specific data constant. The *Overrides.XML* file in the *INSIGHT Documents Folder* contains cost and thermal expansion values that override those in the materials table. Use the *Overrides/Typecodes dialog* to edit them.

Materials Dialog

Browse and edit materials in the MDT.

The screenshot shows the 'Materials Definitions' dialog box for a file named 'STANDARD.XML' containing 245 materials. The title bar includes 'Utility Edit Sync' and standard window controls. The main area is titled 'Albarta Slip' and contains several input fields and a list of material types.

Material Information:

- Alternate Names: Archie Bray Slip
- Weight: 383.4123
- LOI: 9.30
- Formula Weight: 347.76
- Cost/lb-USA\$: 0.45
- Thermal Expansion: 7.08665
- Types: 6

Material Type Selection:

- Choose type: [Dropdown]
- Number: 4
- Filter: [Text]
- Having: any oxide
- Update Recipe Line: [Button]

Chemical Analysis Table:

Formula	%	Analysis
BaO		CoO
CaO	0.440	6.4
CaO		Cr2O3
Li2O		Fe2O3
Li2O		0.120
		5.0
MgO	0.290	3.0
MgO		FeO
K2O	0.120	2.9
K2O		MnO
Na2O	0.140	2.3
Na2O		MnO2
ZnO		NI
ZnO		NI
SrO		ZrO2
F		
P2O5		
PbO		
TiO2	0.020	0.4
Al2O3	0.520	13.8
B2O3		
SiO2	3.620	56.7

Buttons at the bottom: OK, Save, Done.

Note: Since INSIGHT can store materials in CSV files, you have the option of managing your materials externally using Microsoft Excel, Open Office Calc, etc. (this dialog would only be needed as a material picker when entering recipes).

Collectively the information in this dialog embodies the “definition” of a material.

If you call this dialog using the *MDT* button on the *Recipe window* or by double-clicking a recipe line, it will be positioned at the material linked to the line. Otherwise it will be positioned either at the first material in the materials section of the MDT or at the one you last viewed.

Materials List

Click any item in the list to display its definition for viewing or editing. After clicking in the list you can use the arrow keys to move up and down the list.

Name and Alternate Names

Key in a unique full name in the first blank. When INSIGHT searches the MDT looking for materials named in a recipe it looks here. For example, if “3134” appears in the *Materials Lookup* of a recipe line INSIGHT will successfully match this with the material “FRIT 3134” because the former occurs within the latter.

To increase the likelihood of a find, you can optionally fill in a short sequence in the *alternate names* blank. In the event of a failed search for a material INSIGHT goes through the MDT and tests whether each comma separated item occurs within the material name being sought.

There is a need for caution: For example, if you enter “313” so that ‘Frit 313’ will always be found INSIGHT could mistakenly match ‘Frit 3134’ (because it also contains the sequence “313”).

Info Button (Level 2 only)

INSIGHT will take you to the information page for this material at the *Digitalfire Reference Library* website.

Formula Weight

This is the weight of the mix of oxide molecules in the formula area. INSIGHT does not calculate this item, it expects you to supply it on an LOI-adjusted basis. Thus you must pay special attention if your material has a weight loss on firing. This means that 100 grams of the raw material supplies less than 100 grams of oxide for your glaze. The weight that you enter here must take this into account.

Actually, INSIGHT can help you here. If the material has an LOI key it into the adjoining LOI blank and press the *Return* key INSIGHT will calculate the weight.

LOI

This is both a calculated and data item. If you fill in the LOI-adjusted weight in the adjoining weight blank and press the *Return* key, INSIGHT calculates the LOI and displays it here. If you fill in this and press the *Return* key INSIGHT calculates and LOI-adjusts the weight.

You do not need to worry about LOI too much on materials like frits and feldspars, but it is very significant for clays and carbonates.

Calcium Feldspar 

Alternate Names
Lime Spar, Lime Feldspar, Ca-Feldspar

Weight	LOI	Molecular Weight	
518.4843	0.00	518.48	<input type="button" value="Set"/>

Set LOI Button

When you press this INSIGHT tells you how to use the LOI blank to LOI-adjust the formula weight.

Again, INSIGHT uses the LOI value to ad-

just the calculated formula weight, dividing it by $(100 - \text{LOI})/100$. For example, if the LOI of Material A is 5% and it's calculated formula weight is 120, then the adjusted formula weight would be $120 / ((100 - 5) / 100)$ or 126.3. This means that because of the 5% loss in weight on firing, only 95% of the material is actually sourcing oxides used in glass building. If we use 126.3 as the weight instead of 120, INSIGHT will calculate the correct oxide yield.

Molecular Weight Calculation

INSIGHT displays the molecular weight, that is, the weight of the mix of oxide molecules only (without LOI).

Cost per weight unit (calculated)

INSIGHT stores a calculated property value (Cost/Kg as shipped) with each material in the materials database (MDT) as well as a name to label values. If you wish to change this label (to "Cost/lb" for example) edit the MDT file using a text editor (the line in question is near the top).

However if the file *Overrides.XML* is present in the *INSIGHT Documents Folder*, the property label comes from there and individual cost values are selectively overridden. The *Oxide/Material Overrides* report shows what material costs are being overridden. Use the *Overrides/Typecodes dialog* to manage the *Overrides.XML* file.

See the section: *Up-to-date Materials Information Using XML* for more information.

Calcium Feldspar 

Alternate Names

Weight LOI Molecular Weight

Cost/lb-USA\$ Thermal Expansion

Types

Thermal Expansion

Co-efficient calculated from the material chemistry.

Material Type

Materials can be classified in the MDT and each material can be a member of multiple types. Key in a comma-separated list of types. You can see the type numbers in the pop-up list below this

item. When you download an MDT from the Digitalfire Reference site these codes are all preset according to the classification of materials on the site.

Material Search Controls

You can limit the list of displayed materials using these controls. It is valuable to be able to do this when you are using the materials dialog as a tool to find materials for insertion into recipes.

Choose type

Bone Ash	<input type="button" value="^"/>
Boraq	
Boraq 2	
Boraq 3	
Borax	
Borax Decahydrate	
Borax Pentahydrate	
Boric Acid	
Boric Oxide	
C & C Ball Clay	
Cadycal	
Calcined Alumina	<input type="button" value="v"/>

Number

Filter

Having

By Type

Choose the type from the drop down list and the material list will immediately redisplay. If you download your MDT from the Digitalfire Reference Library it will have more types and each material will likely belong to more than one type.

By Record Number

Key the material record number and click to go to it regardless of other active searches.

By Name

Enter a word into the *Filter* blank and click  to show only materials whose names contain the word. This filter is additive to the *Having* list box (both are respected during compilation of the list). However it is exclusive of the type drop-down list.

Having List box

Select an oxide and display only materials containing that oxide.

Update Recipe Line Button

Close this dialog and enter the name for the displayed MDT record into the *Materials Lookup blank* in the *Recipe window*. This button is the key to being able to use the *Materials dialog* as a material picker (when you are not sure what material to use to supply an oxide).

The Formula

INSIGHT stores the formula of each material as part of its definition. Each oxide is listed, key the formula numbers in the appropriate blanks. INSIGHT stores molecular amounts to 6 decimal places (although it displays fewer). Remember, you must enter a formula here, not an analyses (this is not the case if you are managing your materials in a CSV file, it holds analysis numbers).

OK and Save Buttons

Saving is a two-stage process. The *OK* button saves changes to the material record into memory for the rest of the current session. The *Save* button does a permanent save of the entire MDT.

Done Button

Close the dialog. If changes have been made to the displayed record you will be reminded about saving.

Materials Dialog Menu Items

Download Ron Roy MDT

Opens your web browser at the page at the Digitalfire Reference Library relating to this MDT.

Interpret XML

Displays a dialog showing the XML for the current material. It has an Interpret button to enable you to paste in XML from the Digitalfire Reference Library to replace the definition of the current material.

Upload to 4Sight Server

Documented in 4Sight Server.

Get Formula From Recipe Calculation

Replace the chemistry of the current material with the calculated chemistry of the current recipe in the Recipe window.

Export MDT as CSV

INSIGHT will present a file window (enabling you to provide a filename and specify a folder). It will then write a CSV (comma-separated-values with double-quote delimiters) spreadsheet file of the current materials table (for information on this file format, working with it and its advantages and limitations visit: http://en.wikipedia.org/wiki/Comma-separated_values).

CSV files have no formatting, just text and numbers (formatting will be lost on save).

Use this menu item to create a CSV copy of an existing XML or TMT materials table file. Put it into the *INSIGHT Documents Folder*, this is where INSIGHT looks for materials files.

The item is intended to work in consort with the *Edit CSV* button in the *Materials dialog*. That button is available if INSIGHT has a CSV materials file

The screenshot shows a Microsoft Excel spreadsheet titled 'NHIA%20glazes.xls'. The active cell is A1, containing 'Nuka White'. The spreadsheet contains a table with columns A, B, and C. Row 1 has 'Nuka White' in column A and '%' in column B. Row 2 has 'lbs' in column C. Rows 3-11 list various materials with their percentages in column B and values in column C. Row 12 contains a note: 'Note: This recipe is not John Baym...'.

	A	B	C
1	Nuka White	%	
2			lbs
3	G200 Feldspar	34.20	27.36
4	Whiting	21.30	17.04
5	Talc	1.95	1.56
6	Bone Ash	1.97	1.58
7	OM 4 Ball Clay	5.42	4.34
8	Flint	32.20	25.76
9	Frit 3124	2.95	2.36
10		99.99	
11	Titanium	3	2.4
12	Note: This recipe is not John Baym...		

open. When you click it INSIGHT will then ask your operating system to open the file in your spreadsheet program.

Cautions

- You can edit the sheet in Excel (or compatible spreadsheet programs) using all of its tools and then resave as a CSV file. However note that there is no link between Excel and INSIGHT. If you change a file in Excel, INSIGHT does not know it has changed. Thus, depending on the way you are doing it, you may need to restart INSIGHT, click the *Read* button in the materials dialog or choose a different MDT and then reselect the CSV one to force a re-read.
- When editing a CSV file in Excel do not alter the structure. However you can change the order of the oxide columns and material rows.

All of the information normally written into a standard XML materials file is included in the CSV file (it is a visual mirror of the way INSIGHT stores the information internally). An important difference (and advantage) over traditional materials files is that the chemistry of the materials is written as percentage analyses rather than as formulas. Also, the LOI is recorded as a percent rather than being implied from the formula weight.

Importing Many Materials Into INSIGHT

You can use this to create a starter CSV file, then in Excel delete all the materials you do not need, sort the oxides into the order you want and then add material rows.

Comparing MDT Files

Use the following procedure:

- Save each MDT to a separate CSV file, close INSIGHT and open both in your spreadsheet program.
- Insert a column on the left of each and fill the number 1 into the first column of the first worksheet beside each material. Do the same with the second using the number 2.
- Tile the windows one above the other and insert blank columns and move oxide columns as needed to make both the same.
- Copy the materials from one and paste below the other.
- Sort the entire list using column two as the primary key and column 1 as the secondary.
- Insert rows and move rows as needed to pair up any like-ma-

terials that are not consecutive.

Now you will have pairs of materials from each sheet in an easy-to-compare format.

Edit CSV

Available only if the currently selected MDT is a CSV file. INSIGHT will ask the operating system to open the CSV file. It will be successful if you have software (such as Microsoft Excel, SoftMaker PlanMaker or Open Office Calc) installed that knows how to open a file with a name like xxxxx.csv. Depending on your spreadsheet software it might present a dialog asking you how to interpret the CSV file. It is comma separated and uses double quote delimiters (as written and read by INSIGHT).

Save MDT as XML

INSIGHT presents a file window enabling you to save the current in-memory materials database to an XML format file (this has been the default type of materials file for some years).

Save MDT as XML Starter

This differs from the above in that INSIGHT saves only one material, the first one, into the XML file (all of the oxides in the currently open MDT are also saved in the starter MDT). It is assumed you will be opening this MDT and replacing the first record and adding more to create a completely custom MDT.

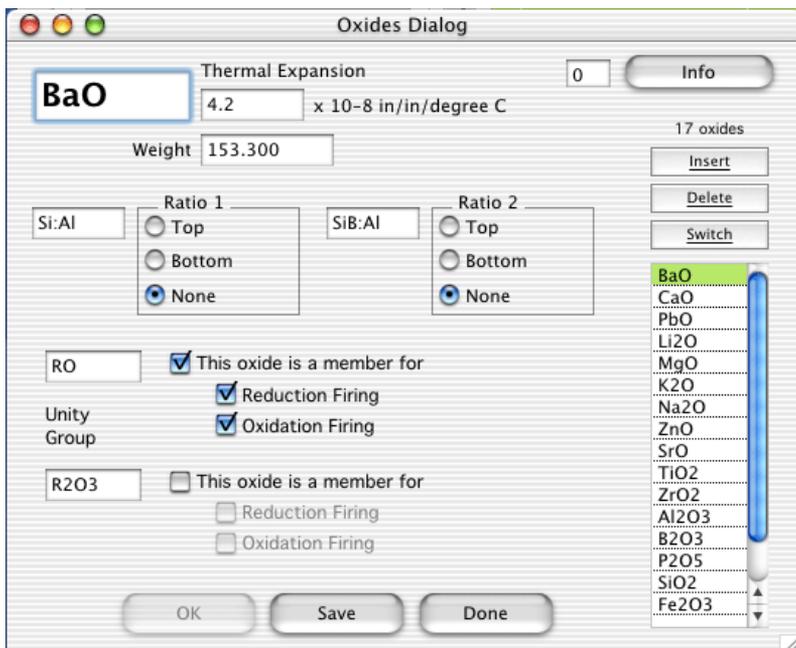
If you name any MDT as mymaterials.xml and save it in the MDT folder INSIGHT will open it automatically as a second overriding MDT on startup. This capability enables you to download an MDT from the Digitalfire website and have a second one that adds your custom or proprietary materials.

Exit Materials Dialog

Close this dialog and display the Recipe window.

Oxides Dialog

The dialog enables you to change items associated with each oxide defined in your MDT. Oxides occupy MDT slots just like materials, but they are restricted to the first thirty records (see the section “The INSIGHT MDT”).



Summon this dialog by double-clicking an oxide in the *Formula List* of the *Recipe window* or selecting *Edit Oxides* from the *Utility menu*. The former positions the dialog at the selected oxide, the latter at the record active when the window was last closed.

INSIGHT is shipped with an MDT adequate for most users. You may want to change the unity and ratio settings of oxides from time to time or add another oxide. Remember to click the *Save* button (if you move to another record or close the dialog changes made to an oxide are lost).

When using the *Insert* and *Delete buttons* to add or delete oxides do not delete ones referenced by materials (all oxides in the shipped version are referenced by materials). Also use up free spaces in the oxide list before adding

new ones).

The record number is shown on the upper right. If you key another and press <Enter> INSIGHT will range-check your entry and go to that record.

INSIGHT allocates a fixed 50-record pool for oxides, usually not all of these are used. You therefore cannot visit unused records between the last oxide record and number 50.

Oxide List

Click a line to view or edit and oxide.

	Expan	Weight
BaO	0.129	153.300

Oxide Name

Keep this name as short as possible, since it is used to title oxide columns in reports. All MDT materials are defined in terms of these oxide names.

Thermal Expansion (Calculated Property Value)

INSIGHT stores a calculated property value (thermal expansion) with each material in the materials database (MDT) as well as a name to label values. If you wish to change this label edit the MDT file using a text editor (the line in question is near the top). You can change the actual value for expansion for each material here.

Note: The value you enter here might not be the one INSIGHT uses. If the file Overrides.XML is present in the *INSIGHT Documents Folder*, the property label and individual expansion values are selectively overridden from there. The *Oxide/Material Overrides* report shows the expansion data from the over rides file. Use the *Overrides/Typecodes dialog* to maintain the Overrides.XML file. For more information about XML, check the index of this manual.

See the section: *Up-to-date Materials Information Using XML* for more information.

Oxide Weight

The sum of the atomic weights of all the atoms in the molecule.

The Ratio Option Buttons

This ratio is the result of a division where the total number of molecules in the *Top* subgroup are divided by the total number of molecules in the *Bottom* subgroup. Each selection determines the oxide's role in the corresponding ratio equation used at calculation-time to produce the ratio value (displayed in the *Calculated Items List*). The three possible settings are *Top* or *Bottom* of the equation, and *Non-participant*.

Ratios of one oxide group to another can be valuable in predicting a variety of glaze behaviors including matte-ness/gloss, lead solubility, color development, etc.

Unity Check boxes

INSIGHT “unifies” formulas by multiplying the amount of every oxide by a number that forces the group sum to 1. A typical Seger formula, for example, will have the *RO* group unified.

This section of the *Oxides dialog* enables you to configure which oxides are part of the two unity groups INSIGHT supports (you pick the desired unity group using the *Calculation Type* control). You control which oxides are members of each group and the conditions under which they are members.

If either membership box in this dialog is checked, the oxide participates in the corresponding unity group during calculations if one of its ‘atmosphere’ (reduction or oxidation) check boxes is checked. To unify an oxide for oxidation firings only uncheck *Reduction Firing*. Future versions will also let you set a temperature threshold at which an oxide participates in unity.

INSIGHT indicates which oxides participate in unity by

displaying an asterisk next to their amounts in the *Formula List* (unity calculations only).

OK and Save Buttons

Saving is a two-stage process. The *OK* button saves changes for the rest of the current session. The *Save* button initiates a permanent save-to-disk of the entire MDT.

Done Button

Close the dialog. If changes have been made to the displayed record you will be reminded about saving them for the rest of the session.

Info Button

INSIGHT will take you to the information page for this oxide at the *Digitalfire Reference Library* website.

Delete and Insert Buttons

Remove or add an oxide. Important: INSIGHT does not prevent you from removing an oxide if materials contain that oxide.

Switch button

Switches the selected oxide with the next one in the list. Use this to reorder the list. When reordering we suggest you work on a copy of the MDT.

Supply Oxide Dialog

The *Supply Oxide* dialog provides a very integrated and elegant way to specify the amount of a material for a recipe line, you can tell INSIGHT how much of one of its oxides

is needed and INSIGHT fills the correct weight amount into the recipe line. When used in consort with a target recipe it defaults the amounts needed for each oxide.

This dialog is used mainly for formula to batch calculations and can be summoned by clicking the *Supply Oxide* button in the *Recipe window* (or with *Supply Oxide* in the *Calc menu*).

Buttons for all oxides are displayed with only those supplied in the source material available

for selection. Click an oxide and the *Molecules Present* will update.

This dialog is only available if the selected recipe is set at non-unity calculation type. If the other area contains a recipe or analysis this dialog will use its formula to default the *Molecules Needed*.

When you click the *Done* button, it subtracts the molecules present from molecules needed, then calculates the amount of the material required to yield the target number of molecules of the chosen oxide. Finally it updates the recipe line to reflect this.

While the formula-to-batch process could be more automated, we feel our approach is a good compromise because it gives you total control over which materials are used to supply the oxides needed, and it helps users keep in touch with the principles involved. In addition, this dialog can be used at any time, you can think of it as an alternative to the *Update Line* button for entering materials by oxide rather than batch amount.

There is a chapter in the lessons section on the use of this dialog.

Remember that materials are selected for other reasons besides just their chemistry.

XML Dialogs

XML is a data format for storage and sharing of interrelated and hierarchical information and INSIGHT's core use of it is its most important feature and the key to future interaction between INSIGHT users and with the Digitalfire Reference Database website. Major efforts are underway in all industries and sectors of government and business to standardize XML specifications. To learn more about XML visit XML.com. We have developed XML specifications for a wide variety of ceramic materials, testing and process related information.

Recipe XML Dialog

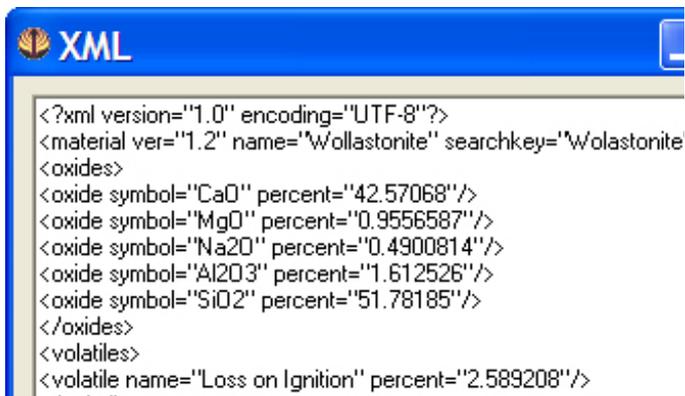
Choose XML in the *Utility menu* to display this dialog



(the XML for current recipe, picture content is not currently supported). If you are e-mailing this make sure the receiving e-mail program is not corrupting the XML by inserting or changing characters.

You can also copy the XML from one recipe, edit, and then interpret it (this is one way to add a new recipe that is similar to another).

Material XML Dialog



When you click the XML button in the *Materials dialog* you will see the XML representation of the current material. You can

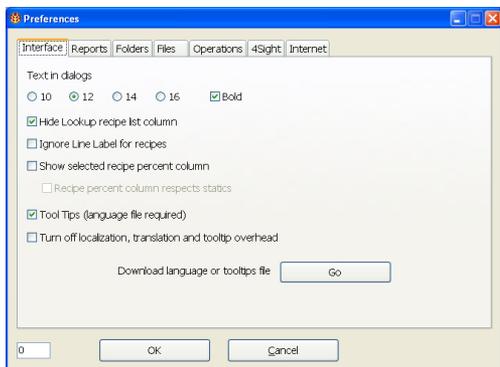
paste material XML (from Digitalfire Reference Database website) into this text box (by clicking in the box and pressing Ctrl-V or Option-V) and click the *Interpret* button to update the material record. You can also copy the XML from one material record, paste it into another, edit, and then interpret it (a good way to add a new material that is similar to another).

Note: After clicking *Interpret* you must click the *OK* button to save the record.

Note: INSIGHT expects the XML to describe the chemistry of a material as a chemical analysis however INSIGHT stores materials in formula format. When doing the conversion INSIGHT recalculates the formula to Mole% (instead of unifying it) to save the material with better accuracy on the smaller amount oxides. You will notice that the formula weight is higher than typical. If you want to see a material as a formula, enter it into an empty recipe (you can do this quickly by clicking the *Update Recipe Line* button in this dialog).

See section on *Up-to-date Material Information Using XML* for more information.

Preferences Dialog



This dialog maintains settings stored in the 'INSIGHT_YYYY_Preferences.XML' file. It is written to the Insight data folder.

Interface Tab

Text in Dialogs

Use this section to control the size of text in INSIGHT windows. INSIGHT does not set all controls at the exact size you specify for cosmetic reasons.

Hide Lookup recipe list column

Each recipe line has a label and a lookup value. The latter is used to try to find chemistry information for the material in the materials database. It is handy to display the lookup so you always have visual confirmation that the chemistry for a line is what you intend. The display of recipe percentages in the this column takes precedence over this.

Ignore Line Label for recipes

INSIGHT will hide the *Line Label* blank in the *Recipe window* and use the *Materials Lookup blank* for both lookup and labelling recipe lines. INSIGHT will also ignore line label information when it opens recipes.

Show selected recipe percent column

INSIGHT will display a fourth column in the *Recipe List* and use it to display the percentage of each item in the selected recipe. Use this to watch percents as you adjust recipes that do not total 100. This check box takes pre-

cedence over the display of lookups in the material list.

Recipe Percent Column Respects Statics

INSIGHT will disregard static materials when showing percentages of each recipe line. You must have the above checked to see this.

Tooltips

These are little help tips that pop-up when you allow the cursor to dwell on a control. On Macintosh OS8/9 you also need to turn on Balloon Help for them to display. Tooltips are stored in a language file in the INSIGHT program folder (e.g. english.lng, german.lng).

Turn Off localization and tooltip overhead

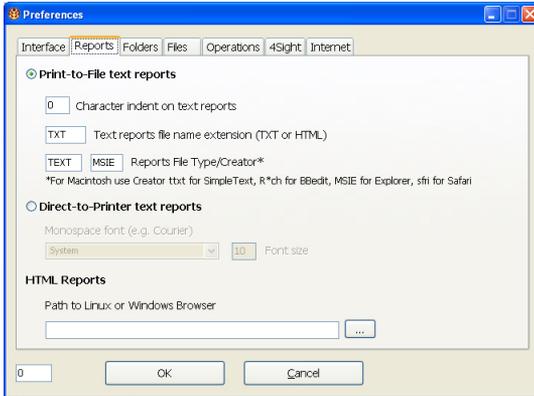
If you are using INSIGHT in English you can check this to prevent INSIGHT from attempted to search for and set dialog controls for a language.

Refocus to Lookup when clicking recipe list

Historically INSIGHT has always refocused to the *Lookup blank* in the *Edit Recipe Line area* of the *Recipe window* to when the *Recipe list* is clicked. This was done on the assumption that the next action is always to edit the line. However you can disable this behavior by unchecking this.

Reports Tab

Print-to-File Text Reports



INSIGHT generates text or html reports. INSIGHT always writes HTML reports to a file and then asks your operating system to open the system browser and show the report. But text reports can be sent to a file for preview in your system text editor (the default setting)

or routed directly to a printer. Select this radio button to print in the traditional INSIGHT manner for text reports.

Character Indent on Reports

Text reports sent to a file are padded with spaces to line up columns and are intended for presentation in a monospaced font like Courier. INSIGHT will prepend blank spaces to indent a report according to the value in this blank.

Reports File Name Extension

If this has a value INSIGHT prints reports to a text file and then asks the host computer to open them (otherwise it displays them using an internal viewer). This setting is the primary way of controlling what program displays the report on Windows or Macintosh. Enter “HTML” to have your web browser show the report. Enter “TXT” to have it displayed in your text editor (e.g. Windows Notepad, Mac SimpleText, Linux Kate). Text reports assume a monospace font like Courier to line columns up, set your text editor to do this. INSIGHT prepends ‘<pre>’ and appends ‘</pre>’ to reports previewed in your web browser to assure the use of a mono spaced font.

In Windows you can control which browser or text editor is employed using the *Folder Options* dialog to associate programs with file extensions.

*See also the *web browser* item in the index.

Reports File Type/Creator (for Mac OS8, 9)

Typical values are 'ttx' for SimpleText, 'MSIE' for Internet Explorer and 'R*ch' for BBEdit.

Direct-to-Printer Text Reports

This method of printing was added in version 2008-2. Select this radio button to tell INSIGHT to present a traditional print dialog and send the report directly to the printer (formatted according to your setting in the Page Setup dialog and the font and size below).

Monospace Font, Font Size

Choose the font and size to use for reports. It is important that you choose a monospace font (one for which the characters are all the same width) since INSIGHT lines up columns in reports using spaces (not tabs). Courier is the most common monospace font.

HTML Reports

Path to Linux or Windows Browser

When INSIGHT needs to visit a web page to display an HTML report it normally asks the operating system to use the system browser. If the operating system is not replying or you wish to override this, enter the full path or click the file window button to find it and INSIGHT will fill in the path for you.

In Linux since the system browser may not properly interpret the INSIGHT request to open a file://. If you do not know the path to your browser:

-Try the 'whereis' command in a terminal window. For example, for Ubuntu Linux the command 'whereis firefox' should produce: */usr/lib/firefox/firefox*.

-Google the words (e.g. 'path to browser Suse'). In Suse Linux 10 it should be: */opt/kde3/bin/konqueror*. Also we recommend entering "TXT" into *Text Reports Filename Extension* for Linux to guarantee the system will display the report in a text editor.

Folders Tab

The settings here can be affected by changes you make to the signals.txt file in the INSIGHT program folder. You must quit and restart INSIGHT to activate changes here.

INSIGHT Documents Folder

INSIGHT maintains the recipe folder, materials (MDT files), the recipe database file, writes reports, saves preferences and creates the startup log file here by default. Click  to reveal it.

Recipe Files Folder

When recipes are saved into the database they are backed up as text files here (normally in XML format) and their associated pictures are stored here. Click  to reveal it.

Temporary Files folder

INSIGHT writes a temporary files here (e.g. a copy of working recipes here during operation for use to recover from a possible system crash). Click  to reveal it.

System Preferences folder

INSIGHT writes a temporary copy of working recipes here during operation for use to recover from a possible system crash. Click  to reveal it.

Documents Folder Override

This option was removed in 2014-8. Insight always keeps this folder in your documents folder (Home in Linux).

Files Tab

The settings here can be affected by changes you make to the `signals.txt` file in the INSIGHT program folder. You must quit and restart INSIGHT to activate changes here.

INSIGHT is located at

The full path to the folder where INSIGHT is installed on your computer. Click  to reveal it.

Database file Folder Override

Click the ... button to tell INSIGHT to use a database file other than the default one in the documents folder. Click the *Reset* button to reset to the default location. If you are specifying a network share or cloud drive folder keep in mind that INSIGHT does not arbitrate more than one person making changes at the same time to its SQLite database.

Materials Files Folder

Click the ... button to tell INSIGHT to use a different than default folder to scan for materials files during startup.

Backup Old Recipe During Save

Backup recipes (before saving) into the Backup folder in the *Recipe Files Folder*.

Backup Deleted Recipes

Move deleted recipes into a Deleted folder in the *Recipe Files Folder* (as defined in the *Preferences dialog*).

Save XML recipe notes using CDATA element

The XML standard defines a standard for saving character text so that the XML parser will not try to interpret any reserved characters it finds within the text. We have found this works best if the text contains international characters. However if you read the file with an older version of INSIGHT your notes will be bracketed like this:

```
<![CDATA[here are my notes]]
```

The XML parser interprets these as an instruction and strips them off. Turn this feature off if this is a problem. You can manually remove the `<![CDATA[` and `]]` if encountered.

I do not want to use the Recipe Database

By default INSIGHT stores recipes in a database and backs them up to the traditional XML format in the recipe files folder. Check this box to tell INSIGHT to operate in *File System mode* where you open recipes from files stored anywhere on the file system of your computer and network. When this box is checked INSIGHT displays a standard file system dialog when you ask to open or save a recipe. Note that you can also open recipes by dropping them on the *Recipe List* or double-clicking the recipe file itself (the Windows INSIGHT installer configures the operating system to associate recipes files with INSIGHT, but you might have to make this association manually in other operating systems).

Assume UTF-8 Encoding

Force INSIGHT to write and read files in utf-8 encoding. This includes recipe, material, translation, overrides and dictionary files. Linux defaults to utf-8 anyway so this box has no effect. If not checked, Macintosh versions will assume MacCentralEurRoman and Windows versions WindowsANSI.

Operations Tab

Calculate Properties by Mole%

Calculate oxide level properties by weighing the contribution oxides according mole% rather than weight%.

Ignore Expansion/Cost Overrides

Do not read the Overrides.XML file to override cost and expansion values contained in the materials file. When this is set the expansion data set in the *Oxides Dialog* will be used.

Divisor

This is enabled if you choose to ignore overrides, if not the divisor defined for a specific set of expansion numbers (in the Overrides dialog) will be used. Use this to move the decimal place left or right in the final calculated value of the thermal expansion. For example, if the expansion calculates to 1600, setting this to 100 will display it as 16.0 instead. Remember that calculated thermal expansion numbers are relative, meant to compare the thermal expansion of recipes of similar formulation.

Persistent recipes

When you start INSIGHT it will restore the recipes exactly as you left them (even if you made changes to a recipe or started a new one and did not save).

Debug

When INSIGHT attempts to call an external program with a filename parameter (e.g. a web browser to display an html report) it will present an alert showing the file name it is about to submit. Use this to troubleshoot problems when INSIGHT is asking external programs to do things.

4Sight Tab

Configure INSIGHT to upload recipes and its materials database to a 4Sight Server.

Internet Tab

URL of Periodic Table

Enter a URL to display when the *Web Periodic Table* item is chosen in the *Help menu*.

Digitalfire Personal Password and Matching Email Address

In the past anyone who downloaded or bought INSIGHT had Digitalfire a login personal password coupled to an e-mail address. INSIGHT used this information to log in for you, check at the site for information, a lookup or needed to get you key. This is not really needed anymore.

Digitalfire URL

For future use in case we move the web site that INSIGHT talks to.

INSIGHT Services URL

The URL that INSIGHT visits when you click the Info button in the *Oxides* and *Materials* dialogs. This now defaults to 'http://digitalfire.com/4sight/jumpers/' if nothing is entered. Until Oct 2008 this was 'http://ceramic-materials.com/ceramat/ceramicmaterials/'.

Download language or tooltips file

This takes you to the web page that enables you to download a file to run INSIGHT in a language other than English (or to download the English file to update tooltips).

Language

A pop-up language selector enables you to select the language. Languages not locally present are indicated. Present or absent languages can be downloaded from our translation site using the *Download* button. If you are a translator and want to check your work, download here each time you make a batch of translations at the site.

Insight-live Login Credentials

These are needed so that Insight can log you in at Insight-live to check for messages or posts you need to see.

Reports

INSIGHT generates recipe and materials reports. All recipe reports (except the main body of the detail calculation report) are based on templates in the *Templates* folder.

Until version 2008-1, INSIGHT generated reports and wrote them to a file in the *INSIGHT Documents Folder* (as defined in the *Preferences dialog*). It uses the file extension specified in the *Preferences dialog* and asks the operating system to open them. The application that ends up displaying the report is determined by the reports file name extension you specify and how your operating system responds when a file of that type is opened.

Starting in version 2008-2 you can select *Direct-to-Printer* reporting for text reports. This presents a typical print dialog and routes the report to the printer you choose. It respects margin settings you specify in the new *Page Setup* dialog.

Templates

INSIGHT substitutes variables into templates to create reports (master template files are in the template folder in the INSIGHT program folder and they are copied into the *INSIGHT Documents Folder* if not already there; their names indicate their purpose). When you upgrade all but the custom master templates will be overwritten (in the INSIGHT program folder), the ones in the documents/template folder will not be touched.

You can edit a custom template using a text editor. Be sure your text editor actually is a pure text editor and that it does not change the file name when saving. TextEdit on the Macintosh, for example, defaults to rich text editing, it has to be customized in Preferences to be a standard text editor; download TextWrangler for a better experience.

Templates employ tags (in the form `<tag>`) that INSIGHT substitutes actual values for.

Monospace fonts have characters that are all the same width and most text editors like Windows Notepad default to using a mono space font.

Here is the template for the compact recipe report:

```
<rname                                     >
Code Number: <rcodenum>
<recipe>
<label                                     ><amount ></recipe>
<oxide                                     ><rtotal >
<formula>
<oxide ><famt ></formula>
```

Notice the block enclosed by the `<recipe>` and `</recipe>` tags, it repeats for each line. The material name (the `<label>` tag) is padded to the length of the tag. Reports like this need to be displayed in a monospaced font so columns line up properly.

Here is the section from the Custom HTML report that displays the recipe lines:

```
<recipe>
<tr>
  <td align="right"><rlabel></td>
  <td align="right" bgcolor="#DDDDDD"><amount></td>
  <td align="right" bgcolor="#DDDDDD"><percent></td>
</tr>
</recipe>
```

The HTML and INSIGHT tags are mixed together, INSIGHT substitutes the `rlabel`, `amount` and `percent` tags it recognizes but leaves the others for the browser.

As a Means to Export Recipe Data

You can edit the custom templates to create a format suitable to import into another program. For example, if you separate columns by tabs in a template and do not use blank padding, the data will be more suitable to paste into a spreadsheet like Microsoft Excel.

Tag Reference

Tags are in the form:

`<tag>` which signifies an item for the selected recipe

`<tag1>` or `<tag2>` specify which recipe the value is for.

Tags can contain spaces before the last `>` to signal padding/trimming of the value to the width of the tag (including the width of the `<` and `>`). For example, the tag `<today >` will print the current date end-padded to the width of the tag.

Tags containing a period before the last `>` will pad with periods. For example, `<today .>` will pad the current date (in this case to 12 characters) like this: `'2008/7/15...'`.

Some tags print entire blocks of text or elements (e.g. `<detail-`

recipe>'), others enclose other tags (e.g. '<*recipe*>').

Block Tags

These tags cannot be blank or period padded.

<*detailrecipe*> A full chart of the calculation for the current recipe. Again, columns are lined up by blank padding so a monospace font is assumed.

The following tags enclose repeated elements (there can be many pictures, formula and recipe lines in a recipe).

<*pictures*></*pictures*>

<*formula*></*formula*>

<*recipe*></*recipe*>

General Tags

<*mdtfile*> - Name of the MDT file active when recipe printed

<*today*> - Today's date in short form

<*ltoday*> - Today's date in long form

Label Tags

The following is a line you might see on a report:

Code Number: P2345

The term 'Code Number' is the label and 'P2345' is the value. To produce the above the template might contain:

<*codelabel*>: <*rcodenum*>

Of course it could also contain:

Code Number: <*rcodenum*>

However INSIGHT is translatable to other languages so the report engine accepts these label tags (like the first example above) so that one template can work for multiple languages.

<*codelabel*> - Label for the recipe *Code* from the *Recipe Details* tab (defaults to "Code Number").

<*oxproplabel*> - Label for the oxide property from the *Overrides/Typecodes dialog* (defaults to 'Thermal Expansion')

<*mtproplabel*> - Label for the material property from the *Over-*

rides/Typecodes dialog (defaults to 'Cost')

<*calcloilabel*> - Label for *Calculated LOI*

<*imploilabel*> - Label for *Imposed LOI*

<*ratio1label*> - Rationame1 label from the *Oxides dialog* (defaults to 'Si:Al')

<*ratio2label*> - Rationame2 label (defaults to SiB:Al)

<*formwtlabel*> - Formula Weight label

<*urllabel*> - URL label

Value Tags

These tags substitute a value from the current or specifically requested recipe number.

Note: Some of these tags have a '1' as the last letter, this is part of the tag name. For example, the tag '<mlp1>' refers to the material level calculated property for the current recipe (in future there will be multiple properites). To specify this same value for recipe 1 the tag would be '<mlp11>'. The same situation exists with olp1, ratio1 and ratio2.

<*rname*> - Recipe name (*Description* from *Recipe Details tab*)

<*rdate*> - Recipe date from the *Recipe Details tab*

<*rcodenum*> - Recipe code from *Recipe Details tab*

<*rlocation*> - Recipe location from *Recipe Details tab*

<*batchsize*> - Recipe batchsize from *Recipe Details tab*

<*rtypes*> - Typecodes assigned from *Recipe Details tab*

<*rid*> - Recipe filename if it is a file system recipe, ID if a database recipe

<*rpath*> - Full path to recipe file (if in file system mode)

<*rurl*> - Recipe URL from *Recipe Details tab*

<*mlp1*> - Material level property value (normally the cost)

<*olp1*> - Oxide level property value (normally expansion)

<*ratio1*> - The calculated ratio 1 for the recipe

<*ratio2*> - The calculated ratio 2 for the recipe

<*calcloi*> - The calculated LOI for the recipe

<*imploi*> - Imposed LOI for the recipe (set using *Override Calculated LOI* in the *Calc* menu).

<*formwt*> - Formula weight

<*rtotal*> - Recipe total

<*btotal*> - Batch total (as calculated during report reporting)

<*rnotes*> - Recipe notes (if this tag is widened the recipe notes will be word wrapped to that width)

Recipe Lines Tags

Each line of recipe must be enclosed with these unpadded tags: <*recipe*></*recipe*> or <*recipe1*></*recipe1*> or <*recipe2*></*recipe2*>

<*lookup*> - Material lookup - for finding chemistry in MDT

<*rlabel*> - Material label with *,+,= status character if appropriate (e.g. 'Potash Feldspar')

<*label*> - Same as rlabel but falls back to the material name lookup if a line label is not assigned. This tag also inserts the prefix "Add:" if the line has added status.

<*amount*> - Material amount

<*percent*> - Material percent

<*bamount*> - Material batch amount (computed based on batch size provided in recipe details tab)

Formula Lines Tags

Each line of a formula or analysis must be enclosed with these unpadded tags: <*formula*></*formula*> or <*formula1*></*formula1*> or <*formula2*></*formula2*>

<*oxide*> - The oxide name

<*roxide*> - Right justified oxide name

<*famt*> - Formula value

<*wamt*> - Analysis value

<*mamt*> - Molar formula value

<*oxlink*> - Name of oxide at the Digitalfire Reference Library

Picture Tags

The nine possible pictures much be enclosed in these unpadded tags: <*pictures*></*pictures*> or <*pictures1*></*pictures1*> or <*pictures2*></*pictures2*>

<*picturelink*> - The filename of the image

<*picturenote*> - The note for the image

Text Reports

Textreports are sent to the printer you choose or previewed in your text editor or using your computers default web browser (depending on the extension you specify in the *Preferences dialog* and whether to have *Direct-to-Printer* or *Print-to-File* chosen).

Columns in text reports will only line up if they are displayed in a mono space font like Courier (tell your text editor to use such a font if necessary). Likewise, if you copy and paste a report into your word processor or e-mail client you may need to set the font accordingly (keep in mind that those reading your e-mail message may not have their e-mail reader set to use a monospaced font).

Standard Recipe: Shows the recipe, formula, values of calculated items and notes.

Side-by-side Recipes: Displays recipe 1 and 2 side-by-side using the Standard Recipe template. The notes for each recipe are wrapped to 50 characters.

Compact Recipe: Produces the smallest report possible to display both recipe and formula.

Recipe for E-mail: Amounts are first on each line for better presentation in E-mail client programs which may not be set to use a mono spaced font.

Mix Ticket: A recipe report with check boxes and totalled to the amount specified in the *Batch Size* blank on the *Recipe Details* tab in the *Recipe window*.

Custom Text Recipe Report: These are based on a custom template that you can modify without fear of it being automatically replaced during installation of an update to

INSIGHT (same template as the standard recipe report).

Detail Recipe Calculation: A table of the intermediate values that INSIGHT creates during the formula calculation (use it to understand how the calculations are done).

HTML Reports

These are available if you have a level 2 serial number.

HTML Recipe: A web page containing internal and external internet links to material and oxide information and to explanations of row and column headers. These recipe reports are research and information tools suitable for being posted onto a web site.

HTML Side-by-side Recipe: Displays two recipes side-by-side, this will fit onto a page better than the text side-by-side recipe as the browser will rearrange it as needed.

Custom HTML Recipe: We encourage you to modify this template first to learn how the substitution system works (before modifying the other templates).

MDT Reports

Oxides/Materials Report is a listing of the MDT.

Oxides/Materials Overrides Report is a listing of the contents of the Overrides.XML file.

Recipe Window Menu Items

File Menu

Changes Starting Version 2008-6

Most of the items in this menu have different or slightly different behaviors. INSIGHT can now save and read old and new format recipes and it can write and read them from the file system or the database. It can display recipes from either system side-by-side and it can default to working in database or file system mode.

Database Recipes

Recipes stored in the recipe database.

File System Recipes

Recipes stored in files on the file system of your computer.

Recipe Database Mode

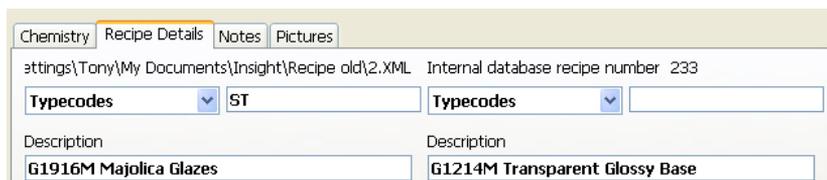
The default recommended mode; INSIGHT stores and opens recipes from the database when you choose *Open* and *Save* in the menu or click the *Open* and *Save* buttons.

File System Mode

If you check “I do not want to use the Recipe Database” on the *Operations tab* of the *Preferences dialog* INSIGHT stores and opens recipes from files (the *Save* and *Open* menu choices and buttons show file dialogs rather than the *Recipe Database dialog*).

Is a Recipe from the database or file system?

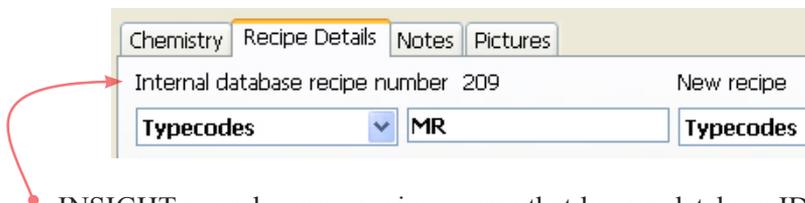
The status line at the top of the *Recipe Details tab* tells you. In this example, the recipe on the left is from (and will be saved to) the file system, the one on the right is from (and will be saved to) the database.



Note

Regardless of what system is active, you can still retrieve and save recipes into the other system using the *Import* and *Export* menu items.

New Recipe, Duplicate Database Recipe



INSIGHT regards a new recipe as one that has no database ID number (in recipe database mode) or no file system file name (in filesystem mode, see the section *Database and File System Recipes* for more information). Both of these menu choices zero any existing ID number or name in the current open recipe, thus changing its status to ‘new recipe’. When INSIGHT is asked to permanently save a recipe it checks this and either saves the recipe to the same location from which it was read or creates a new recipe record in permanent storage.

When you are using INSIGHT in recipe database mode (the default) the *Duplicate* menu item simply zeros the ID number. Thus, on the next Save INSIGHT sees the number is missing and creates a new database record, saves the recipe there and begins displaying that ID number in the *Recipe Details* panel.

If you are using INSIGHT in file system mode (in *Preferences* you have clicked the “*I do not want to use the recipe database*” checkbox), this menu item will be labelled “Save As”. Choosing it will signal INSIGHT to clear the existing name. This in turn signals INSIGHT to display a *File Save* dialog. However, **it is important to note** that it is up to you to make sure the file name you provide ends in .RCP, .RCX or .XML. INSIGHT will write the data in the format appropriate to each type. If you use a different extension, it will be written in the default XML format but you will not be able to open it in INSIGHT (although you can manually rename the file with an XML extension, then INSIGHT will be able to see it).

Open...

In standard recipe database mode this displays the *Recipe Database Window*, in file system mode a *File Open dialog*.

Open Recent...

In standard recipe database mode this displays the *Recipe Database Window* showing recently opened recipes. Past searches are not remembered when it is opened or closed. In file system mode, this menu item is disabled.

Close

Does the same as the *New* item.

Save

In standard recipe database mode if the recipe has a database ID it is written to the database using the same ID. If it does not have an ID it is added to the database (creating an ID). It is then backed up as an XML format recipe file into the *Recipe Files Folder* using the ID number as part of the filename. In file system mode, if the recipe has no file name (it is new) the Save dialog is displayed and it is written to the place and name specified. If it does have a name, it is written over the same name. It is then backed up to the recipe database (the filename is remembered in the database).

The saved status of each recipe is indicated by the availability of the *Save* menu item and the visibility of its half of the save button (to the left of the *Recipe list*).

Open File System/Database Recipe...

In standard recipe database mode this menu item displays a file open dialog for your operating system to find RCX, RCP and XML format recipe files (INSIGHT will remember where you last opened a recipe file from and start from the same folder). In file system mode, INSIGHT will display the *Recipe Database window* to open a recipe from the database. If you save the recipe, it will be written back to the same file format. RCP and RCX are older file formats and should be converted to XML using the *Save As* function.

Save File System Recipe As... Convert to Database Recipe

The wording of this menu item changes according to the recipe storage mode. In standard recipe database mode this menu item displays a file save dialog for your operating system. The file is written to the location and file name of your choosing. You determine the file format by the file extension you supply (either RCP, RCX or XML). RCP and RCX are old formats and do not hold all of the information that XML does. Thus, you need to name your recipes like this: myrecipe.rcx or myrecipe.xml.

In file system mode, choosing this item converts the recipe to database by zeroing its file name and adding it to the database (as thereby assigned a database ID number).

Open XML Recipe Library File

Recipe library files can be created at Insight-live.com. Choose this and Insight will present a file open dialog. After you choose the downloaded XML recipe library file, a dialog will open enabling you to search and open the recipes in the library. For more information, see the page dedicated to this dialog.

Page Setup

Set up margins, etc for *Direct-to-Printer* reports (as chosen in the *Preferences dialog*. These settings are remembered from session to session.

Report Type

Select a report type. The report type will be remembered when you select *Print* from the *File* menu in future. For more information see Reports section of this manual.

A number of recipe report formats are available. Some print out both recipes enabling you to compare.

There is an MDT report to create a listing of all the oxides and materials and one to show the overrides assigned in the Overrides.XML file.

Print Print the last-printed report type.

Edit Menu

Undo, Cut, Copy, Paste, Clear

These work only on the character and word level when editing values in text blocks and blanks.

Copy Recipe

INSIGHT remembers the source area, 1 or 2, only. Thus, if you copy a recipe, then make a change to it, the changed recipe is the one that is going to be copied into the destination when you choose *Paste Recipe*.

Copy Recipe as Text

Copies the recipe to the clipboard in text format suitable for pasting into other applications (i.e. a word processor). The recipe name is on the first line, followed by lines containing each material name, a tab character, and the amount.

Paste Recipe

INSIGHT performs a copy from the source area to the destination. This works in the same manner as the *Copy* button in the *Multi Recipe Utilities dialog*.

If you want to start a new recipe using the current one as starting point, use the *Duplicate* item in the file menu. It zeros the recipe ID and filename turning it into a new recipe that is unlinked to any database record or file system location. In standard database mode, INSIGHT will write this new recipe to the database and assign it a new ID.

Interpret Clipboard

INSIGHT tries to interpret text on the clipboard for the current recipe (replacing the one already there). In the example below a recipe has been selected in Microsoft Excel and copied to the clipboard to prepare for interpreting.

Here is the algorithm it uses to interpret the clipboard:

- Scan the entire clipboard for tab characters to predict if columns are tab separated, set no-tabs flag accordingly

Parse each line as follows:

- If no-tabs convert all double-spaces to tabs, then convert all double-tabs to single tabs
- If there are still no tabs in a line convert single-spaces to tabs if working on second line or higher and no-tabs flag set
- Separate columns according to tab delimiters
- Scan columns looking for those with only numeric characters; if one contains a “%” use it only if there is not another amount column
- Assign remaining column as the material name if some letters are found in it
- If a line has no amount and it is line 1 assume it to be the recipe name

As it interprets the recipe, INSIGHT tries to find each material in its MDT. Any that are not found are set as phantom.

Utility Menu

Recipe 1/Recipe 2

A check mark indicates the selected one. You can also select a recipe by clicking an amount column heading in the *Recipe List*.

Compress Recipe

Removes blank lines from the recipe. INSIGHT uses this item automatically (for example in *Recipe Open*).

Delete Recipes via SQL Statement

This will present a dialog asking you for an SQL whereclause. Normally you need to know SQL (structured query language) database syntax to use this, however the default whereclause presented (*testrecipe=1*) will remove test recipes. For example, to remove all recipes that have been imported having a file name in the pattern “I-xxxx” you would enter: *picturebasename LIKE “I-%”*. All this might sound strange to you, but you can learn about SQLite syntax at sqlite.org and you can use the *View/Edit Database* menu item to see the database and learn the names and types of columns in each of the tables. Note that this item will not allow you to remove all the recipes. In addition, we recommend that you copy or backup the INSIGHTDATA.DB database file if you are unsure about the whereclause you are using.

Import Recipes

INSIGHT asks you to find a folder, then asks confirmation, then imports all the recipe files in that folder into the database. We recommend that file names be imported be patterned (for example: I-xxxxxx) so you can remove them all from the database using the *Delete Recipes via SQL Statement* menu item (e.g. in the case of a problem and you want to reimport).

If imported recipes contain typecodes you will want to define these typecodes (give them names) within INSIGHT after import (in the *Overrides/Typecodes dialog*).

We recommend that you keep the source recipes (perhaps archived in a ZIP file) as a backup.

Export Database Recipes as XML Files

Export all the recipes in the SQLite database into XML files in a folder outside the Insight recipe folder. The recipe description will be used as the file name (characters not allowed in file names will be converted to underscores: \?%*:]><();#&). Picture files will be copied and renamed also. Only recipes having descriptions (names), as set in the *Recipe Details* tab, will be exported.

If you do this in order to begin managing your recipes using the file system of your computer rather than the Insight database, beware that you give up keyword, category and material name searching, the ability to easily find targets and limits, previewing, quick note changing, all the powers of SQL batch processing, certain digitalfire.com web site data interchange abilities and all the future enhancements and Insight-live.com connections we will make to the database system. However, you can re-import the recipes later if needed (using the above menu item). In addition, if you change a recipe file name you must manually rename all the pictures to maintain the connections.

Selected recipes can be exported into a recipe library in the *Recipe Database window*.

Edit Materials/Oxide: Open the *Materials* or *Oxides* dialog.

Overrides/Typecodes: Open the dialog.

View/Edit Database

Ask the operating system to launch the database file (this will open your SQLite editor if you have one installed and configured for the .db file extension). You will be able to see all of the tables and column and data in the INSIGHTDATA.DB database file. See SQLite section in this manual for more information.

View Log File: View the database operations log.

XML: See an XML rendering of the current recipe.

Preferences: Open the *Preferences dialog*.

Calc Menu

Calculate Now

INSIGHT will perform an immediate calculation of the current recipe (according to the unity type selected) and update the *Formula List* and *Calculated Items List*. Calculation is normally automatic, this item is just a precaution if INSIGHT does not recalculate.

Enter Formula

INSIGHT presents the *Formula Entry* dialog that enables you to key a formula that it will convert into an analysis and paste into the selected recipe area. For more information see the *Enter Formula* dialog and the lessons section in this manual.

Limit/Target Formulas

Displays a dialog telling you how INSIGHT deals with this and how to create and open target formulas.

Normalize

Recalculates a recipe total to produce identical unity and non-unity formulas. *Normalize* is available if the calculation type for the selected recipe is set to one of the unity types (this is because INSIGHT needs to know what type of unity you want to normalize to). This function is needed for formula to batch calculations because the *Supply dialog* requires a non-unity calculation type.

Round Amounts

Round all the amounts in a recipe to the nearest tenth.

Supply Oxide

Displays the *Supply Oxide* dialog that enables you to add a material to a recipe based on the amount of an oxide needed from the material. This menu choice does the same thing as the *Supply button* in the *Recipe window*. For more information see the *Supply Oxide dialog* section.

Retotal Recipe

Key the new total in the dialog box and click *OK*. INSIGHT adjusts each material amount by first deriving this multiplier:

$$\text{NewTotal}/(\text{RecipeSum}-(\text{StaticSum}+\text{AddedSum}))$$

Where:

NewTotal: The new total you request

AddedSum: The sum of all materials with added status

RecipeSum: The sum of the existing recipe

StaticSum: The sum of all materials with static status

The new total thus becomes the requested total plus added materials (amounts of which are adjusted). Suppose you retotal to 200 a recipe having 50 parts material A, 50 of B and 2 added parts of colorant C. INSIGHT will recalculate to 204, that is, 100-A, 100-B and 4-C. On the other hand, if you recalculate to 200 a recipe having 50-A, 50-B and 2 static parts of colorant C INSIGHT will produce 99-A, 99-B and 2-C. For a recipe having 50-A, 50-B, 2-Static C and 2-Added D; INSIGHT will produce 98.04-A, 98.04-B, 2-C and 3.92-D.

INSIGHT will sometimes hesitate with a warning if your recipe contains static materials. This happens if you supply a new total that is more than twice as large, or less than half as much, as the old. This is done to prevent you forgetting to remove the static attribute from materials before adjusting totals for mix ticket printing.

Recipe Times Ten/Divided by Ten

A quick way to move the decimal in all of the recipe lines.

Override Calculated LOI

INSIGHT will present a dialog where you can specify an LOI for the recipe. INSIGHT always calculates an LOI and posts the result in the *Calculated Items List*, however this enables you to override that calculation. Such an override is sometimes appropriate where you have entered a recipe or analysis that is going to be inserted into the MDT and you wish to impose a measured LOI to make the analysis more accurate. This procedure is called 'imposing an LOI'.

Help Menu

HowTo Videos

Opens your browser to the INSIGHT installation, overview and lessons videos. If they are installed on your computer they will run from there, otherwise from our website.

Digitalfire Reference Library

Open this website in your browser.

Web Periodic Table

Open the periodic table webpage defined in the *Preferences dialog*.

Magic of Fire Book

The Digitalfire Magic of Fire eBook will open in Adobe. Thus Adobe Reader must be installed on your computer. See the section on Adobe Reader (formerly Acrobat) in this manual.

Readme File

Opens the readme.txt file. This is a must-read for each new version of INSIGHT.

Digitalfire.com

Opens your browser to our home page.

E-mail Digitalfire Support

Opens your browser to our e-mail contact page.

Update Materials File

Tells you how to update the materials database.

Check Latest Version

Opens a web page at Digitalfire that shows what version you have and what version is currently downloadable at the website.

About INSIGHT

Displays a dialog about Digitalfire Corp. and the INSIGHT version number.

Other Topics

Backing Up Your Data

INSIGHT maintains your data in XML format files and in an SQLite.org database file named INSIGHTDATA.DB. The *File Paths* tab in the *Preferences dialog* has green ‘reveal’ buttons to open any the folders that INSIGHT is using to store data.

INSIGHT Documents Folder

The first time it is launched INSIGHT checks for the existence of a folder named Insight in your documents folder. If the folder is not there is it created. If the folder is empty INSIGHT attempts to copy starting materials and recipe files to it and create an empty database there by importing them. By default INSIGHT continues to maintain all its data in this folder, including pictures and the overrides file (whose data is edited in the *Overrides/Typecodes dialog*).

Recipes folder

These are the recipe files you read and write using *Open File System* item in the *File menu* (if you are not sure of the difference between database and file system recipes see the section with this title). You determine where recipes files are written during the Save process (this is completely outside the control of Insight), Thus it is your responsibility to know where you put the recipes in order to be able to back them up.

Materials file

This is normally named STANDARD.XML and located in the Insight folder in your documents folder (the original is kept in the INSIGHT program folder).

Recipe Database File

This is named INSIGHTDATA.DB and by default, it is where all recipe data is stored. This file is not mandated to be in the Insight folder in your documents folder, its location can be overridden in the *Preferences dialog*.

Setting Up a Cloud Drive

Note: We include this section for reference only. However we now recommend an account at [Insight-live.com](https://insight-live.com) to provide access to a common data store for access from many locations.

Cloud drive technology is a huge advance. A cloud drive is just a program you install on your computer. It constantly monitors a folder of your choice, if you change any file it is immediately backed up to the internet. But it gets better.

- If two computers reference the same cloud drive, changes to a file on either updates it on the other. If more than two computers are connected, all the others are updated.
- The connected computers can be Windows, Linux or Macintosh.
- Insight-Live.com can be configured to see your DropBox folder, this means incredible potential for synchronization in future.
- Backup is automatic, all your cloud-drive equipped computers are backing up onto each other and the cloud.
- Moving Insight to a new computer is so much easier, just install, point to your cloud drive folder in the Preferences dialog, then quit and restart Insight.

This is revolutionary, especially for INSIGHT, since its file formats are the same across these three platforms.

How to store your data in the cloud

Many different cloud drives are available (we have experience with DropBox).

- Decide on what you are going to put on the cloud drive. Insight will continue to store your configuration file, the boot log and other things in the default data folder (documents/insight or home/insight for linux). In the Preferences dialog you can tell Insight to look for its INSIGHTDATA.DB recipe database file and the MDT XML files in another folder. You can choose to look for both or one of these on the cloud drive.
- Copy the appropriate files (from your documents folder) to your DropBox folder. Leave the original where it is. If Insight has trouble connecting to the recipe database in the new location it will revert to the default location and inform you.
- Start Insight and set the location to your DropBox folder on the File tab of the *Preferences dialog*.
- Restart Insight. Check the title bar of the Recipe window. It will show the locations Insight is using for the recipe database and the

materials files.

- Install DropBox on your other computers (Mac, Windows or Linux) and configure each of them likewise.

Now whenever any copy of Insight updates the files you have configured to be in the cloud drive folder, the changed file will automatically be uploaded to the cloud and be available to any other computer on which DropBox is installed and enabled.

Things to watch for

- This is for single users only (do not use Insight to edit data on two DropBox-connected computers at the same time).
- You must learn to be cognizant of the state of your cloud drive, watch its status indicator mini-icon. Give it time to upload any changed files before shutting down your computer. When starting a computer allow it time to update all the files. When installing Insight and a cloud drive on a new computer, give it time to download all the files.
- If you have a large Insight database and intend to do alot of recipe editing, you may like to disable DropBox while Insight is running, then re-enable it when you quit Insight (to prevent DropBox from uploading the entire database every time you make a small change).
- You do not need to have anything beyond the basic Dropbox free account for this to work.
- If you need multi-user or to work as a group, consider using insight-live instead.

A History of INSIGHT

24-year-old Tony Hansen, the plant technician at Plainsman Clays in Alberta, Canada, began development of INSIGHT in 1978. This was shortly after the introduction of the first personal computers by companies like Altair, Apple and Tandy. The first commercial version ran on the Tandy Model III and featured separate recipe and formula frames (the term 'window' was not yet conceived). He subsequently ported it to the first commonly available laptop computer, the Tandy Model 100. The IBM PC was introduced in 1982 and INSIGHT was running on it by 1983. Shortly after that he got INSIGHT running on the first Macintosh 128K, albeit in a PC-like fashion. Windows and more Macintosh friendly versions followed in the early nineties.

Tony Hansen continues to be the prime developer of INSIGHT. He introduced FORESIGHT in 1990 as the first fully relational recipe, ceramic calculation and physical test record keeping system, it is still used by many companies today (some have hundreds of thousands of tests in their databases). INSIGHT has been used around the world since 1980 and we are confident in calling it the international standard by which others are measured. Full page ads for INSIGHT first appeared in ceramics monthly in the middle 80s. The first INSIGHT BBS went online in 1992 and the first website in 1995 (the year after the HTML internet was born). Digitalfire pioneered eBook publishing long before it went prime time and developed its own eCommerce sites to support and sell INSIGHT starting in 1998. Current work is done on our own servers and involves cutting edge database sites that form international communities of material experts and generate moment-in-time eBooks.

The past two decades have required a lot of tenacity to 'hang on' until the ceramic world fully appreciates the value of glaze chemistry. Hundreds of thousands of dollars have been spent and many hard lessons learned. Customer service occupies the major portion of our resources and we are convinced that web support and integration are the key to future success.

INSIGHT Design Philosophy

At Digitalfire we try to bring the knowledge of ceramic industry within reach of the average potter, technician or entrepreneur. We have maintained constant public online material and chemistry knowledge bases since 1992 and have always freely distributed our research and know-how.

Unlike the past there are now many products to choose from. Each reflects the philosophy of its author. Some products are free, others are priced modestly, INSIGHT is likely the most expensive one available. Our philosophy favors glaze chemistry calculations as opposed to being a recipe database or existing recipe analyzer. We generally encourage potters to stop testing endless recipes from others that never seem to work and focus on creating a few good base recipes and understanding them well to control their melt, surface character, opacity, color response and producing craze/scratch/leach/bubble/blister/crawl resistant glazes that are nice to work with. We likewise encourage industries to have in-plant expertise and not rely fully on consultants, suppliers and supplier recipes.

Monies we receive are invested back into our product and web sites and our continued success keeps us from getting side tracked. The continued existence of Digitalfire Corp. is your best assurance that the time and effort you put into compiling information within INSIGHT will not be lost.

There are a number of fundamental design differences between INSIGHT and some of the other products. These relate to our preference for storing recipes as files rather than in a database, design of our materials file, the use of XML as a fundamental INSIGHT data storage format, emphasis on speed and small size, simplicity of operation, etc. (for more information see our FAQ page at the Digitalfire website.

One of the things that INSIGHT has been known for is its ability to display side-by-side recipes that are completely operational and independent. This is invaluable since most calculation scenarios involve adjusting an existing recipe. You will find that the way in which these recipes cohabit only marginally complicates program operation.

Creating a Materials Database

INSIGHT does not permanently store material data in the INSIGHT managed internal SQL database (which is used for recipes). Instead it reads a materials text file at startup and saves back to that file if material changes are made. This file can be in various formats and only contains information INSIGHT needs to do calculations. When users need more information about a given material or oxide INSIGHT provides a button in the *Materials dialog* that opens a pertinent page at the Digitalfire Reference Database website.

INSIGHT ships with XML lessons and standard materials starter databases. These are suitable for learning, people who only need generic materials or only use main-stream materials in the US or Canada. However if you need to add or change materials there are several strategies and combinations of strategies you can employ.

Create an Override MDT

The *Materials dialog* has a menu choice to create a starter MDT file. You can activate it in INSIGHT and customize with proprietary, local or other materials that are not found in our online materials website. If you name this MDT file *mymaterials.xml* and put into the *INSIGHT Documents Folder*. INSIGHT will open it after opening the main one and materials in it will be added and override those of the same names already read. *However, since the data for the two MDTs is not stored separately, if any materials appear in both the main one and the overrides, if you change and save the main one the override values will be written into the duplicate materials.*

Employ the Overrides/Typecodes Dialog

INSIGHT has a specific override system for oxide, material and recipe properties (at this time: thermal expansion, cost, typecodes). At startup it first reads information from the materials database and then your personal overrides. To create oxide thermal expansion and material cost overrides use the *Overrides/Typecodes dialog*.

Maintain Your Own MDT Inside INSIGHT

The INSIGHT *Materials dialog* has tools to find, edit, add, remove and save materials from the in-memory MDT. You can also add

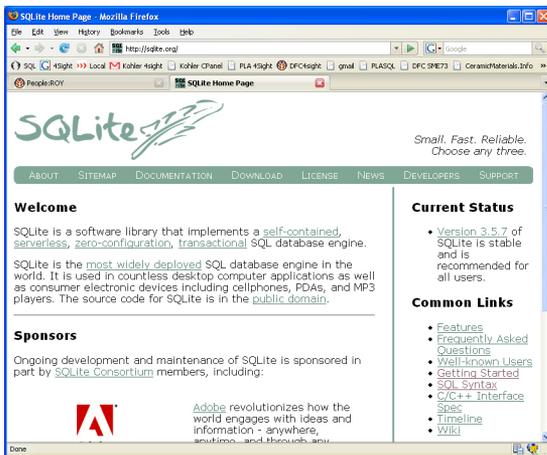
materials from the Digitalfire Reference Database website by copying XML code from material pages and pasting it into the *Materials dialog* for interpretation.

Use a CSV MDT

INSIGHT can export, read and write percentage analysis material data from/to CSV spreadsheet files (strict formatting rules apply). Microsoft Excel is a convenient way to manage chemical analysis data. The *Export MDT as CSV* and *Edit CSV Utility* menu items in the *Materials dialog* are used to maintain CSV files.

SQLite Recipe Database

Starting in April 2008 INSIGHT 2008-6 uses the SQLite.org database engine for Windows, Mac and Linux versions. The arrival of this very widely used, cross platform, fast, efficient and powerful, and reliable database engine is the reason for going ahead now. This is the same database that is used in your cell phone, PDA or MP3 player.



INSIGHT automatically manages the import of your existing recipe files. Each time it starts INSIGHT looks for the INSIGHTDATA.DB SQL database file in the *INSIGHT Documents Folder*. If the file is not present INSIGHT creates it and imports all XML, RCX and RCP recipe files it finds in that folder.

When first installed INSIGHT normally encounters the standard sample recipes that are installed with it and the database is thus created from these.

Rebuilding the Recipe Database

The traditional recipe file has now become the backup file. Each time a recipe is saved to a database recipe it also creates an XML recipe filename in the form DB-ID.XML and writes it into the *INSIGHT Documents Folder*. In addition, as pictures are imported the original files are left in the source folder. Thus, in the event of catastrophic database file loss or failure INSIGHT automatically recreates the database file.

Importing Recipes in the SQL Database

If you have been maintaining recipes in many different folders (using an older version of INSIGHT or using the *Import* and

Export features of newer versions) and want to import them into INSIGHT there are two ways.

One by one: Open each recipe file and then use the *Convert to Database Recipe* item in the *File menu* and save.

All at once: Erase the INSIGHTDATA.DB database file in the *INSIGHT Documents Folder* and put all the RCP, RCX and XML recipe files you want to import into that same folder. Then launch INSIGHT and it will automatically rebuild and import.

A folder containing RCP, RCX or XML recipe files: Use the *Import Recipes* item in the *Utility menu*.

Opening the SQL Database Outside INSIGHT

SQLite is standard across many devices and operating systems. There are many general purpose programs (commercial and free) that you can use to open an SQLite database file. For example, <http://www.razorsql.com> has a high quality product. Or go to <http://sqlitebrowser.org>. Or SQLite shell from <http://www.sqlite.org/download.html>. A syntax overview can be found at <http://www.sqlite.org/sqlite.html>.

Put the program in the same folder as the INSIGHTDATA.DB file (no install is required) and open a command line interpreter window and start typing your commands.

Of course, you need to be careful not to change the structure of the database files or INSIGHT may not be able to interpret it properly.

A tool like this can be very valuable for doing searches using syntax INSIGHT does not support and for studying the database schema to create tools to import and export data. It can also be great for making changes to a lot of records at one time by using SQL commands. •

Recipe ID Numbers, File Names, Picture Linking

Historically INSIGHT employed a manual sequential numbering system for new recipes (they were stored using this number as the file name in the *Recipe Files Folder*). Starting with version 5.3.5 ID numbering became automatic and not overrideable and the *Code* blank assumed the main function of the former *ID* (people were using the ID number to identify test samples).

Starting with INSIGHT 2006, references to recipe *ID* numbers were changed to simply the ‘recipe file name’. Operating systems guarantee unique file names so INSIGHT was able to use the file name as the unique key for its pseudo-recipe-database. It also tolerated imported file names of any format, you could thus dump a bunch of older recipes into the *Recipe Files Folder* and the names were left unchanged. Pictures were linked to recipe files by simply having the same base name. Thus the first picture for recipe “white matte.xml” was “white matte-1.jpg”.

In INSIGHT 2008 the database engine generates the unique key when recipes are added. Backup XML recipe file names (and picture base names) are generated from this key (with one exception, see below). For example, the XML filename of the recipe with key xx would be DB-xx-1.XML. Pictures for this recipe would be named: “DB-xx-1.jpg”, “DB-xx-2.jpg”, etc.

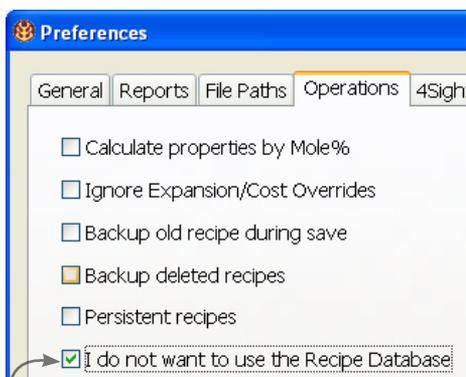
When XML recipe files are imported into the recipe database (this happens when INSIGHT starts and does not find the INSIGHTDATA.DB recipe database file), it stores the filename (which was the ID) that each had with its database record (to override the above scheme). Thus picture file names for the imported “whitematte.xml” would still be “whitematte-1.jpg”, “whitematte-2.jpg”, etc. regardless of the database key. This enables an older version of INSIGHT to read the file properly (link the pictures). But it also provides a mechanism for people who used the former ID as an organizational tool: The *Pic-ID* column in the *Recipe Open* dialog (shown here) matches the ID column in the older versions of INSIGHT.

Db-ID	Pic-ID	Pict...
221	2826T	
250	DB-93	
245	DB-42	
223	003	
224	004	
227	005	
252	DB-96	
253	DB-98	
235	chartre...	
187	#3946	
229	006	
230	007	1
231	000	

Database and File System Recipes

In recent years INSIGHT allowed users to manage recipes under two philosophies. It encouraged a standard method of accessing recipes using the *Recipe Open dialog*. This dialog managed files in the *Recipe Files Folder* and presented them in database-like fashion with search, sort and print tools. If an older format RCX or RCP file was read and then saved it was written in XML format and the original deleted. Users could use the *Import* and *Export* menu items and open and save recipe files from any location outside the *Recipe Files Folder*.

With the introduction of the recipe database both methods have been improved. The *Recipe Open Dialog* has been renamed as the *Recipe Database Window*, however its operation is very similar except that now the recipes being presented are from the database, not for files in the recipe folder. Searching, ordering and display are now much faster and the complex recipe cache is no longer needed. The database itself resides in one file in the INSIGHT database folder (documents/insight by default).



This setting determines how the *Open*, *Save*, *Import* and *Export* menu choices and buttons work.

Database Recipes

The *Open* and *Save* menu choices (and buttons) now maintain recipes stored in the SQL database (if you have clicked the “*I do not want to use the Recipe Database*” checkbox in *Preferences*, the *Export* and *Import* File menu items maintain database recipes). When new recipes

are saved to the database it assigns them a unique key number that is used to identify that recipe. This key is used to form an XML backup file name (e.g. DB-101.XML) that is written in the recipe

files folder as in the past (this folder is named ‘recipe’ and it INSIGHT maintains it in the Insight folder in your documents folder). This automatic backup strategy means

that an older version of INSIGHT could open, change, and save an XML recipe file. However these changes would not be seen by the new INSIGHT running in database mode (since it only reads recipes from the recipe database). Recipe picture file names are normally generated from the database key (eg. DB-101-1.jpg), however where INSIGHT imports recipes from an older version, it remembers the ID from the original and names (and therefore implicitly links) pictures using it.

File system Recipes

File system recipes are those that you write or read from files on the file system of your computer or your network. The *Export* and *Import* File menu items are normally used to maintain file system recipes, however if you have checked the “*I do not want to use the Recipe Database*” item in the *Preferences dialog* the *Save* and *Open* menu items and buttons will work with file system recipes.

When saving or opening the standard *File Open* and *File Save* dialogs will appear. In the past the *Save* button (and menu item) always saved recipes as internal and updated their format to XML. However now recipes are written to the original location and in the same format. Thus, even old RCP and RCX format recipes will remain as such. However INSIGHT does write more information at the end of the old RCP format so everything you enter is saved (e.g. code number, date, location). Thus if this file is read and saved by a very old version of INSIGHT that extra information will be lost.

Caution: When operating in the default recipe database mode, each time you save a recipe it is of course written to the database. However INSIGHT also writes a traditional XML recipe file into the recipe files folder as an automatic backup mechanism. You can store file system recipes in the recipe folder but they will be automatically imported into a newly created database if you ever decide to erase the database file.

To Convert a file system recipe to a database recipe:

See the *File menu* section of this manual.

How INSIGHT Calculates Properties

INSIGHT determines oxide and recipe level properties during each calculation. As shipped it calculates cost at the recipe level and thermal expansion at the formula level. Both properties are derived using the simple additive principle as follows:

If a formula contains oxides A, B, C, etc. (or a recipe contains materials A, B, C, etc.), whose percentage weights are p^A , p^B , p^C , etc., and the physical constants are x^A , x^B , x^C , etc., then:

$$K = (p^A * x^A) + (p^B * x^B) + (p^C * x^C) \text{ etc.}$$

where K is the calculated property value of the mix.

Material and oxide property values are maintained primarily in the MDT file and you can edit them using the *Oxides* and *Materials* dialogs. However INSIGHT supports an override MDT that is read after the main one and the override MDT can have the same materials; their property values thus override. In addition you can use the *Overrides/Typecodes dialog* to create specific property values for cost and thermal expansion that override those read in MDTs.

Needless to say, it is important to have reliable figures in your MDT. However, this is not always possible at the oxide level. We have provided thermal expansion data, however, since there are so many separate sources for it, and since they vary significantly, we have taken the advice of technicians in whom we have confidence. Note that there are two kinds of expansion figures available, those for use with unified formulas and percent-by-weight analysis figures. Additive calculations treat both sets of figures in the same way, however, the data must be paired correctly with either the formula or percent analysis. INSIGHT calculates oxide properties on the basis of the percent by weight analysis.

Chemistry Discrepancies Between INSIGHT and Others

INSIGHT users often find this frustrating. Before over reacting on this please consider some of the following:

If you compare textbooks you will find the same phenomenon. Even documentation from the supplying company will often have conflicting information on material chemistry.

But the most important question is: how big a difference did you find? If one analysis lists MgO, for example, as 2.3% and another at 2.5%, this is normal. However if one says that SiO₂ is 75% and another says it is 65% this is much more significant. It is not so much that the silica is different but what is in the unaccounted for 10% of the latter? Certain oxides relate directly to the purpose for which the material is sold. For example, feldspar is sold as a source of KNaO, thus the supplier will concentrate mainly on maintaining the percentage of this oxide group (hence not being as watchful of fluctuations in the other oxide amounts).

Sometimes you can explain differences by LOI. One analysis might not include it or the LOI figure might be in error. Thus one needs to be corrected.

Is it difficult to measure material chemistry, it involves the interpretation of complex graphic data. Changing the person or lab doing the test will often produce different results. Also, different types of know-how are needed to chemically analyze different types of materials and experience with a material is a big factor. Companies that have their own labs, well defined procedures and long-time lab workers are most likely to have good analysis results.

There are companies that either do not know or care to know much about the chemistry of their materials. The analyses we have of these are either calculated, guessed or done as one-shot tests at independent labs.

Consistency is also a big factor. Any manufacturer that takes delivery of car-load lots of material knows that the

analysis on each shipment is different. The most insightful companies are thus those that provide a representative analysis showing the tolerance.

Our Solution to Materials Chemistry Reliability

The most reliable source of information is going to be the one that is listening, most easily corrected, accessible and compiling representative material analysis data (rather than one-time). This is the online Digitalfire Reference Library website. This site can generate an up-to-date INSIGHT materials database at all times. It also displays an XML representation of each material record, this can be pasted directly into the INSIGHT materials table.

This web site has feedback on every one of its thousands of pages and we constantly get emails from people challenging the information there. Updating incorrect material information is a number one priority. We are also in the process of setting up experts from around the world to author materials on which they have expertise.

Thus if you find a significant discrepancy between material information in INSIGHT and else where, please visit the Digitalfire Reference Library website at <http://digitalfire.com/4sight/index.php> and leave a message for us on the appropriate page. We will research the situation and listen to you and make changes as needed. The goal will always be to provide an analysis that is historically representative of the material.

How INSIGHT Handles Unity & LOI

Sometimes the relationship between the way INSIGHT calculates the formula of certain materials and the way it stores them in the materials table can be puzzling. This is especially true with clays. It is important to understand this because the best way to enter materials into INSIGHT's materials database is by first entering their chemical analysis as a recipe.

Consider the example of Pioneer Kaolin, a material already known by INSIGHT. Figure 1 shows a one-material-recipe duplicated into recipe 2 calculated as RO Unity on the left and R2O3 unity on the right. Even though these numbers look so different the chemistry for the two recipes is exactly the same, it is the unity that is different.

Setting RO unity is not really appropriate for kaolins because recalculating the minute amount of fluxes to unity drives the alumina values very high and thus the formula weight is also high. In addition, if you make even a small change to one of the flux amounts the silica and alumina numbers will change drastically. It is thus better to set the alumina

Figure 1

The screenshot displays the INSIGHT software interface. At the top, the 'Recipe List' window shows a table with columns for 'Line Label', '1', '2', and 'Lookup'. The first row is 'Pioneer Kaolin' with values '100.00' and '100.00' under columns 1 and 2 respectively. A 'Calculation Type' dropdown menu is open, showing 'RO Unity' and 'R2O3 Unity' options. Below the recipe list, the 'Other Calculated Items' window is visible, showing two tables. The left table compares values for Recipe 1 and Recipe 2, and the right table shows oxide compositions for both recipes.

Item	1	2
Formula We...	8650.33	229.32
Si:Al Ratio	2.01	2.01
SiB:Al Ratio	2.01	2.01
Expans	5.06	5.06
Cost/kg	0.73	0.73
Calculated L	13.96	13.96
Imposed LOI		
Recipe Total	100.00	100.00

Oxide	1	2
CaO	0.43*	0.01
MgO	0.35*	0.01
KNaO	0.23*	0.01
TiO2	1.79	0.05
Al2O3	37.72	1.00*
SiO2	75.94	2.01
Fe2O3	0.27	0.01

at unity, then the weight will be in the expected range. If you consider that theoretical kaolin has no flux, this makes sense.

However, remember that during operation INSIGHT remembers materials as formulas and calculations will still work properly no matter

what unity setting a material is recorded with. This is true because the proportion of oxides to each other does not change with unity setting changes.

Notice that INSIGHT shows *Calculated LOI* as 13.96 for both recipes on the last line of the *Calculated Items* list (lower left figure 1). INSIGHT knows the LOI of each material in its materials table by noting the difference between the formula weight it calculates and the one it has been given to save with the material (it assumes any difference is LOI). However INSIGHT also displays an *Imposed LOI* on the next line. You can override calculated LOI on a recipe (forcing INSIGHT to ‘LOI adjust’ the formula weight). INSIGHT assumes zero LOI when calculating the formula weight because it is assuming you want to know the chemistry of the fired product (which of course has no LOI).

In figure 2 recipe 1 is set to display analysis. The “*Override Calculated LOP*” item in the *Calc* menu has been used to impose an LOI of 13.96 on recipe 1 only. Notice its

Figure 2

Item	1	2
Formula We...	n/a	229.32
Si:Al Ratio	2.01	2.01
Si:B:Al Ratio	2.01	2.01
Expan	5.06	5.06
Cost/kg	0.73	0.73
Calculated L	13.96	13.96
Imposed LOI	13.96	
Recipe Total	100.00	100.00

Oxide	1	2
CaO	0.24%	0.01
MgO	0.14%	0.01
KNaO	0.14%	0.01
TiO2	1.42%	0.05
Al2O3	38.27%	1.00*
SiO2	45.40%	2.01
Fe2O3	0.44%	0.01

formula weight has increased to a typical kaolin value.* Raw unfired kaolin is thus ‘properly represented’ in recipe 1 (and ready to be inserted into the materials table if desired).

Notice that recipe 1 shows no formula weight. This is because an analysis cannot, by definition, have a weight.

Figure 3

Materials Definitions for file: LESSONS.XML (116 materials)

Utility Edit

Pioneer Kaolin ?

Alternate Names

Weight: LOI: Molecular Weight:

Cost/lb-USA\$: Thermal Expansion:

Type: Number:

Filter:

Having:

Formula	% Analysis
BaO	<input type="text"/>
CaO	<input type="text" value="0.011"/> 0.2
PbO	<input type="text"/>
Li2O	<input type="text"/>
MgO	<input type="text" value="0.009"/> 0.1
K2O	<input type="text"/>
Na2O	<input type="text" value="0.006"/> 0.1
ZnO	<input type="text"/>
SrO	<input type="text"/>
TiO2	<input type="text" value="0.047"/> 1.4
ZrO2	<input type="text"/>
Al2O3	<input type="text" value="1.000"/> 38.3
B2O3	<input type="text"/>
P2O5	<input type="text"/>
SiO2	<input type="text" value="2.013"/> 45.4

Fe2O3: 0.4
MnO:

LESSONS.XML

Figure 3 shows the material record for the same kaolin. The formula and percentage analysis numbers are shown for each oxide. You can compare these and the weight, molecular weight and LOI numbers to confirm some of the things just discussed. The percentages in the *Materials dialog* differ from those in recipe 1 figure 1 because no LOI was imposed there.

INSIGHT will do its calculations correctly as long as it is given an LOI compensated weight for materials entered into the materials table. There is an example in the Lessons section of this manual on adding a material, it shows you how to do this most effectively.

One final point: Why are there differences in second decimal in some of the numbers shown here? The answer: INSIGHT favors calculation speed over unneeded accuracy.

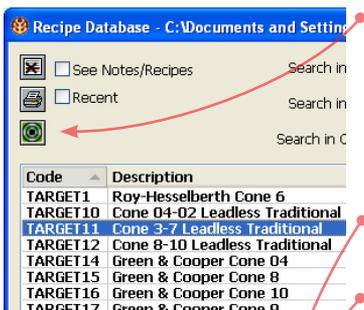
* You will find similar behavior with materials like calcium carbonate calculates to, soda ash, nepheline, dolomite and others.

Limit/Target Formulas

INSIGHT uses the term Target Formulas and intends them as examples of glaze types rather than statements of what safe or durable glazes, for example, should be. We teach you to understand what oxides contribute rather than trust limit formulas whose original purpose you may be unaware of. You can find more information about limit formulas by using the search at digitalfire.com.

To Create/Edit a Target Formula

In INSIGHT, target formulas are entered and stored as recipes.

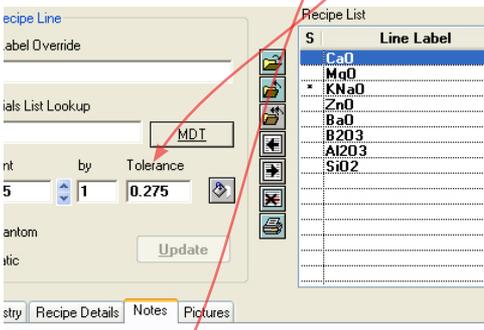


To open one for editing click the green button to show only target formulas in the *Recipe Database window*. Select one and click *Open*. It displays as a recipe. If needed, use an existing one as an example for entering a new one.

Use the *Notes* area to record the purpose of the limits.

Use the *Amount* and *Tolerance* blanks

to enter the range for each line. You can also enter the range in the amount blank using hyphenated notation (for example: 1.2-1.5), and INSIGHT will calculate the tolerance and amounts (in this case, 1.35 +/- 0.15).



intent of this formula does not likely go and the formation of a mechanically durable even then maximum amounts of some

To Open a Target Formula for Comparison

Click the target button above the *Formula list*. It will open as an additional column in the formula list so you can easily compare.

Oxide	1	2	Target
CaO	0.73*	0.79*	0.3-0.6
MgO	0.00*	0.00*	0.1-0.2
K2O	0.03*	0.07*	
Na2O	0.23*	0.14*	
TiO2	0.00	0.00	
Al2O3	0.49	0.35	0.2-0.35
B2O3	0.33	0.21	0.3-0.5
P2O5	0.00	0.00	
SiO2	4.24	3.35	2.5-3.5
Fe2O3	0.01	0.00	
KNaO			0.2-0.5
ZnO			0.1-0.25
BaO			0.1-0.3

About Files INSIGHT Writes

INSIGHT reads previous material, recipe, overrides, and preferences file formats (we standardized on a strict XML format in 2005). All files (except reports) have used an XML file name extension. However in 2007 CSV materials files were introduced, in 2008 an SQL recipe database format was added).

To find INSIGHT files use the green reveal arrows in the *File Paths* tab in the *Preferences dialog* to display the containing folders.

If you are interested in the internal structure of an XML file, just drag and drop it on your web browser and it should display as an outline. Since these files are just text you can also open and edit them with a text editor (e.g. Windows Notepad). Be careful since any violation of XML syntax can make a file unreadable in INSIGHT.

INSIGHT determines the types of older format files by the file name extension (e.g. RCP or RCX for recipe, TMT or MDT for materials). However since XML files can contain different kinds of information it must often distinguish them by ‘sniffing’ inside. When INSIGHT starts it sniffs all XML files in its home and data folders to compile lists of each type (e.g. language translation, materials, overrides, preferences). However recipe files are not sniffed, their type is inferred based on their location and thus must be kept in a separate folder.

As noted above, materials databases can now be maintained in CSV (comma separated values) format. These are readable by spreadsheet programs. CSV files represent a grid of columns and rows by separating data with commas and new-line characters.

The database file is named INSIGHTDATA.DB and is stored in the *INSIGHT Documents Folder* (normally documents/insight or home/insight for Linux). There is a separate section in this manual on this.

Report Files

When INSIGHT generates a report it uses the file extension specified in the *Preferences dialog* and writes the report into a file in the *INSIGHT Documents Folder* (as defined in the *Preferences dialog*).

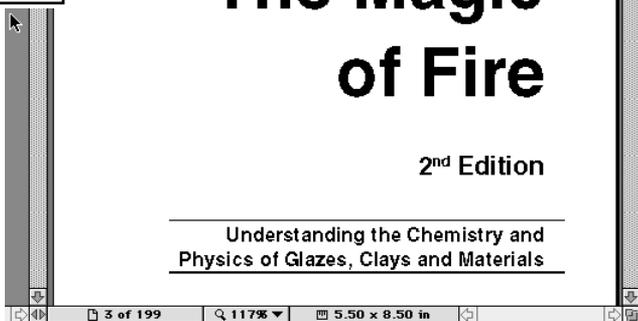
Adobe Reader

You need Adobe Reader (formerly Acrobat Reader) version 5 or higher to read our ‘electronic books’ (including the INSIGHT manual). You can recognize e-book files by their ‘.PDF’ filename suffix (Portable Document Format). Acrobat displays book pages on-screen exactly like the printed versions and you can zoom, print, search, etc. Buttons at the top of the screen turn the pages, zoom in and out, search, go to a page number, etc. and the Table of Contents and Index items are typically clickable. You can print high quality output of any range of pages. Newer versions anti alias the text and can display more than two pages at once.

To install an electronic book onto your computer just copy it from a CD, use the installer we provide or download it from the Internet. If you already have Acrobat installed, just open the book. If not you will find it on most software

CDs sold today or on your System CD. Otherwise you can download it at www.adobe.com. For more information open the README.TXT file in the Acrobat folder on our CD.

To...	⌘L
Page	⌘1
ous Page	⌘2
Page	⌘3
'age	⌘4
Page...	⌘5
es...	⌘⇧A
ck	⌘-
rward	⌘=
Only	⌘6
marks and Page	⌘7
bnails and Page	⌘8



Your Web Browser

Depending on a setting in the *Preferences* dialog, INSIGHT will attempt to display some or all reports using your computer's web browser (Explorer, Firefox, etc.). The call is made by asking your operating system to open its default browser. The same is also true if you choose certain items in the *Help menu*, the intended effect is that your browser opens and displays the page that INSIGHT requests.

The vast majority of computers respond correctly to an INSIGHT request, especially those supplied with standard operating systems from Apple and Microsoft. However, it is possible to customize a computer so that it does not respond as expected.

If there is a problem, tell your computer what the default browser should be. This is normally done in the control panel. In newer versions of Windows there is a special menu choice, "Program Access and Defaults" in the Start button for this. Microsoft and other browsers also have help on how to do this.

Warning: If your browser already has a window open it might replace the contents with the report. If you were part way through answering an e-mail or filling out a form, for example, your work could be lost.

Glossary

Attributes

Settings applied to recipe materials to make them behave a certain way during calculation.

Contained-within Search

A name fragment match is allowed anywhere within a search term.

Definition

The composite information INSIGHT stores with each material in its MDT. This includes the materials name, weight, cost and formula.

Formula

A comparison between numbers of oxide molecules (i.e. CaO, Al₂O₃, SiO₂) in a fired glaze.

Ignore-Case Search

A match is judged successful if an upper or lower case equivalent is found.

MDT

Materials Definition Table. The database in which INSIGHT stores formula, weight, cost, expansion, and other information about materials and oxides.

LOI

The amount of weight a material loses on firing. LOI is usually carbon material that burns away.

LOI-Adjusted Weight

Where the formula weight of a material has been adjusted to compensate for LOI.

Name Fragment

Any portion of a material name which is unique enough to differentiate it from all other material names in an MDT.

Normalized Recipe

A recipe whose unity & non-unity formulas match.

Recipe

A collection of raw materials (i.e. kaolin, flint/silica, feldspar) which are measured by weight to form a composite mix of powders.

Starts-with Search

A name fragment match is allowed only from the start of a search term.

TEXT file

A file that contains only ASCII characters in a line by line format, with carriage returns delimiting the lines.

Glossary - Ceramic

This section has been moved to our reference web site.

Note: This manual describes the mechanics of using the INSIGHT software. If you need more information on glaze chemistry basics and how to make practical use of INSIGHT calculations, remember that our web site a **'The Magic of Fire'** book.

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