Spreadsheet Applications for Materials Science

Microsoft Excel Reference Card (draft)

The Basics

Notebooks – Excel uses a notebook concept in which your spreadsheet application is actually a number of individual spreadsheet notebooks. Each notebook contains the cells, data, formulas and other objects you place in them. You can switch between notebooks using the tabs at the bottom of the window. (See figure below.) Right-click these tabs to change the notebooks name or to add, delete or move notebooks.

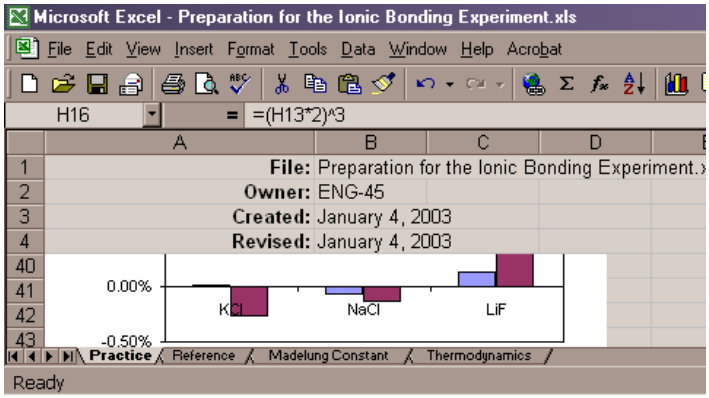

Figure 1 Truncated screen shot of the Excel desktop.

Main Menu – Like nearly all Windows programs the main menu (see figure above) provides quick access to all of Excel's functions and features.

Toolbars – Toolbars make accessing common procedures and functions easier than navigating the main menu. By default the standard and formatting toolbars are displayed (see figure above), but there are many other toolbars that pop up automatically or can be turned on and off through the View/Toolbars option in the main menu.

Editor Bar – The third bar in the figure above is the editor bar. It lists the current cell address and the cell contents, in this case a formula. The formula can be edited in this bar.

Properties – The properties of any notebook, cell, chart or other object can be changed by right-clicking the object, or by selecting an option under the Format item in the main menu, and making the changes through the dialog box that pops up.

Cells – The cells in each notebook are where data and formulas are entered. Each cell has a unique row (1-65536) and column (A-IV) address. Cell addresses are written A1 for the top left (home) cell and A1:F10 for a rectangular block of cells. To select a block of cells drag the mouse over the cells or hold down the SHIFT key while using the arrow key to select the block.

Keyboard Shortcuts and Other Conventions

Navigation Shortcuts – Home – move to column A in the same row. End+↑,↓,→ or ← – move in the arrow's direction to the last non-empty cell. PgUp/PgDn – move up or down one screen. CTRL+Home/End – move to the home cell or the last row and column your notebook uses.

Menu Shortcuts – The ALT and CTRL keys provide quick access to functions and features in the main menu. Typing ATL followed by the underlined letter, for example, ALT+F+S, is equivalent to *File/Save*. Some CTRL sequences, for example CTRL+S which is equivalent to ATL+F+S, are even quicker. CTRL+C, V and X will copy, paste and delete cell contents and CTRL-Z will undo the last change.

Function Keys – F1=help, F2=start editing a cell, F3=paste cell names , F4=redo last change , F5=go to cell, F6=?, F7=spell check, F8=select a block of cells, F9=recalculate?, F10=?, F11=insert new notebook, F12=save file as.

Entering Data

Entering Text – To enter text into a cell simply start typing. If Excel does not recognize your entry as a number or formula Excel will assume it is text. If you want to enter a number, formula or function as text start by typing an apostrophe, for example, '123.

Entering Numbers – To enter a number simply type the number. To enter a number using scientific notation such as 6.023×10^{23} type 6.023E23. To enter a number such as one-third enter 0.333 followed by as many 3's as you wish, or enter the formula =1/3.

Editing Cell Contents – To change the contents of a cell without retyping everything press F2 to enter edit mode.

Formulas

To enter formulas start by typing one of the following symbols: = + - (. (decimal point) $ or @. The @ symbol is only used with functions and the parentheses must be used in pairs. Operators commonly used in formulas are: = equals, - subtraction, + addition, * multiplication, / division, ( ) grouping of operations, and ^ exponent. Examples of simple formulas are:

Formula	Excel Formula	Result
1+2	=1+2	3
$-\frac{1}{2+3}$	-1/(2+3)	-0.2
$[(1+2)(3+4)]^2$	=((1+2)*(3+4))^2	441
$\frac{4}{3}\pi r^3$	=4/3*@pi()*A2^3	113.097335529

Referencing Cells in Formulas – Note that the value for *r* in the last formula above is found in cell A2. (@pi() is a function that returns the value of π.) If this formula is moved or copied, to the cell immediately to its right for example, the cell reference would change to A1. To prevent this write the cell reference as A2. Each dollar sign fixes its respective cell coordinate.

Precedence – The precedence (order of execution) used in

evaluating a formula, from first to last, is: 1: ^ and ( ), 2: * and /, 3: + and -. Logical operators and inequalities have even lower precedence. Examples of precedence can be seen in the table above.

Functions

Excel offers over 500 functions, including math, statistical, engineering, financial and other categories of functions. If you know which function you need then simply type it starting with an @ to tell Excel that it is a function. All functions begin with this @ character. Examples are @sin(x), @average(A1:F10) and @sum(A1:F10). If you need to find a function click the f_x button in the toolbar to bring up the *Paste Function* dialog and select your function.

Formatting Cells

Nearly every display characteristic of any cell can be changed using the *Format/Cells* menu option, or the shortcut CTRL+1, or by right-clicking the cell and selecting the *Format Cells* option. Attributes that can be changed include font type, size, color and style, also alignment, fill patterns and colors and even drawing a border around the cell. Several cells can be joined and text can wrap to the next line. Many of these things can also be changed using buttons in the formatting toolbar.

Text in cells can be changed in different ways. Text within a single cell can be several colors, sizes and styles. Enter edit mode, select the portion of the text to change, and use the same menus, shortcuts and toolbars used to format the whole cell.

Charts

Creating a Chart – Excel provides a chart wizard that will help you create a new chart or graph. Simply click the button in the standard toolbar and go through the series of four pages that asks you to specify the type of chart, the source data, chart options such as titles, axes, grid lines, and finally where in your spreadsheet the *Chart Wizard* should place the chart.

Editing your Chart – To change any part of your chart simply mouse-click it and select the item to be changed from the toolbar that pops up. Or, right-click that part, select the "Format ..." option at the top of the pop-up menu and make the changes from the dialog.

Types of Charts – Excel offers many types of charts. Among the most frequently used types, and how they are generally used are:

Bar and Column Charts – comparisons of magnitudes of discrete measurements, possibly illustrating a trend. See figure 2.

Line Charts – draws lines to connect points that are evenly spaced. The data points in line charts do not require x-axis coordinates.

Pie Charts – illustrates how all of something is partitioned or shared, such as a chart illustrating relative numbers of students in each engineering major.

XY (scatter) – plots where each data point has an x and y-axis coordinate.

Pasting Charts into Your Document – To copy the chart to your document simply click the chart, type CTRL-C to copy it to the clipboard, go to the place in your document where you want to place the chart, and type CTRL-V to paste it from the clipboard.

Recommendations – Please consider the following suggestions when preparing charts for your engineering reports:

- The color of the frame and plotting areas should be white
- Do not place titles in your charts. Put this information in the figure caption.
- Pay attention to details such as the format of the numbers used for the axes labels, where the x and y axes cross, the size of the text and symbols in your final graph, and how you graphs will look when the printer or photocopier does not support color.

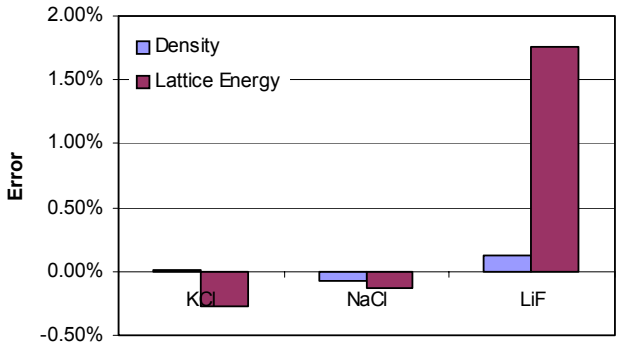

Figure 2. Differences between the reference and calculated densities and lattice energies of three NaCl-type compounds.

Advanced Numerical Tools

Sorting and advanced numerical tools such as solver, histograms, amortization, regression analysis...

Importing Data

There are several ways to import data into Excel and once imported Excel offers tools to help you break up the text into cells and columns of cells. Three methods are:

Cut and Paste - Cut and paste data and/or text from another open file or document using standard Windows techniques. Use the *Data/Text to Columns* function to parse the data.

Double-click – This works for several types of files that Excel recognizes. Comma-separated variable (*.CSV) and space-delimited text (*.PRN) files are two examples. Files that will automatically open into Excel will have an Excel-type icon.

Open File – Open the file in the usual way. File types that Excel recognizes will be parsed automatically. For other types of text files the *Text Import Wizard* will pop up so that you can specify how the data should be parsed.