

(DRAFT VERSION)

Periodic Table Live! Graphing Applet

Introduction

The Periodic Table Live! Graphing Applet is an interactive utility designed to facilitate the exploration of trends in elemental properties. It is also an efficient tool for looking up elemental data. The graphical interface of this applet has been designed to resemble a Windows based interface, allowing the separate components of the program to be moved, resized, and hidden on demand.

The Periodic Table Live! Graphing applet consists of two major component – a graphing component and a table component – that can be used for visual presentation of a variety of elemental data. The graphing component is used to view elemental data that can be characterized numerically, such as densities, atomic numbers, and so on. The table component can be used to view the same data that is presented in the graphing component, as well as data that is non-numerical in nature, such as the uses and sources of an element.

Before You Start

The Periodic Table Live! Graphing Applet has been designed to integrate with the web-browser based format of the Periodic Table Live! program. In order to be able to view the program in a web-browser necessitates that it be implemented as a Java applet. However, supporting the robust nature of the program required that a version of Java be used that is not generally supported in most web-browsers. The solution is to install a web-browser plug-in that allows the program to be used in a web-browser.

Java applets are, in theory, platform independent. However, when using browser plug-ins to support applets based on more recent releases of Java, the degree of platform independence is reduced. This is due to the fact that Windows has implemented more support for Java than Macintosh has, at least until the release of the Mac OSX operating system. For this reason, different operating systems will require different plug-in(s) to be installed in order to use this applet. Furthermore, due to the limitations of the plug-ins available for the Macintosh Classic operating system, certain functions of the applet, such as printing, cannot be utilized under this operating system.

Instructions regarding what plug-ins to install on your computer and how to install them follow. These instructions are broken down into three categories: 1) [Window based computers](#), 2) [Macintosh Classic OS based computers](#), and 3) [Macintosh OSX based computers](#).

Windows-based Computers:

In order to run the Periodic Table Live! Graphing Applet on a Window's based computer, you must first install Sun Microsystem's Java Plug-in 1.4. The installer for this plug-in is located on this cd at

X:\Installation\Windows\j2re-1_4_0_01-windows-i586.exe

where X is the letter name of your CD-ROM drive. Alternatively, the installer can be downloaded free of charge from Sun's website at <http://java.sun.com/j2se/1.4/>. Version 1.4 is the most recent release of the Java Plug-in Software. The Periodic Table Live! Graphing Applet has been tested with all 1.4 and 1.3 versions of the Java Plug-in Software. The only versions of the Java Plug-in software that will run the Graphing Applet without problems are version 1.4 and version 1.3.1_01a. It is not recommended that you run the Graphing Applet with version 1.3.1_02 or 1.3.1_03.

To run the installer, launch the file *j2re-1_4_0_01-windows-i586.exe*, and follow the on-screen directions. After the installation is complete, you will be able to use the Periodic Table Live! Graphing Applet.

Macintosh Classic OS Based Computers:

If you are using any Macintosh Classic Operating System (every Macintosh operating system except Mac OSX is considered to be a Macintosh Classic Operating System), you will need to install the MRJ Java plug-in version 2.2 or higher. This will require a number of steps.

The latest version of the MRJ Software available for the Macintosh Classic operating system is MRJ 2.2.5. This software can be downloaded free of charge from <http://developer.apple.com/java/download.html>. Alternatively, the MRJ 2.2.4 (which is the latest version that can be redistributed) installer is located on this CD at

X:\Installation\Macintosh\MRJ2.2.4_Redistribution_SDK_smi.bin

where X is the letter name of your CD-ROM drive. To run the installer, unpack the .bin file with a decompression program such as *Stuffit*, and run the *Install* file. The installer will copy all of the MRJ files to the proper location on your computer. It is recommended that you download MRJ 2.2.5.

VERY IMPORTANT: The MRJ Software installed to your computer does not include one of the files required to run the Periodic Table Live! Graphing Applet. This file, which is named *swingall.jar*, is located on the CD at

X:\Installation\Macintosh\swingall.jar

where X is the letter name of your CD-ROM drive. After you have run the MRJ installer, you must copy the *swingall.jar* file from the CD to your System. *swingall.jar* needs to be placed on your computer in the folder

System Folder : Extensions : MRJ Libraries : MRJClasses.

If you plan on running the Periodic Table Live! Graphing Applet in Netscape Navigator, there is still one more plug-in to install. In order for Netscape Communicator (any version) to use the MRJ software, the MRJ Java Plugin must be installed in your Netscape folder.

This plug-in can be downloaded free of charge from Mozilla at <http://www.mozilla.org/oji/MRJPlugin.html>. From this page, download the plug-in folder and follow the installation instructions. Alternatively, the .sit file containing the plugin is located on this CD at

X:\Installation\Macintosh\MRJPlugin.sit.hqx

where X is the letter name of your CD-ROM drive. Unstuff *MRJPlugin.sit* with a compression utility such as *Stuffit*. A folder named *MRJPlugin* should appear on your desktop. This folder contains separate plugins for Netscape 6 and all other versions of Netscape.

Netscape 6:

If you are using Netscape 6, first locate the *Netscape 6* or *Netscape Communicator* folder on your computer. Next locate the *Plugins* folder within the Netscape folder on your computer. Copy the files **MRJPlugin** and **MRJPlugin.jar** from the *MRJPlugin : Plugin for Netscape 6 : -->Plug-ins* folder to the *Plugins* folder within the Netscape folder. When you restart Netscape, the MRJPlugin for Netscape will be installed.

Netscape 4.x:

If you are using Netscape 4.x, first locate the *Netscape 4.x* or *Netscape Communicator* folder on your computer. Next locate the *Plugins* folder within the Netscape folder on your computer. Copy file files **MRJPlugin(4.x)** and **MRJPlugin.jar** from the *MRJPlugin : Plugin for Netscape 4.76 : -->Plug-ins* folder to the *Plugins* folder within the Netscape folder. When you restart Netscape, the MRJPlugin for Netscape will be installed.

Macintosh OSX Based Computers:

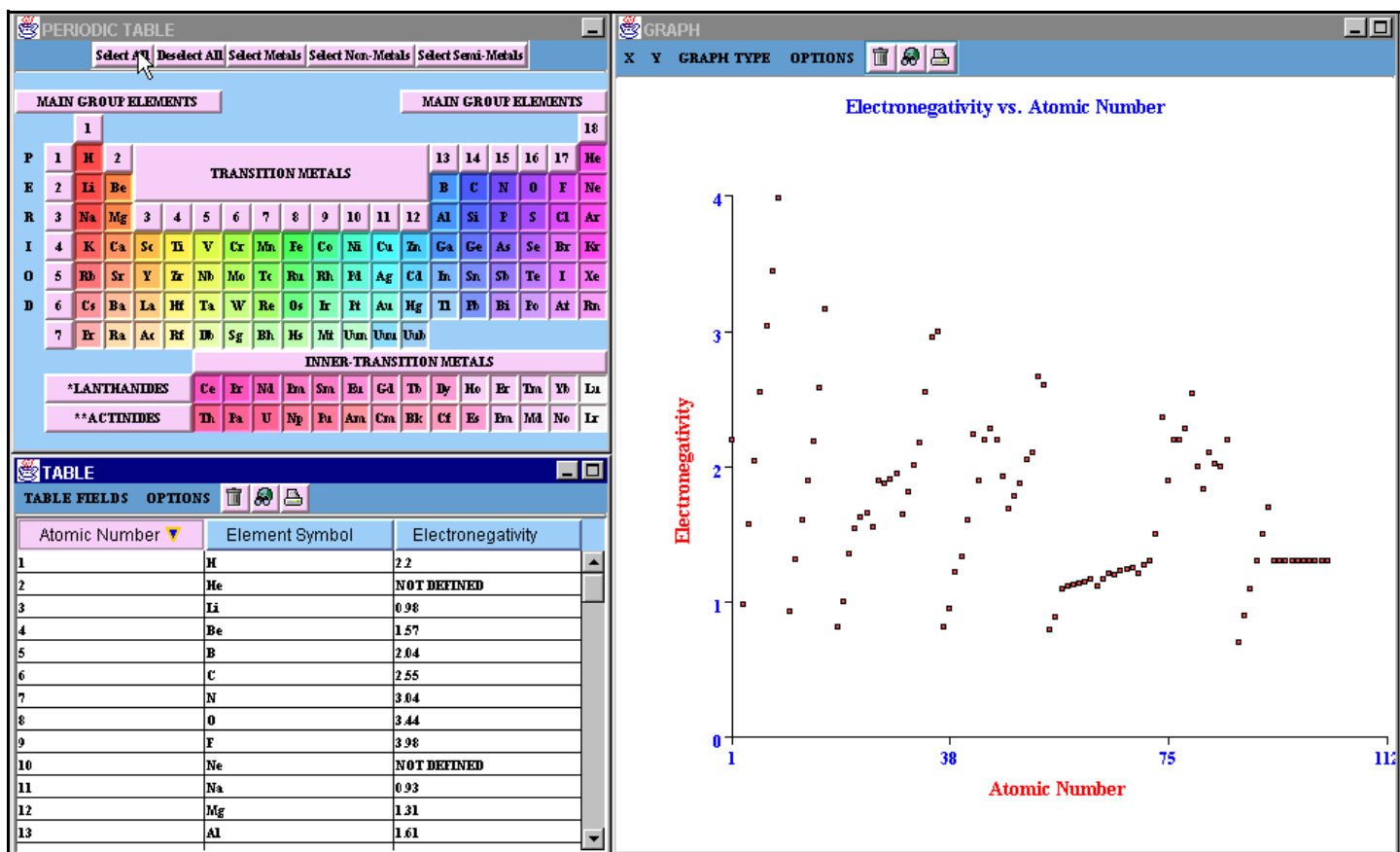
Currently, the Periodic Table Live! Graphing Applet is not being supported under the Macintosh OSX operating system. This will change in the future. If you want to this applet under the Mac OSX operating system, run it while in native mode, and follow the instructions for [running the applet under the Macintosh Classic Operating System](#).

Running the Applet

The Periodic Table Live! Graphing Applet is integrated with the rest of the Periodic Table Live! collection. Clicking on the *Charts* icon in the Periodic Table Live! collection will launch the applet in a separate browser window. When the applet is launched, some checking is done to determine what operating system and web browser you are running. Additionally, an attempt is made to determine if all of the proper plug-ins are installed to be able to use the applet. If the web browser fails any test, instructions on how to proceed are displayed. Assuming that the proper plug-ins have been installed, you should only have to adjust your web browser settings in order to use the applet.

Using the Applet

The overall layout of the applet is illustrated in the following figure.



The graphical interface for the Periodic Table Live! Graphing Applet consists of three major windows, as well as a number of dialog boxes that may or may not be used. Each of these windows can be resized, minimized and maximized in a manner consistent with windows in any Windows Operating System. The appearance of the windows may differ depending on your operating system and system settings. The three windows are the [Graph window](#), the [Table window](#), and the [Periodic Table window](#). The function of each of these windows is described below.

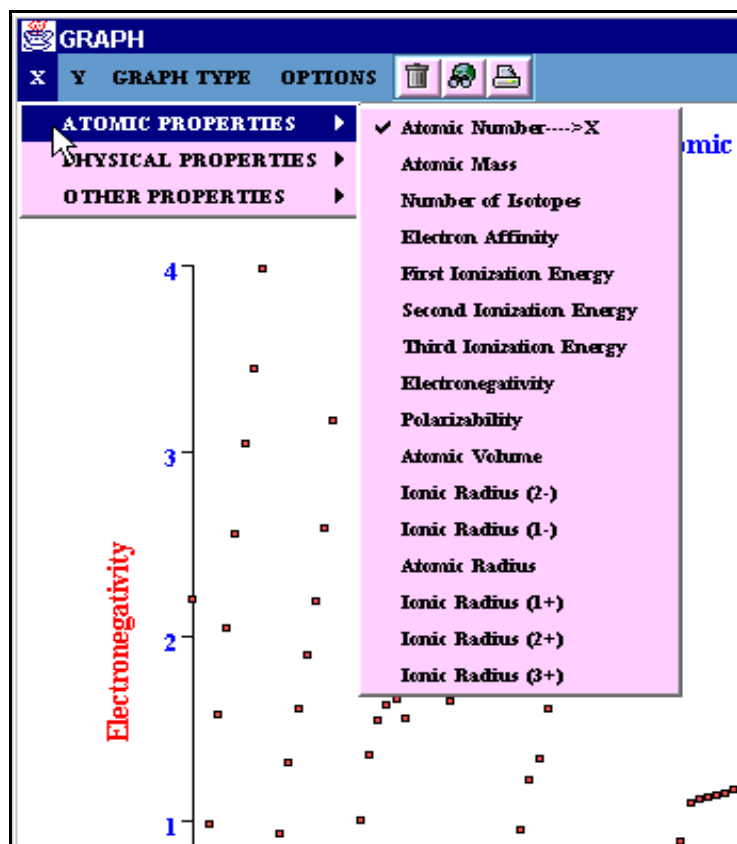
The Graph Window:

The Graph Window displays a standard plot of the selected data. The data that is displayed in the plot can be manipulated by selecting or deselecting elements in the Periodic Table Window, and by selecting what fields to display from the drop-down menus.

At the top of the graph window there is a menu bar that contains four drop-down menus and three buttons. Descriptions of each menu and button are listed below.

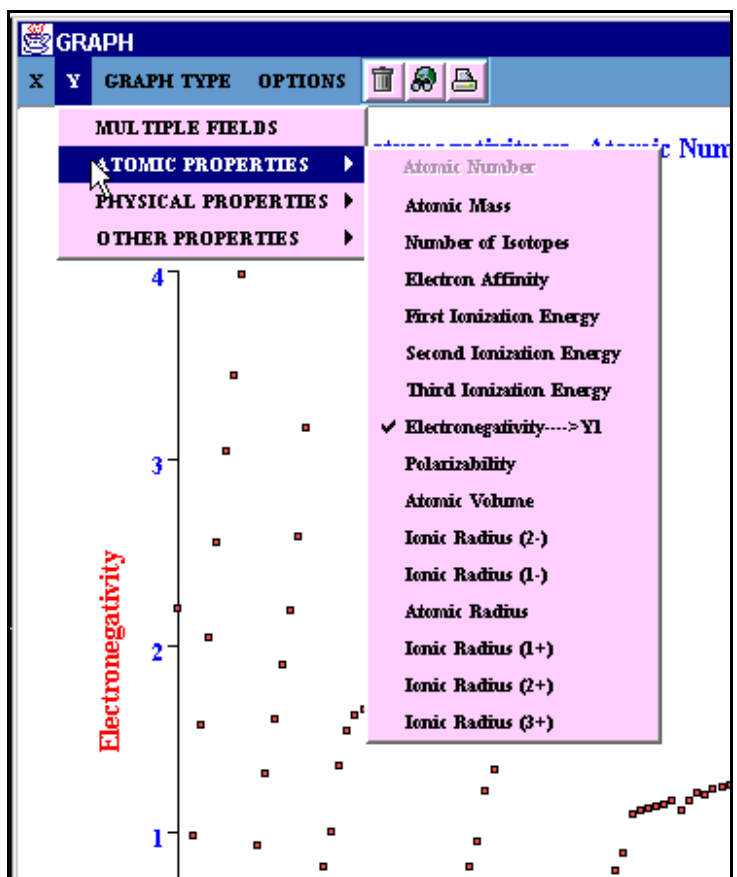
X Menu

The *X Menu* allows the user to choose an elemental property to be used as the X axis in the plot. Only one property at a time can be chosen for the X axis. Every graphable elemental property is listed on this menu within one of the three sub-menus (Atomic Properties, Physical Properties, and Other Properties). The property that is currently selected will be highlighted on the menu with a check mark, and an arrow pointing to the letter X, indicating that this property is being used on the X axis. When the applet starts or when the graph is cleared, the selected elemental property defaults to Atomic Number. If the [data link between the Graph Window and Table window](#) is enabled, selecting an elemental property from the *X Menu* will simultaneously select the corresponding property on the *Table Window Table Fields Menu*, and consequently create a new column in the *Table Window* displaying the data for the selected elemental property.



Y Menu

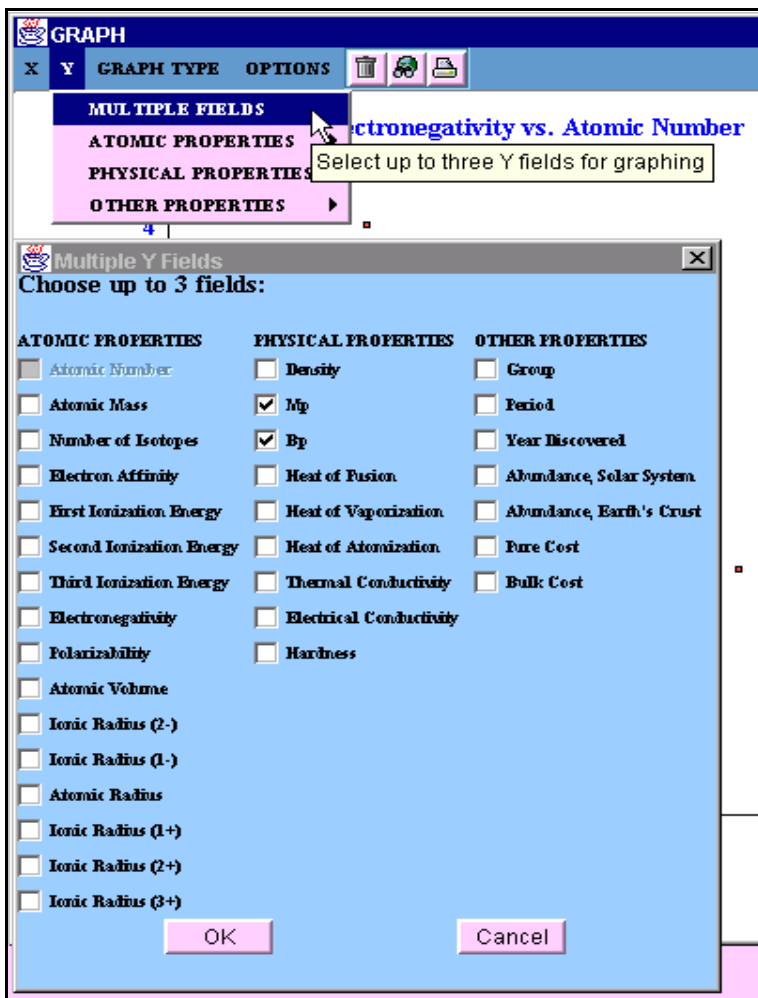
The *Y Menu* allows the user to choose one, two or three elemental properties to be displayed on the Y axis of the plot. Every graphable elemental property is listed on this menu within one of the three sub-menus (Atomic Properties, Physical Properties, and Other Properties). The menu contains the same items as the *X Menu*, plus one extra menu item labeled *Multiple Fields*. Properties that are currently selected on the *Y Menu* are highlighted with a check mark and an arrow pointing to either Y1, Y2, or Y3. If a property is selected on the *X Menu*, it is automatically disabled on the *Y Menu*. If the [data link between the Graph Window and Table window](#) is enabled, selecting an elemental property from the *Y Menu* will simultaneously select the corresponding property on the *Table Window Table Fields Menu*, and consequently create a new column in the *Table Window* displaying the data for the selected elemental property.



By default, only one property can be selected from the *Y Menu* at a time. In order to view multiple properties on the Y axis, the *Multiple Fields* menu item must be selected. Selecting *Multiple Fields* will open the window shown to the right.

In this window, up to three fields may be selected simultaneously, using the check boxes to select or deselect elemental properties. Pressing the OK button on this window will cause the selected elemental properties to be displayed on the graph. The property currently selected for the X axis is disabled in this window. Note that the option to graph multiple fields on the Y axis is not available when [graphing by period or graphing by group](#).

If the [data link between the Graph Window and Table window](#) is enabled, selecting one or more elemental properties from the *Multiple Fields Dialog* will simultaneously select the corresponding properties on the *Table Window Table Fields Menu*, and consequently create new columns in the *Table Window* displaying the data for the selected elemental property. If you want to alter the graph without changing the contents of the table, first [disable the data link between the Table Window and Graph Window](#).

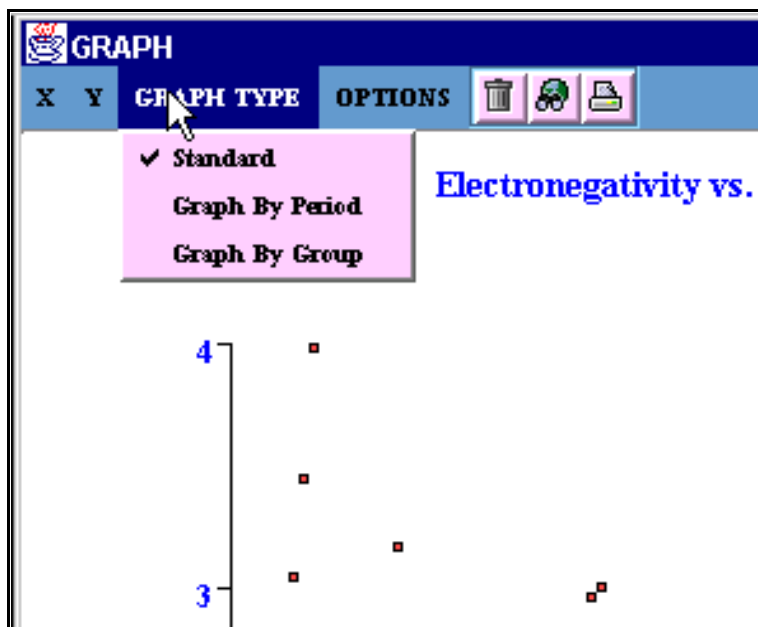


Graph Type Menu

The *Graph Type Menu* allows the user to select between three types of graphs.

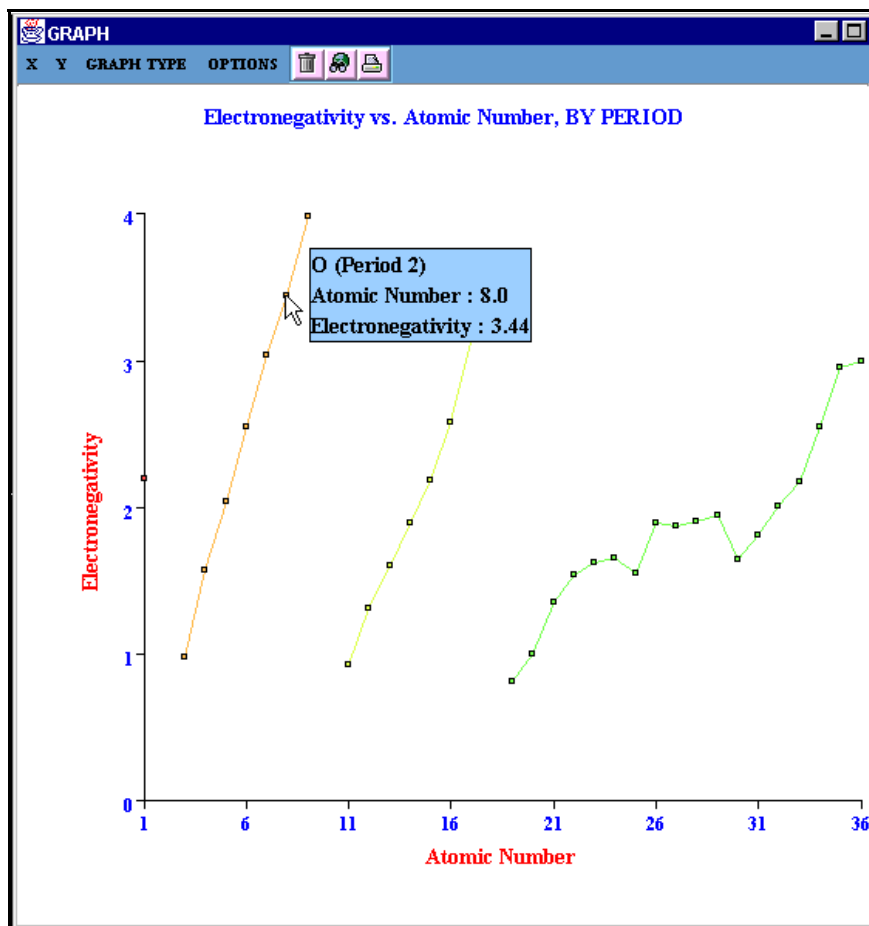
Standard:

The standard graph is simply a scatter plot of the field(s) selected for the Y axis versus the field selected for the X axis. This is only type of graph in which multiple fields may be plotted on the Y axis. If the [Graph by Period](#) or [Graph by Group](#) option is selected from this menu while multiple Y fields are displayed on the plot, only the field labeled "Y1" will remain selected. When multiple elemental properties are displayed on the Y axis, the Y axis label will read "Y1, Y2, Y3". The properties represented by Y1, Y2, and Y3 can be determined by three methods. The first method is to examine the *Y Menu*. On this menu, the selected elemental properties will be labeled Y1, Y2 or Y3. The second method is to [display the graph's legend](#). The color coding of the legend will indicate the color of the data points representing specific elemental properties. The third method is to look at the graph's title. The title will list the properties displayed in the graph in order. For instance, for a graph of Melting Point and Boiling Point versus Atomic number, the title will read "MP and BP versus Atomic Number". Thus Melting Point is Y1 and Boiling Point is Y2.



Graph By Period and Graph By Group:

These types of plots organize the graph data according to the period or group of the elements currently displayed on the plot. The figure to the right illustrates graphing by Period. The data points for all elements in a given period are connected by a line. Similarly, when graphing by Group, the data points for all elements in a given group are connected by a line. In these types of plots, only one elemental property may be selected at a time for display on the Y axis. This restriction was implemented to ensure legibility of a graph. [Displaying the graph legend](#) may be helpful when viewing these types of charts.

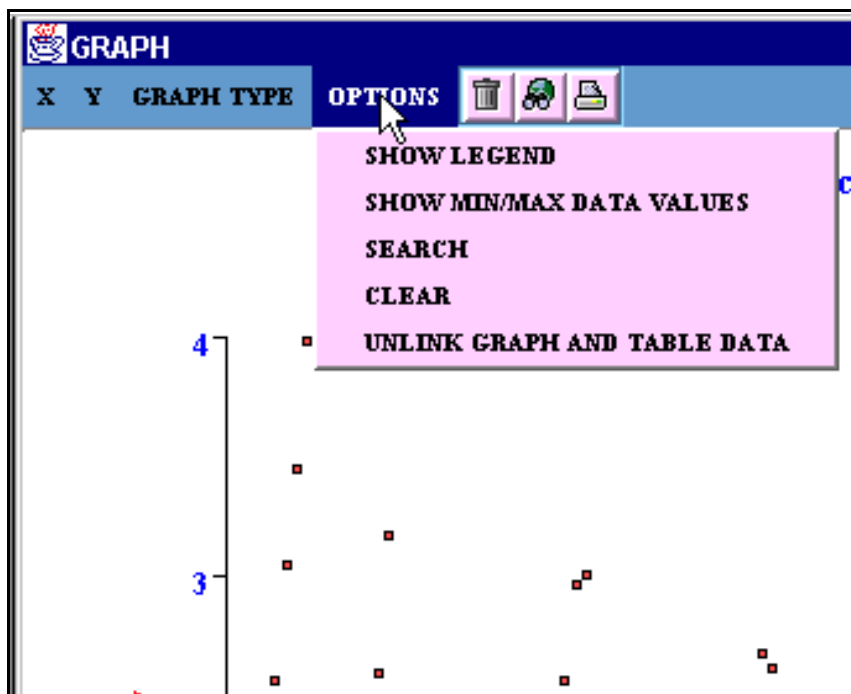


Options Menu

The *Options Menu* contains a number of utility functions that can be used to manipulate and view graph data more efficiently. Each utility function listed on the *Options Menu* is described in detail below.

Link/Unlink Graph and Table Data:

By default, the data in the Graph and [Table](#) are linked so that the Graph and [Table](#) display the same information (when possible). If an elemental property is selected to be displayed from the [X Menu](#) or [Y Menu](#), that property will simultaneously be displayed in the table. This option can be toggled by selecting the *Link/Unlink Graph and Table Data* option from the *Options Menu*. Unlinking the Graph and [Table](#) data allows more field to be viewed simultaneously. When linked, a maximum of three elemental properties can be displayed at any given time. When unlinked, a maximum of three properties may be view on both the [Table](#) and the Graph, for a total of six.



It should be noted that when the [Table](#) and Graph are linked, changing the Graph will simultaneously alter the [Table](#) and vice versa. If you want to change one without changing the other, you should first unlink the [Table](#) and Graph.

Clear:

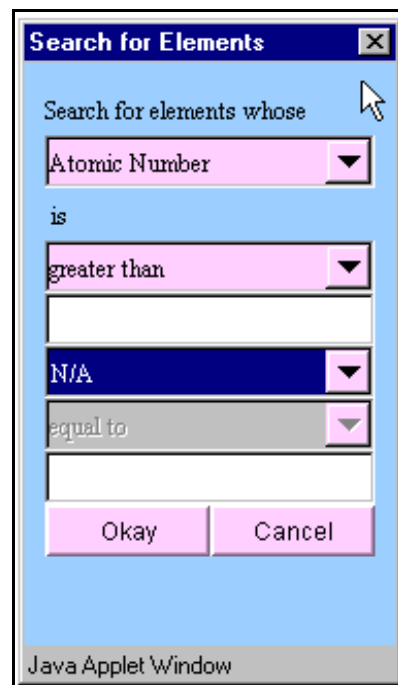
This option simply clears the graph. No elements are selected or deselected when clearing the graph. However, the elemental property displayed on the X axis is set to Atomic Number, and any elemental properties selected on the [Y Menu](#) are deselected.

Search:

This option displays the search window shown to the right. The *Search Dialog* allows the user to search for elements that fit specific criteria. A search is performed by selecting the elemental property to search within, and entering the limitations of the search. The topmost drop-down list contains all of the elemental properties. When the *Search Dialog* is opened from the [Graph Window](#), only those properties that can be graphed (i.e. properties that are numerical in nature) are enabled. The other drop-down lists and text boxes are used to select the criteria to search for within the elemental property. Searches that can be performed include greater than, less than, equal to, greater than and less than, greater than or less than, greater than or equal to, less than or equal to, and so on. Search criteria that are illogical are not allowed. For instance, a search could not be performed for an element whose Atomic Number is equal to 1 and equal to 2. Once the search criteria have been entered, press the *Okay* button to perform the search. Pressing the *Cancel* button will close the search dialog without performing a search.

When a search is performed, the selected elemental property will be plotted on the Y axis, unless the selected elemental property is already chosen for the X axis. For example if a search is performed to find all elements with an Atomic Number great than 50, Atomic Number will be selected as the Y axis field on the graph, unless Atomic Number was already chosen as the X axis field on the graph.

Performing a search will select all elements that fit the criteria, and deselect all others. If no elements fit the criteria, all elements will be deselected, and the graph will be cleared (equivalent to selecting the [Clear](#) option). If no values are entered in the text boxes on the search dialog, performing a search will simply change the Y axis field in the graph.



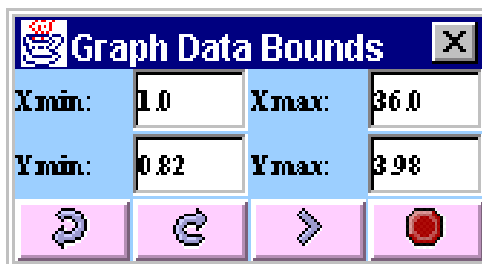
The *Search for Elements* dialog box is a Java Applet Window. It features a title bar with a close button. The main area is light blue and contains the text "Search for elements whose" followed by a dropdown menu currently showing "Atomic Number". Below this is the word "is" followed by another dropdown menu showing "greater than". There are two empty text input fields below the second dropdown. The third dropdown menu shows "N/A". Below that is a dropdown menu showing "equal to" and another empty text input field. At the bottom are two buttons: "Okay" and "Cancel".

Show Min/Max Data Values:

This option displays the toolbar shown to the right. This toolbar displays the current minimum and maximum values of the data on the graph. The values in this toolbar can be changed, and consequently may be used as another method of searching for elements that fit specific criteria. This toolbar effectively allows the user to zoom in or out on sections of the graph.

This toolbar has four buttons. The two left-most buttons are *undo* (↶) and *redo* (↷). This toolbar keeps a list of the last five changes that have been made to the graph. The *undo* button will revert the graph to the previous state.

The *redo* button will perform the opposite action. The *graph button* (➤) will apply the entered changes to the graph. The *cancel button* (⛔) will close the toolbar. Note that when the toolbar is closed, the list of changes that have been made to the graph is erased. The *graph button* is the default button, so pressing the *Enter key* will perform the same action as pressing this button.



The *Graph Data Bounds* toolbar has a title bar with a close button. It contains four text input fields arranged in a 2x2 grid: "Xmin:" with value "1.0", "Xmax:" with value "36.0", "Ymin:" with value "0.82", and "Ymax:" with value "3.98". Below these fields are four buttons: a left arrow (undo), a right arrow (redo), a right-pointing arrow (graph), and a red octagon (cancel).

The data values displayed in this toolbar are the minimum and maximum values for the actual data points on the graph, not the minimum and maximum values of the X and Y axes on the graph. Consequently, the value displayed most likely will end up being a different value than any value that the user enters. For instance, consider the case where a plot of Melting Point (on the Y axis) versus Atomic Number (on the X axis) is current displayed in the [Graph Window](#). If a value of 200 was entered as the maximum X value and the *graph button* pressed, the *Xmax field* would end up displaying 112, because this is the maximum value that any element included in this program may have for Atomic Number.

When entering values into the text fields of this toolbar, it should be noted that entering invalid values in any of the text boxes will essentially disable the *graph button*. When the *graph button* is pressed while one or more of the text boxes contains invalid data, nothing will happen. Examples of invalid data include any non-numerical characters (such as any letters) and invalid numbers (such as 123.45.67). The only exception is the asterisk character ("*"). This character may be used as a wildcard,

indicating that any value will be acceptable. For instance, consider again the case where a plot of Melting Point versus Atomic Number is currently displayed in the [Graph Window](#). Suppose that you were looking for the Melting Points of any elements with Atomic Numbers between 55 and 75, but only those with Melting Points higher than 2500 K. In this case the following entries in the toolbar would achieve the desired results:

Xmin: 55
Xmax: 75
Ymin: 2500
Ymax: *


Show Legend:

The graph's legend may be shown or hidden by selecting this option. An example of a graph with the legend visible is shown to the right. Displaying the legend can take up a lot of space, and chances are that it will not normally be needed, so it is hidden by default. The legend is most helpful when [graphing by Period or graphing by Group](#). In these cases, the legend is very useful for distinguishing what period or group a data point belongs to.


The Graph Window Buttons

The Graph Window contains either two or three buttons (depending on the operating system) that may be used as shortcuts for manipulating the graph.


Clear Button:

The *clear button* () performs the same action as the [Clear](#) selection on the [Graph Window Options Menu](#).

Search Button:

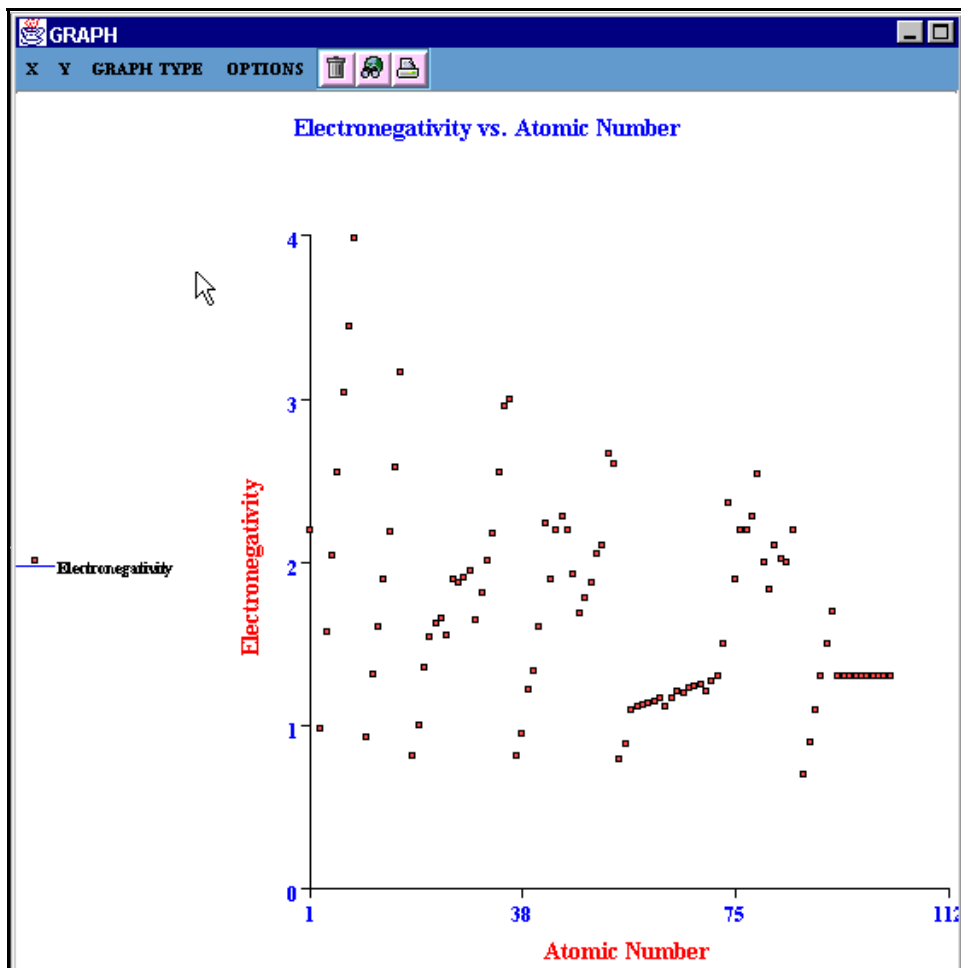
The *search button* () performs the same action as the [Search](#) selection on the [Graph Window Options Menu](#).

Print Button (Windows only):

The *print button* () can be used to send the current graph to a printer. Due to the limitations placed on Java applets under the Macintosh operating system, printing is not available when running the applet on a Macintosh computer.

Additional Information Regarding the Graph Window

The Graph Window has two additional features designed to assist in viewing and analyzing data displayed in a graph. These features are described in detail below.



Pop-up Data Labels:

The first feature is a pop-up box that appears whenever the mouse is pointing to a data point in the graph. The pop-up box contains the elemental symbol of the element represented by that data point, the elemental properties used for the X and Y axis for that data point, and the X and Y values for that data point. An example of this pop-up data label is illustrated in the figure to the right. If the current graph type is Graph by Period or Graph by Group, the Period or Group of the element represented by the data point will also be included in the pop-up data label.

Highlighting Specific Data Points:

If the current graph consists of a large number of data points, it may be difficult to locate the data point(s) that represent a specific element of interest. To alleviate this problem there is a feature that allows the data point(s) representing a specific element to be highlighted on the graph. In order to highlight a specific element on the graph, highlight the desired element in the [Table Window](#). An example of highlighting data points is shown in the following figure.

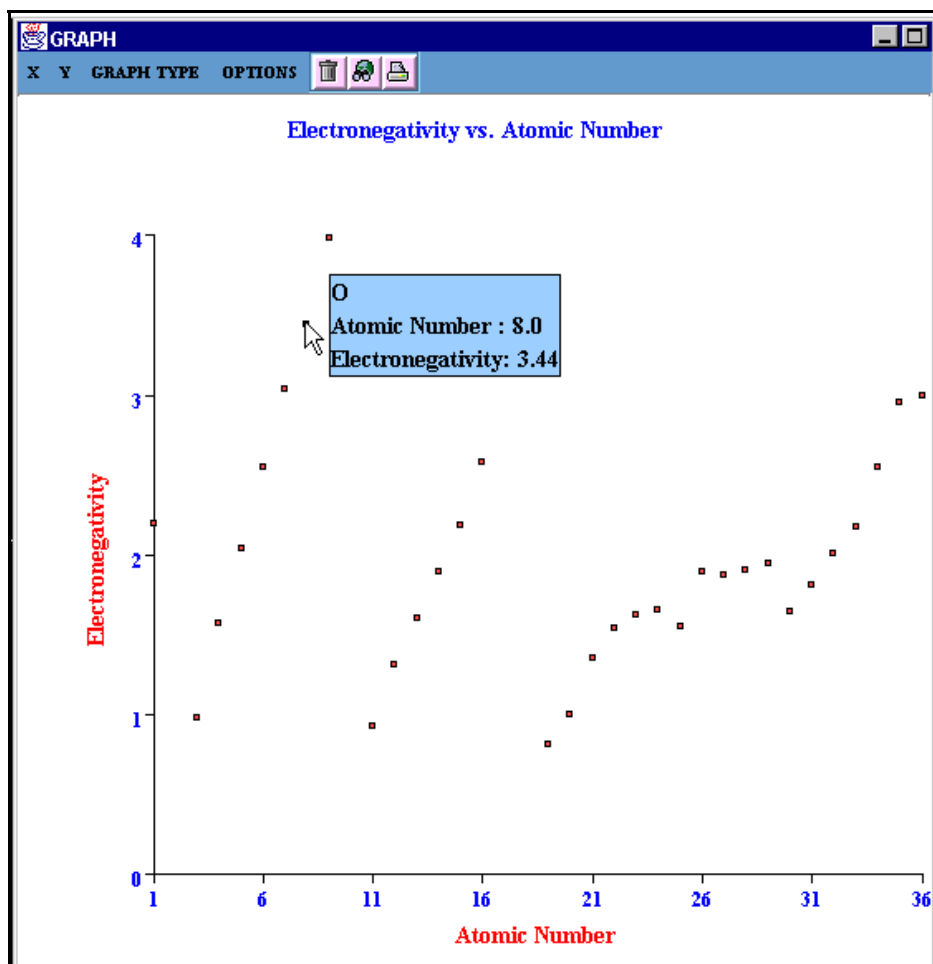
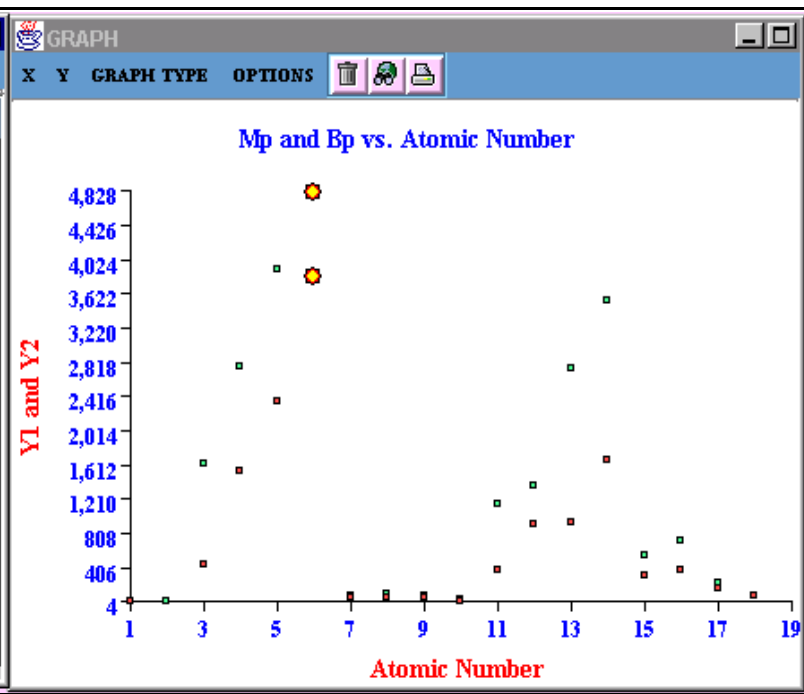


TABLE			
TABLE FIELDS		OPTIONS	
Atomic Nu...	Element S...	Mp (K)	Bp (K)
1	H	14.06	20.4
2	He	NO DATA	4.2
3	Li	453.74	1620.0
4	Be	1551.2	2773.0
5	B	2352.2	3923.2
6	C	3823.2	4827.0
7	N	63.34	77.4
8	O	54.8	90.2
9	F	53.58	85.1
10	Ne	24.53	27.1
11	Na	371.01	1154.6
12	Mg	922.0	1378.0
13	Al	933.57	2740.0
14	Si	1683.2	3553.0
15	P	317.3	553.7
16	S	386.0	717.9
17	Cl	172.22	239.2
18	Ar	84.0	87.3



In this example, there are multiple elemental properties graphed on the Y axis. Selecting an element in the [Table Window](#) will highlight **all** of the data points in the [Graph Window](#) that correspond to the selected element.

The Table Window:

The table window displays a more complete set of data than the graph window. The data in this window is displayed in tabular format to make viewing the data easier. Furthermore, the data within a column in the table can be sorted in ascending or descending order. The Table Window resembles the following figure.

Atomic Number ▼	Element Symbol	Group	Density (g/cm³)
1	H	1	1.0E-4
2	He	18	2.0E-4
3	Li	1	0.534
4	Be	2	1.848
5	B	13	2.35
6	C	14	2.266
7	N	15	0.0012
8	O	16	0.0014
9	F	17	0.0017
10	Ne	18	9.0E-4
11	Na	1	0.968
12	Mg	2	1.738
13	Al	13	2.699
14	Si	14	2.336
15	P	15	1.823
16	S	16	2.069
17	Cl	17	0.0032
18	Ar	18	0.0018
19	K	1	0.856
20	Ca	2	1.55

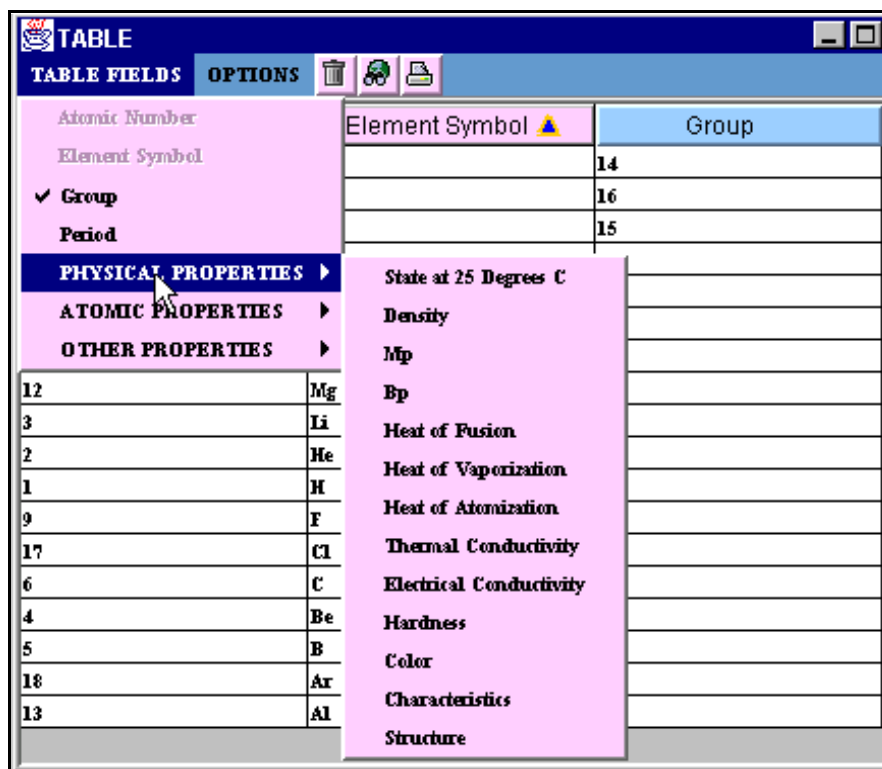
There are two major differences between the data that is displayed in the Table Window and the data that is displayed in the [Graph Window](#). First of all, if a particular element does not have any data associated with it for a particular elemental property, that element will not appear in a plot containing that property. Conversely, in the table all data is explicitly shown. For instance, consider a plot of Electronegativity (on the Y axis) versus Atomic Number (on the X axis) in the [Graph Window](#). Helium's electronegativity is not defined (using the Pauling Scale), and therefore no data point for Helium will appear on the plot. However, in the table the data for Helium's electronegativity will be listed as "NOT DEFINED".

The second major difference between the data displayed in the Table Window and the data displayed in the [Graph Window](#) is that more elemental properties are available for viewing in the Table Window. The table is not limited to displaying only elemental data that is numerical in nature. Therefore, elemental properties such as sources, uses, and reactions of elements can be viewed in the table.

The Table Window has two menus and two or three buttons (depending on the operating system). The menus and buttons perform similar, if not exactly the same, actions as the menus and buttons in the [Graph Window](#). A detailed description of each menu and button is listed below.

Table Fields Menu

The *Table Fields* menu allows the user to select or deselect elemental properties for display in the table. The function of this menu is essentially the same as either the *X Menu* or *Y Menu* in the [Graph Window](#). However, as mentioned above, more elemental properties are available for selection than in the [Graph Window](#). Selected properties are highlighted on the menu with a check mark. Up to three elemental properties may be selected at any one time. Additionally, the Atomic Number and Element Symbol properties are always present in the table, so up to five properties may be viewed at a time. Because these two properties always appear in the table, they are disabled on the *Table Fields Menu*. The *Table Fields* menu is illustrated in the following figure.



If the [data link between the graph and table](#) is enabled, selecting a property that is numerical in nature from the *Table Fields Menu* will simultaneously select the same property from the *Y Menu* in the *Graph Window*. If you want to view new fields in the table without changing the current graph, it is recommended that you [disable the data link between the graph and table](#). Similarly, selecting a new elemental property in the *Graph Window* will select that property from the *Table Fields Menu*, and selecting multiple properties in the *Graph Window* will select all of the corresponding properties from the *Table Fields Menu*. This may replace the current fields displayed in the table with the newly selected fields. If you do not want this to happen, [disable the data link between the graph and table](#).

Options Menu

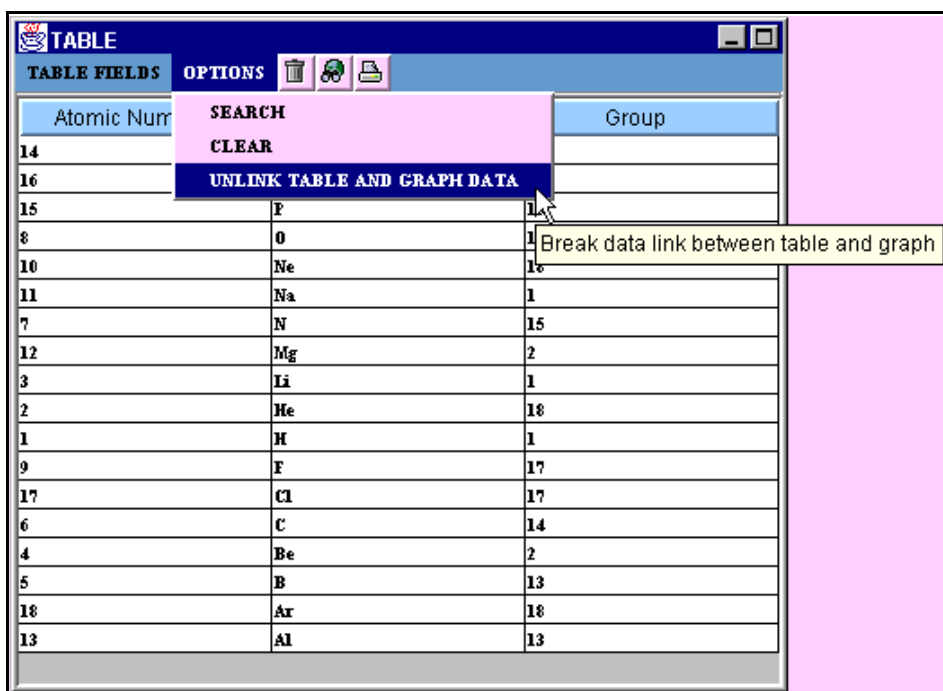
The *Options Menu* for the Table Window is shown to the right. All of the table options also appear on the *Graph Window Options Menu*. Each option is described below.

Link/Unlink Table and Graph Data:

This option performs exactly the same function as the [Link/Unlink Table and Graph Data](#) option on the Options menu in the Graph Window. See the section on the *Graph Window* for a full description.

Clear:

This option clears the data from the table, leaving only the Atomic Number and Element Symbol columns. Clearing the table while the [data link between the table and graph](#) is enabled will also clear



the graph. If you want to clear the table without altering the contents of the [Graph Window](#), disable the data link between the table and graph. Clearing the table does not select or deselect any elements.

Search:


The search option opens the same *Search Dialog* that is opened when the [Search](#) option is selected from the [Graph Window Options Menu](#). See the section on the [Graph Window](#) for a full description. There are some major differences in the *Search Dialog* when it is opened from the Table Window. First of all, all elemental properties may be searched, as opposed to being limited to searching within properties that are numerical in nature. If a search is performed within a numerical field and the [data link between the table and graph](#) is enabled, the search results will also appear in the [Graph Window](#). If a search is performed within a non-numerical field while the [data link between the table and graph](#) is enabled, the properties displayed on the X and Y axes in the [Graph Window](#) will not change.

There are some differences in the available search criteria when searching within a non-numerical field. Rather than searching with the “greater than”, “equal to”, and “less than” operators, the available operators are “equal to” and “contains”. A search within a non-numerical field is not case-sensitive.

The Table Window Buttons

The Table Window contains either two or three buttons (depending on the operating system) that may be used as shortcuts for manipulating the graph.


Clear Button:

The *Clear Button* () performs the same action as the [Clear](#) selection on the [Table Window Options Menu](#).

Search Button:

The *Search Button* () performs the same action as the [Search](#) selection on the [Table Window Options Menu](#).




Print Button (Windows only):

The *Print Button* () can be used to send the current table to a printer. Due to the limitations placed on Java applets under the Macintosh operating system, printing is not available when running the applet on a Macintosh computer.

Additional Information Regarding the Table Window

There are a couple of other useful features in the Table Window. The first is the [data point highlighting feature described in the Graph Window section](#) of this documentation. See the section on the [Graph Window](#) for a full description.

The second feature is data sorting within the table. The contents of the table may be sorted in ascending or descending order according to the data in any table column. Sorting is performed by using the mouse to click on the desired column header. Pressing a column header once will sort the table in ascending order by the data within that column. Pressing the column header a second time will sort the table in descending order. The table is always sorted by one column. By default, it is sorted by the Atomic Number column in ascending order. The column that is sorted is highlighted by coloring the column header pink. Furthermore, the sorting method (ascending or descending) is indicated by a small triangle within the pink column header. If the

TABLE		
TABLE FIELDS	OPTIONS	  
Atomic Number	Element Symbol ▼	Group
13	Al	13
18	Ar	18
5	B	13
4	Be	2
6	C	14
17	Cl	17
9	F	17
1	H	1
2	He	18
3	Li	1
12	Mg	2
7	N	15
11	Na	1
10	Ne	18
8	O	16
15	P	15
16	S	16
14	Si	14


triangle is pointing down, the column is sorted in ascending order. If the triangle is pointing up, the column is sorted in descending order. The two figures to the right illustrate a table sorted by the Element Symbol field. In the top figure, the table is sorted by Element Symbol in ascending alphabetical order. In the bottom figure, the table is sorted by Element Symbol in descending order.

There are two minor issues to note regarding sorting data within the table. First of all, if a column is added or removed from the table, the resulting table will be sorted by Atomic Number in ascending order. Secondly, if the data for an element in the field being sorted is not defined, that element will be placed at the bottom of the column.

Atomic Number	Element Symbol	Group
14	Si	14
16	S	16
15	P	15
8	O	16
10	Ne	18
11	Na	1
7	N	15
12	Mg	2
3	Li	1
2	He	18
1	H	1
9	F	17
17	Cl	17
6	C	14
4	Be	2
5	B	13
18	Ar	18
13	Al	13

The Periodic Table Window:

The Periodic Table Window is essentially the heart of the program. All of the data that is displayed in the [Graph Window](#) and [Table Window](#) are dependent on which elements are selected in the periodic table window. The Periodic Table Window contains a standard periodic table (containing elements 1 through 112), as well as buttons that can be used to select or deselect blocks of elements. The Periodic Table Window is illustrated in the following figure.



PERIODIC TABLE

Select All

Deselect All

Select Metals

Select Non-Metals

Select Semi-Metals

MAIN GROUP ELEMENTS

MAIN GROUP ELEMENTS

	1																	18	
P	1	H	2	TRANSITION METALS									13	14	15	16	17	He	
E	2	Li	Be										B	C	N	O	F	Ne	
R	3	Na	Mg	3	4	5	6	7	8	9	10	11	12	Al	Si	P	S	Cl	Ar
I	4	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
O	5	Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
D	6	Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	
	7	Fr	Ra	Ac	Rf	Db	Sg	Bh	Hs	Mt	Uun	Uuu	Uub						
INNER-TRANSITION METALS																			
*LANTHANIDES				Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu		
**ACTINIDES				Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr		

Germanium (32)

Each element in the periodic table is a button. Pressing one of these buttons will select or deselect the element. Selected elements appear darker than deselected elements. In the above figure, the elements Zn, Ga, Ge, As, Se, Br and Kr are selected.

All other elements are deselected. Holding the mouse over any element will cause a pop-up label to appear, in which the element's full name and Atomic Number appear.

All of the other buttons in the Periodic Table Window are used to select or deselect blocks of elements. On the left-hand side of the table of each period in the periodic table is a button that will either select or deselect all of the elements in that period. Similarly, at the top of each group in the periodic table, there is a button that will either select or deselect all of the elements in that group. Additionally, the buttons labeled *Main Group Elements*, *Transition Metals*, and *Inner Transition Metals* select the corresponding blocks of elements. These three buttons cannot be used to deselect the corresponding blocks of elements.

The toolbar at the top of the Periodic Table Window contains five additional buttons. These buttons can be used to select all of the elements in the periodic table, deselect all of the elements, select all of the metals, select all of the non-metals, and select all of the semi-metals.

The data displayed in the [Graph Window](#) and [Table Window](#) can be manipulated by selecting and deselecting elements in the Periodic Table Window. Elements can also be selected or deselected by [performing a search](#) or altering the data in the [Graph Window Data Bounds Toolbar](#).