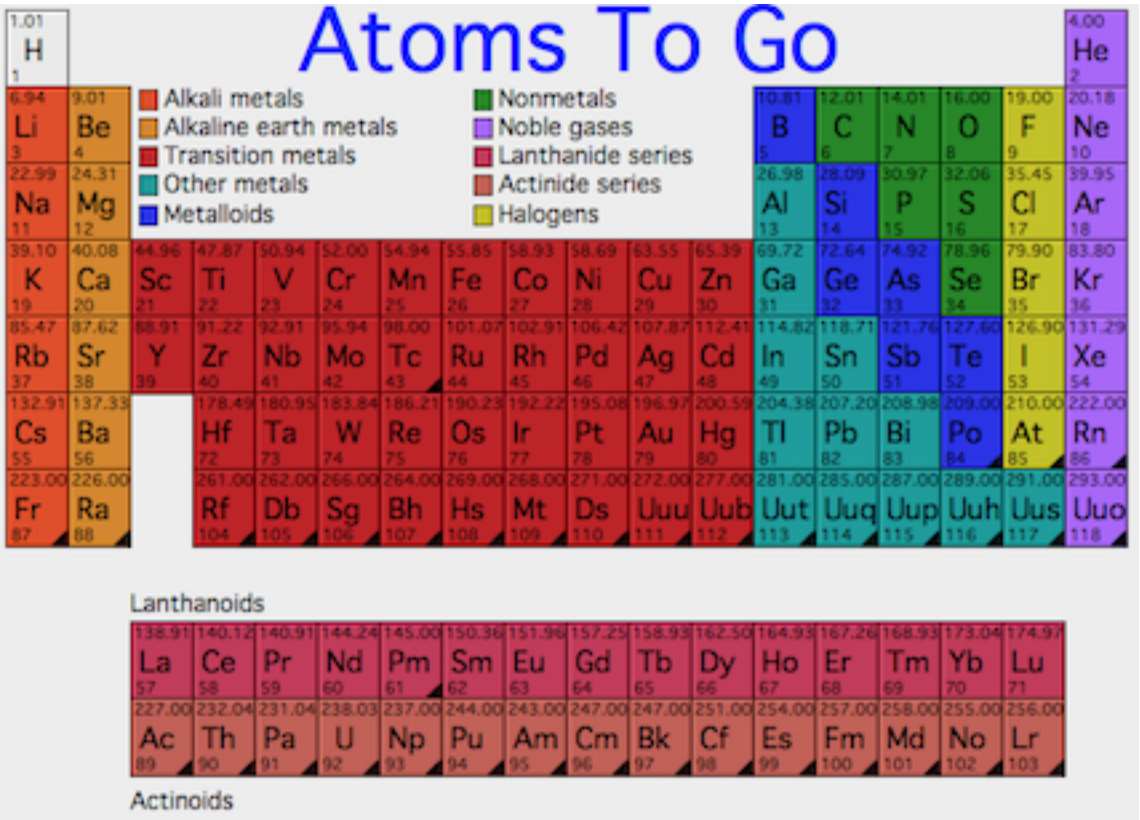
Atoms To Go
Version 7.0.0 October 19, 2012

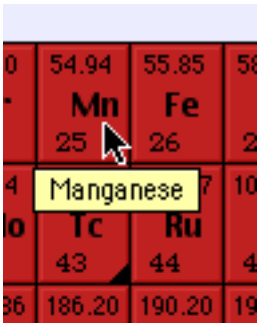
Introduction

Atoms To Go is a Periodic Table of the Elements.



When you first launch Atoms To Go, you see a normal presentation of the periodic table of the elements.

If you place the cursor over an element for a few seconds, you'll see the name of the element pop up. (This feature must be enabled in the preferences)

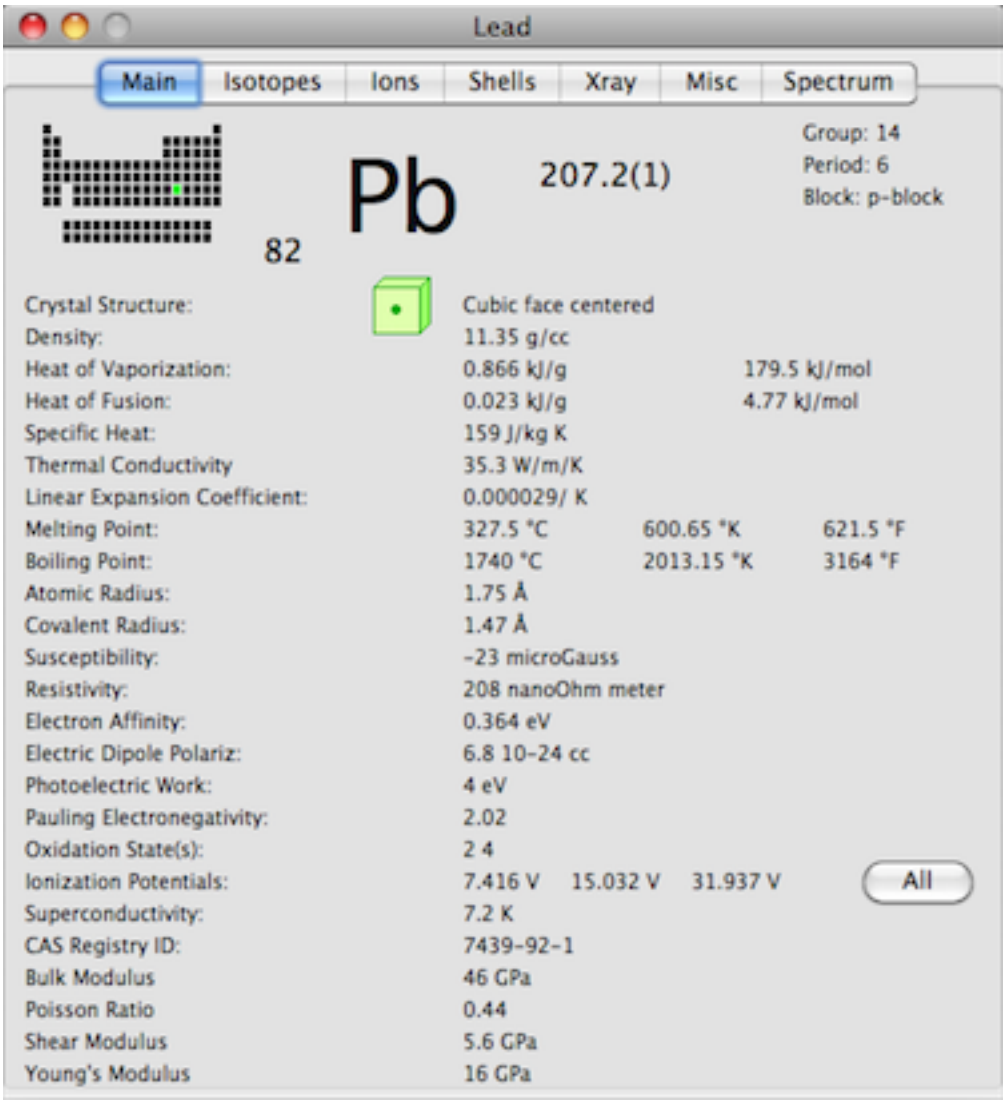


Clicking on one of the elements brings up a window that contains detailed information about that element. You can copy many of the data values to the clipboard by clicking on the value with the mouse, you'll hear a short faint click sound when you click on a value you can copy. You can then paste the value into another application.

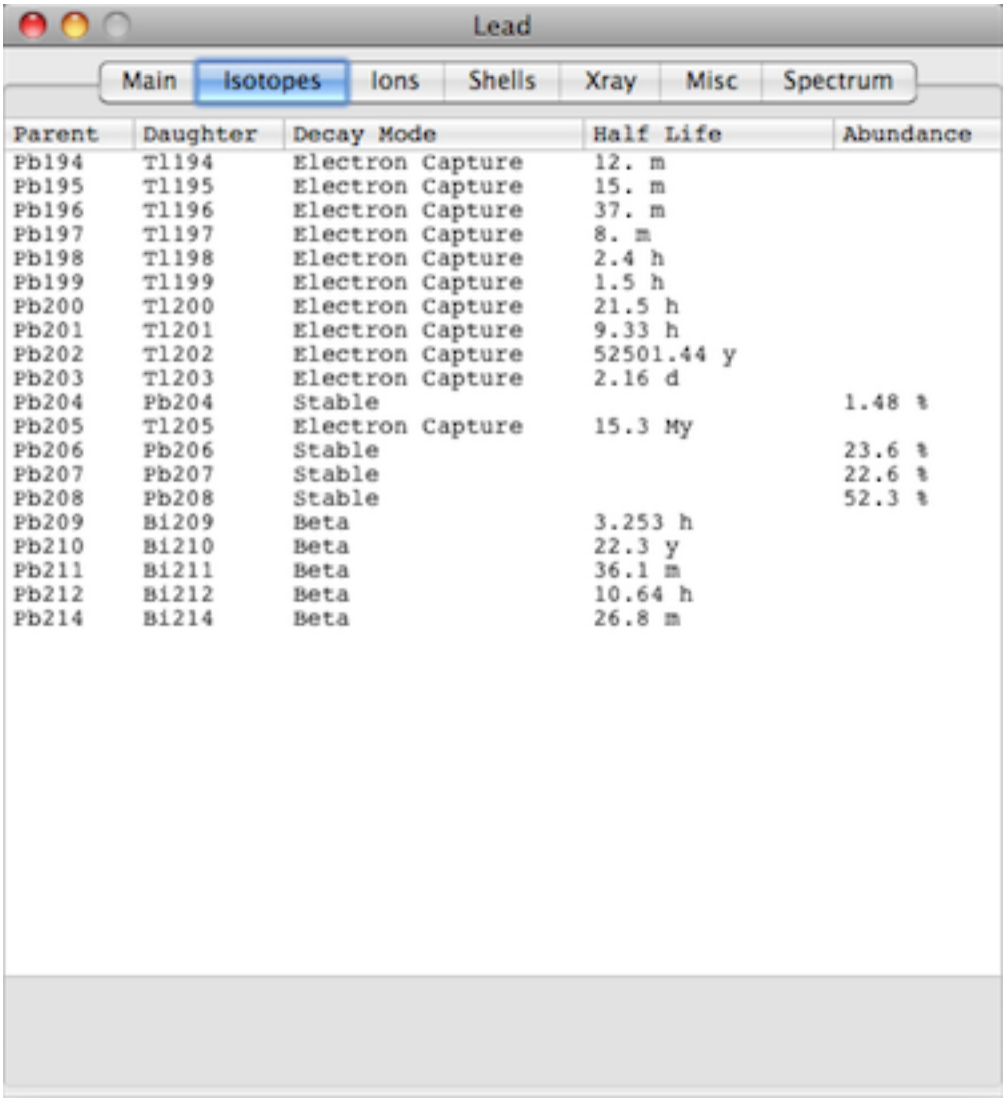
You can also open the text list of elements (from the File menu) to get an alphabetical list of elements. Double click on one to open the detailed view window for that element.

There are six different sets of detailed information you can display, selected from the tabs in the window. They are:

Physical View - a list of physical properties, such as density, melting point, etc.



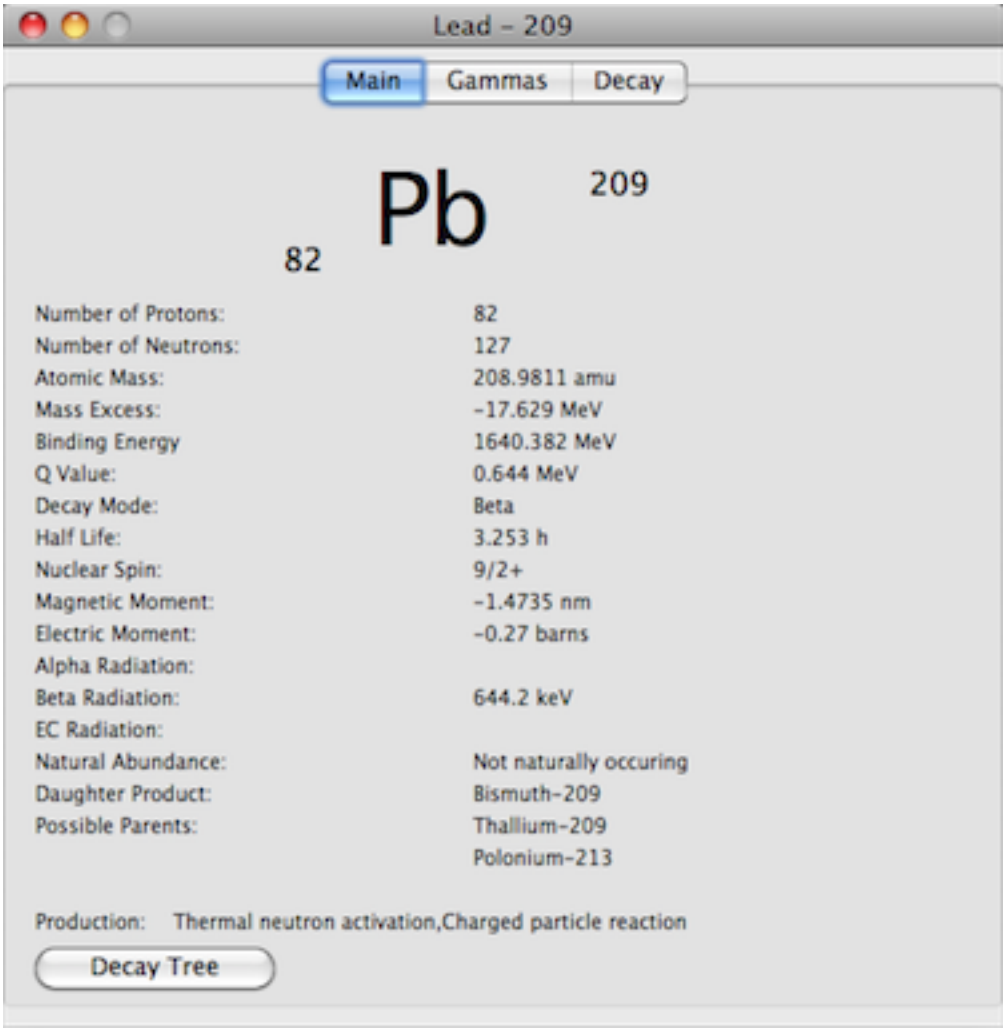
Isotopes View - a list of all isotopes for this element, showing the atomic mass, decay mode, half life, and percent natural abundance. If there are too many isotopes to fit in the window, then you can scroll down the list.



Parent	Daughter	Decay Mode	Half Life	Abundance
Pb194	Tl194	Electron Capture	12. m	
Pb195	Tl195	Electron Capture	15. m	
Pb196	Tl196	Electron Capture	37. m	
Pb197	Tl197	Electron Capture	8. m	
Pb198	Tl198	Electron Capture	2.4 h	
Pb199	Tl199	Electron Capture	1.5 h	
Pb200	Tl200	Electron Capture	21.5 h	
Pb201	Tl201	Electron Capture	9.33 h	
Pb202	Tl202	Electron Capture	52501.44 y	
Pb203	Tl203	Electron Capture	2.16 d	
Pb204	Pb204	Stable		1.48 %
Pb205	Tl205	Electron Capture	15.3 My	
Pb206	Pb206	Stable		23.6 %
Pb207	Pb207	Stable		22.6 %
Pb208	Pb208	Stable		52.3 %
Pb209	Bi209	Beta	3.253 h	
Pb210	Bi210	Beta	22.3 y	
Pb211	Bi211	Beta	36.1 m	
Pb212	Bi212	Beta	10.64 h	
Pb214	Bi214	Beta	26.8 m	

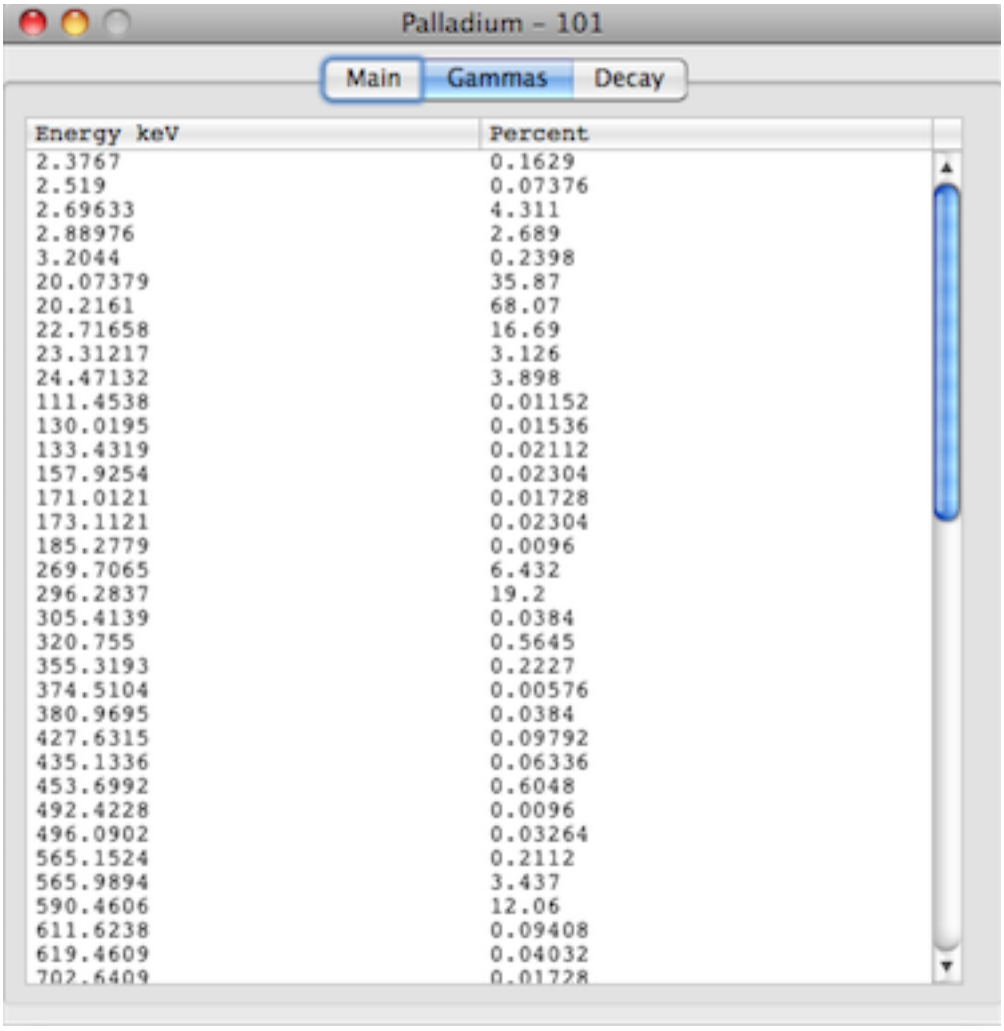
Isotope Detail View

Clicking on an isotope will bring up the another window, with detailed information, such as the number of protons and neutrons, atomic mass, mass excess, binding energy, natural abundance, decay mode and half life, nuclear spin, magnetic moment, and alpha and beta radiation energies. (Not all information is available for all isotopes) In addition, possible parent nuclides are also listed, as well as the daughter product.



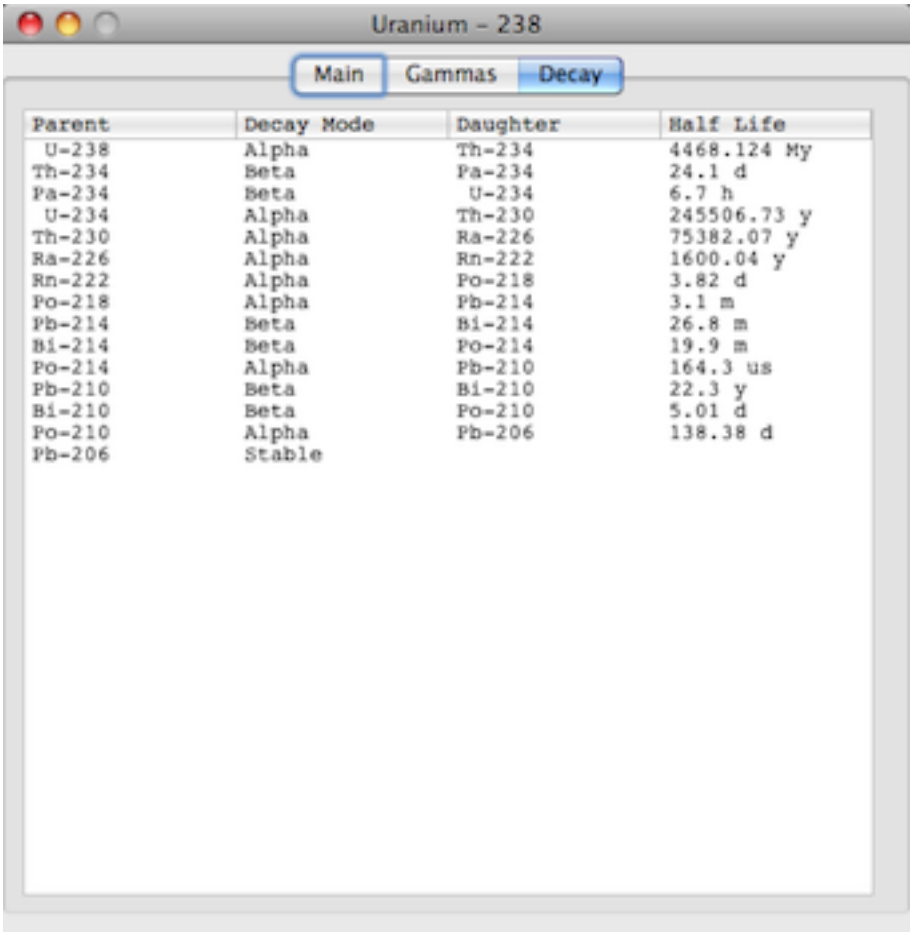
Gamma Rays

Clicking on the Gammas tab will bring up a window listing all of the gamma rays that occur in at least 0.1% of transitions.

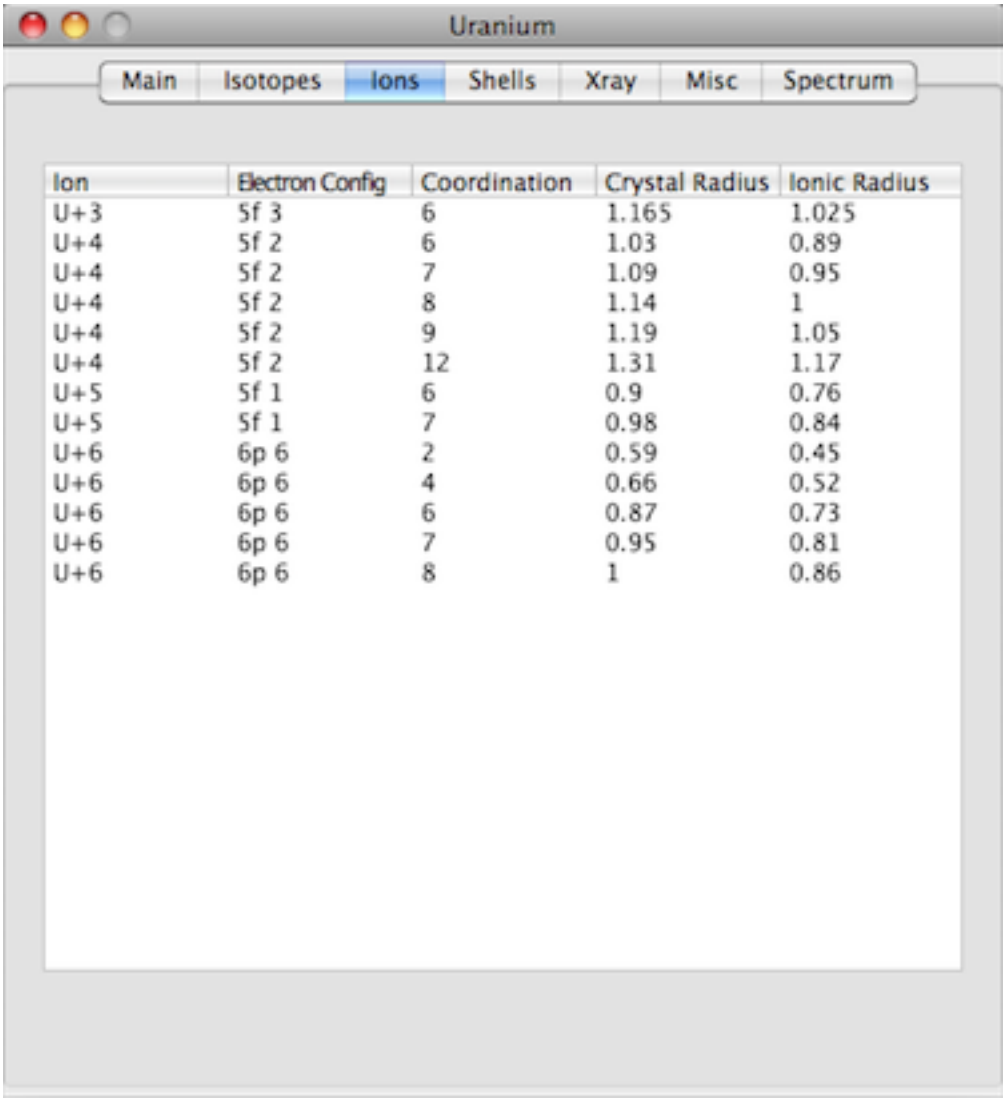


Decay

Clicking on the Decay tab will display the path taken by the nuclide as it and daughter products decay, until they become stable. This view is of course only useful for radioactive nuclides.

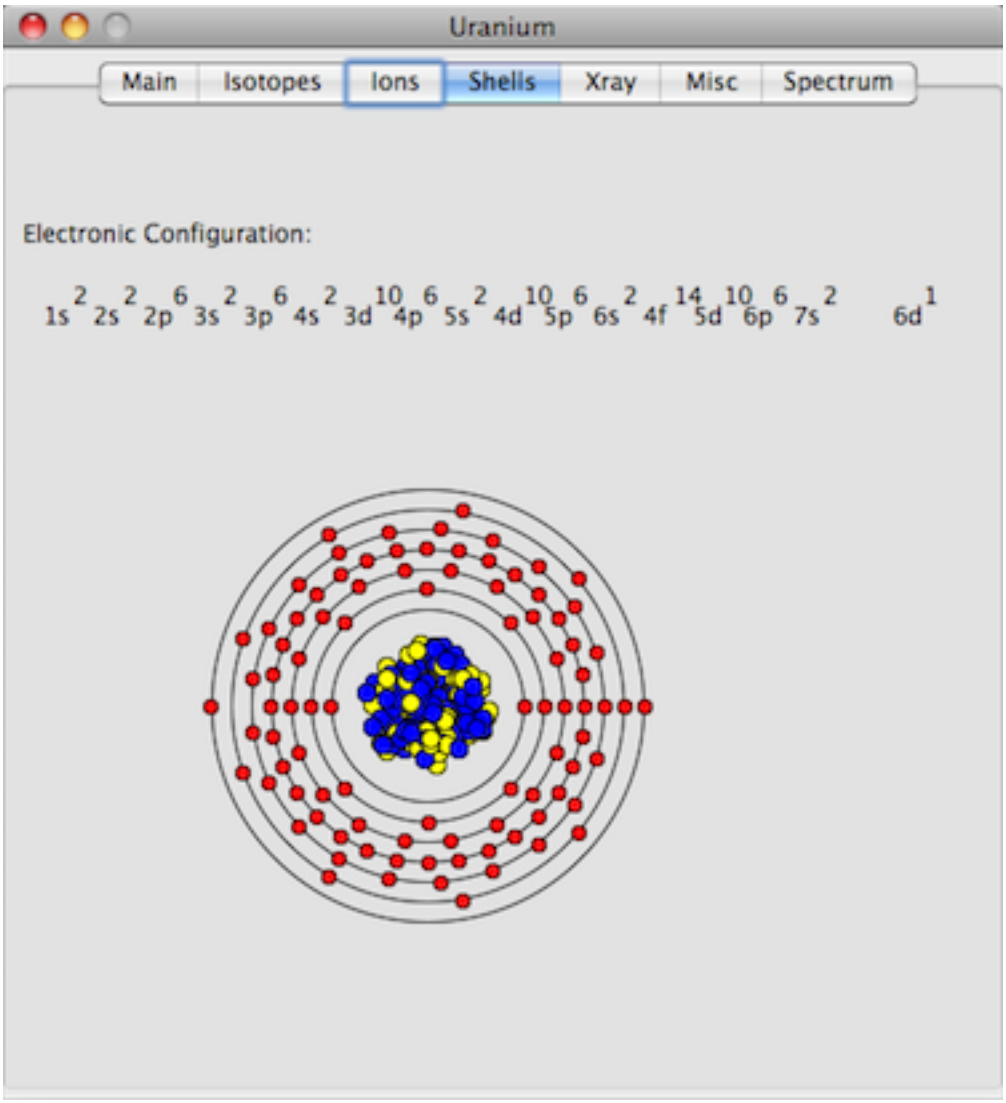


Ions View - a listing of the crystal and ionic radii for various ions and coordination numbers. Radii data are in Angstroms.

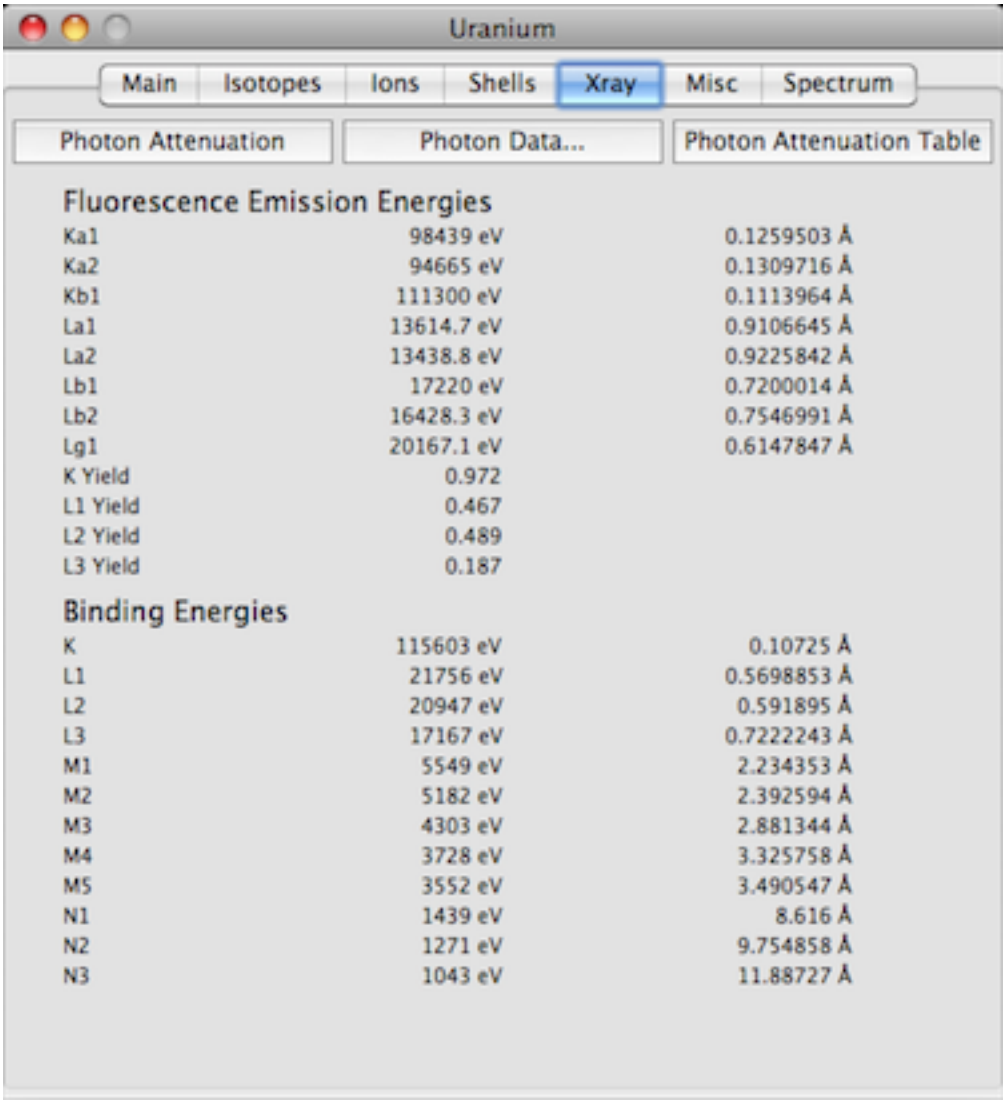


Ion	Electron Config	Coordination	Crystal Radius	Ionic Radius
U+3	5f 3	6	1.165	1.025
U+4	5f 2	6	1.03	0.89
U+4	5f 2	7	1.09	0.95
U+4	5f 2	8	1.14	1
U+4	5f 2	9	1.19	1.05
U+4	5f 2	12	1.31	1.17
U+5	5f 1	6	0.9	0.76
U+5	5f 1	7	0.98	0.84
U+6	6p 6	2	0.59	0.45
U+6	6p 6	4	0.66	0.52
U+6	6p 6	6	0.87	0.73
U+6	6p 6	7	0.95	0.81
U+6	6p 6	8	1	0.86

Shells View - a graphical display of the atom, showing the electron shells, along with the electronic configuration.

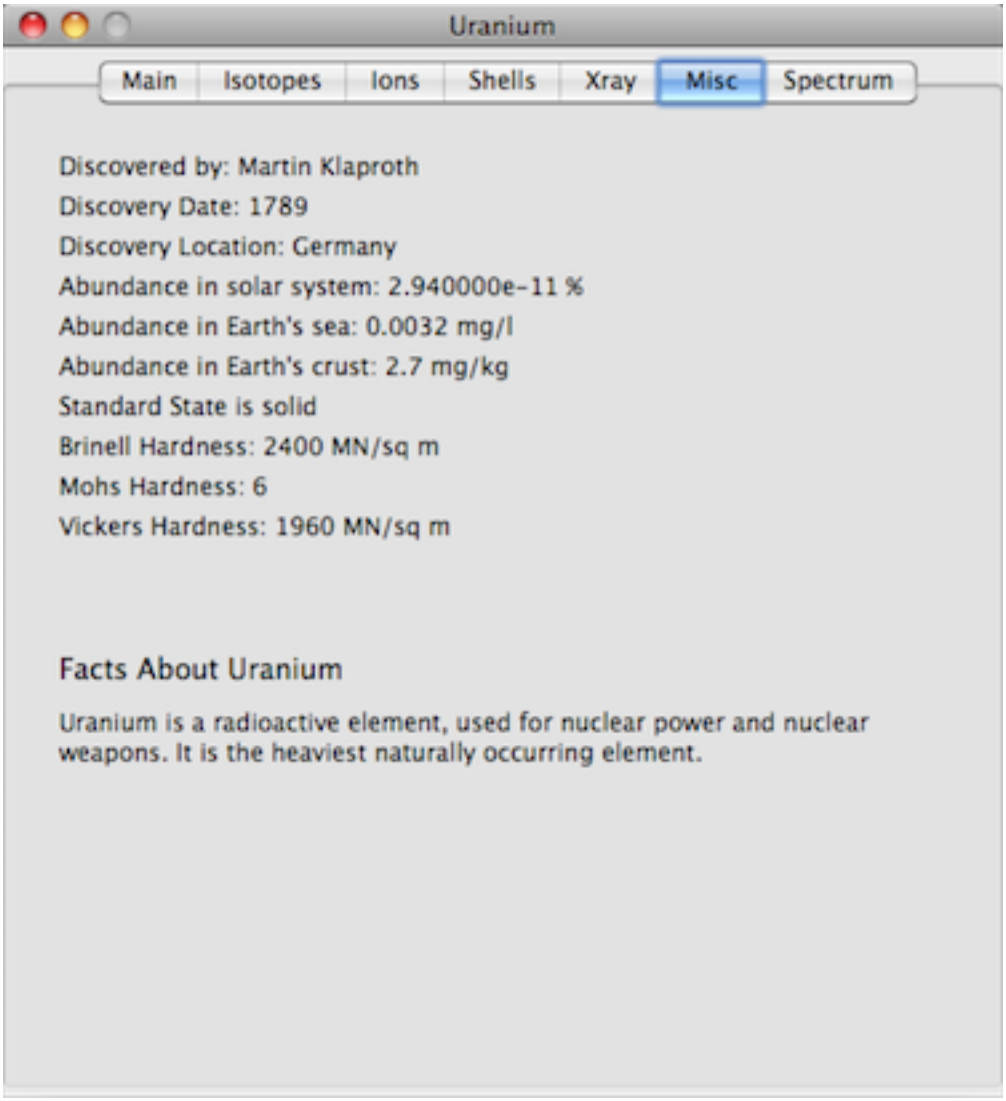


X-Ray View - A list of the K and L shell fluorescence energies, and K, L, M, and N shell binding energies. Clicking n the Photon Attenuation button will bring up a window showing the attenuation graph, while clicking on the Photon Attenuation Table button will bring up a tabular form of the same data. The information is based on the McMaster data. Clicking on the Photon Data button will bring up an interactive window, allow you to display the relevant data for any energy between 1 keV and 10 MeV.

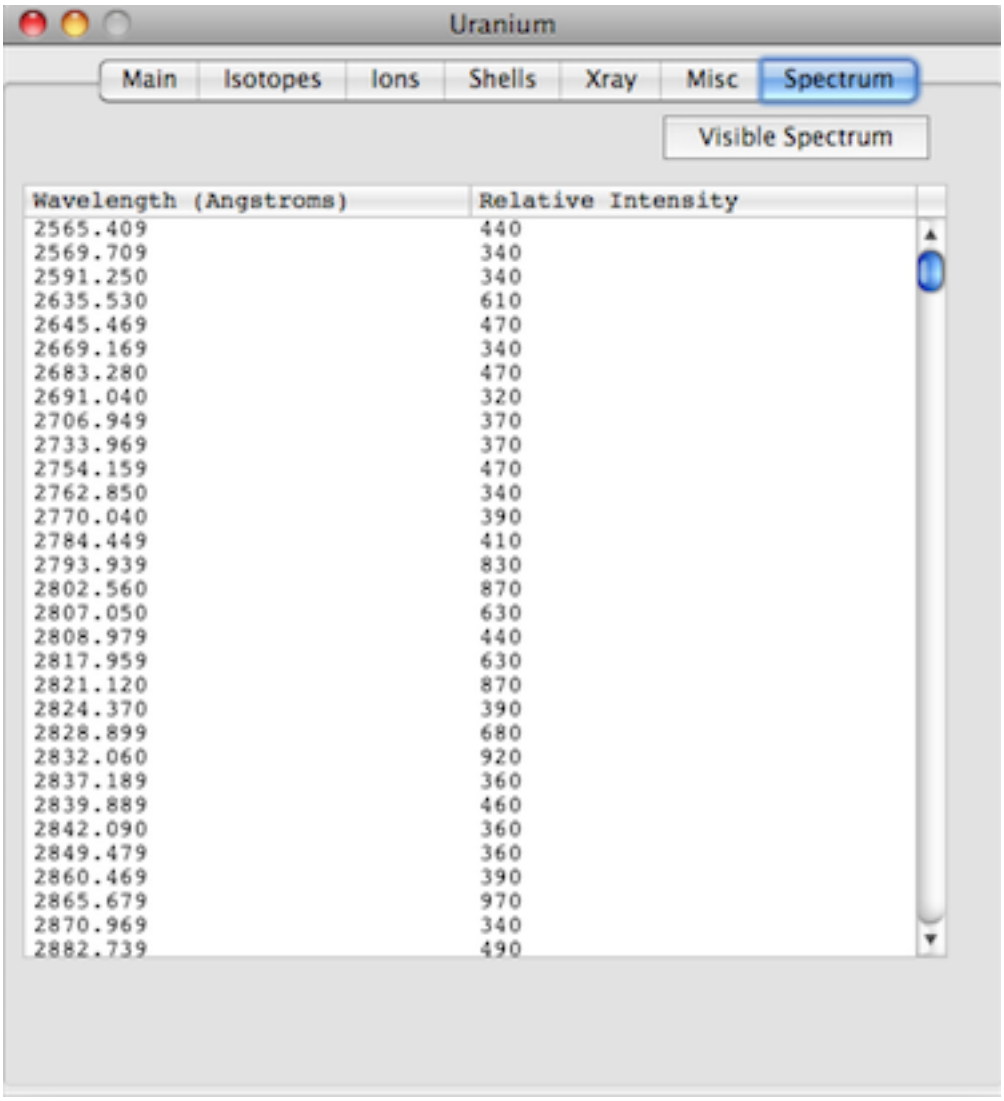


Misc View - General information showing the name of the discoverer of the element, and where and when it was discovered. Interesting bits of information are also displayed, including the Brinell, Mohs, and Vickers hardness, as well as the standard (room temperature) state of the element.

If you have any other interesting facts about an element, let us know, and we'll be glad to add them to a future version.



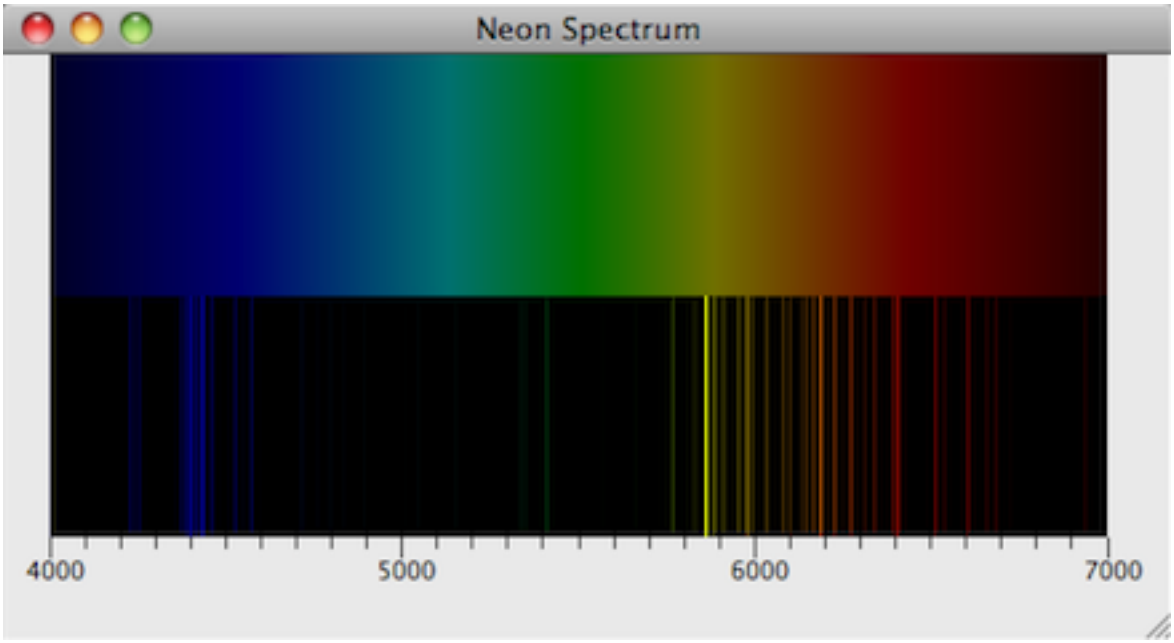
Spectrum View - A list of the wavelengths and relative intensities of the optical spectra of an element, including visible, UV, and IR.



Wavelength (Angstroms)	Relative Intensity
2565.409	440
2569.709	340
2591.250	340
2635.530	610
2645.469	470
2669.169	340
2683.280	470
2691.040	320
2706.949	370
2733.969	370
2754.159	470
2762.850	340
2770.040	390
2784.449	410
2793.939	830
2802.560	870
2807.050	630
2808.979	440
2817.959	630
2821.120	870
2824.370	390
2828.899	680
2832.060	920
2837.189	360
2839.889	460
2842.090	360
2849.479	360
2860.469	390
2865.679	970
2870.969	340
2882.739	490

Visible Spectrum Display

Clicking on the Visible Spectrum button will bring up a window showing the visible line spectrum of the element, along with a complete (rainbow) spectrum for reference.



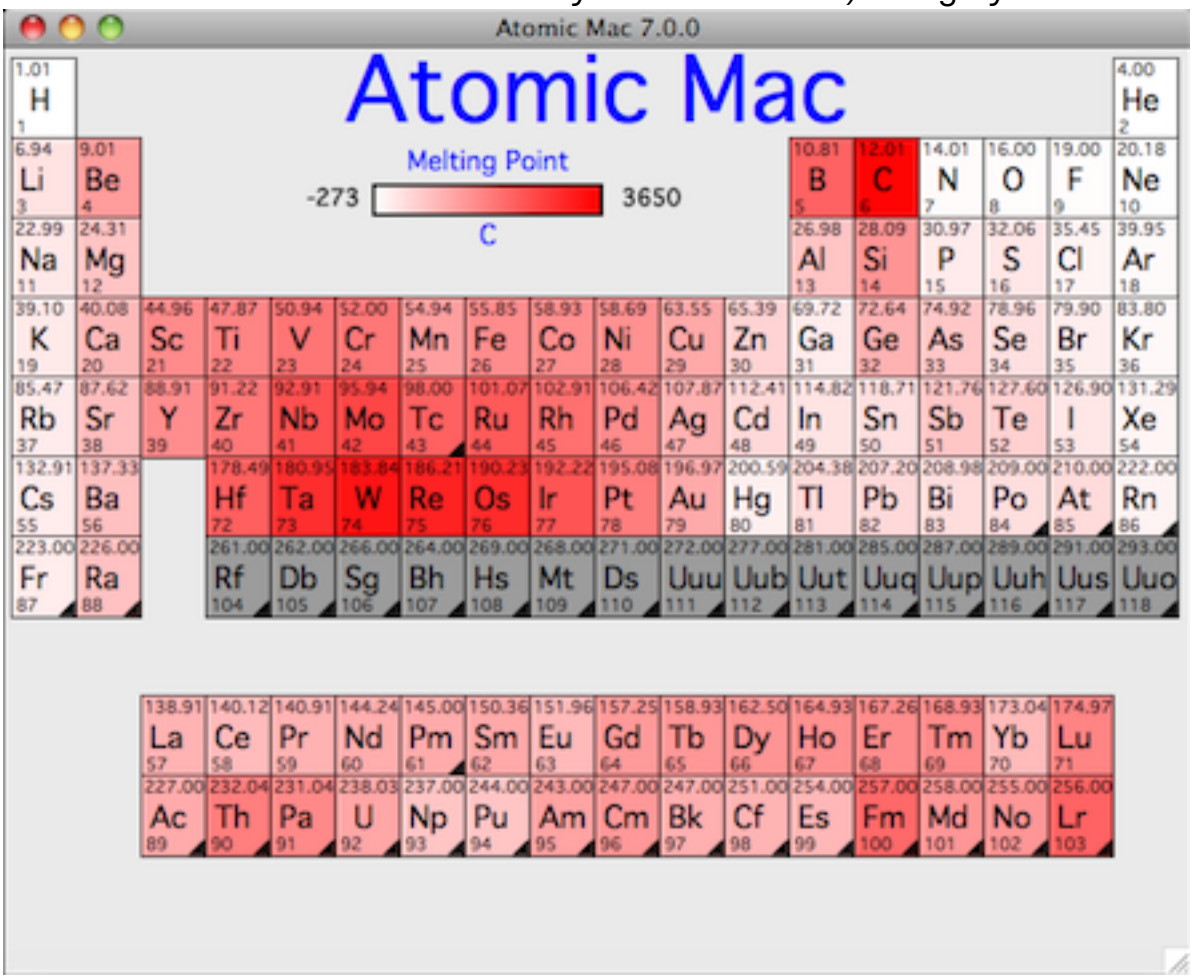
Property View

You can also alter the periodic table display to shade each element, by several properties, which include:

Density
Heat of Vaporization
Heat of Fusion
Specific Heat
Thermal Conductivity
Linear Expansion Coefficient
Melting Point
Boiling Point
Atomic Radius
Covalent Radius
Magnetic Susceptability
Electrical Resistivity
Electron Affinity
Electric Dipole Polarizability
State (gas, liquid, solid)

Photoelectric Work Function
Electronegativity
Crystal Structure
Abundance in Crust
Abundance in Sea
Abundance in Atmosphere
Solar Abundance
Number of Isotopes
Number of Natural Isotopes
Number of Stable Isotopes
Atomic Mass
Superconducting Critical Temperaure
First Ionization Potential
Second Ionization Potential
Third Ionization Potential

Below is a display with the view set to melting point. The elements with higher melting points are more red, those with lower melting points are more white. Elements for which there is no data (typically the man-made transuranic elements with extremely short half lives) are gray.



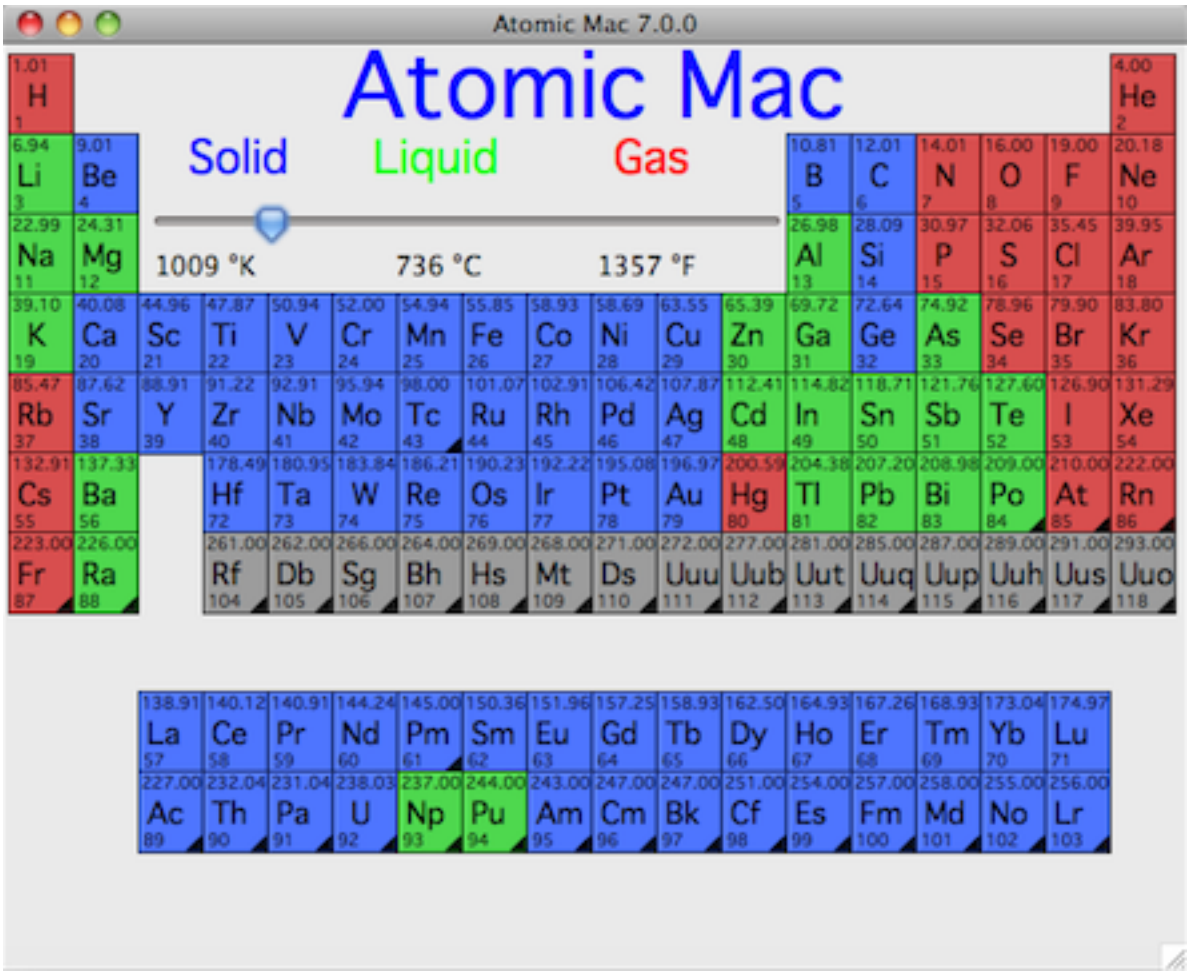
These properties are selected under the **View** menu. If you place the cursor over an element for a few seconds, you'll see the name of the element pop up, as well as the value for that view.

Temperature State View

When viewing the state, you can change the temperature using the slider control. The selected temperature is displayed below, in degrees Kelvin, Centigrade, and Fahrenheit.

You can also use the + and - keys on the numeric keypad to increase and decrease the temperature by one degree. Holding down option will make the change 10 degrees, and holding down shift will make the change 100 degrees.

The following picture shows the state of each element at 1000 degrees Kelvin:



One of the views is the **Molecular Weight Calculator**. Selecting this will display a text entry box just above the periodic table. You can enter a

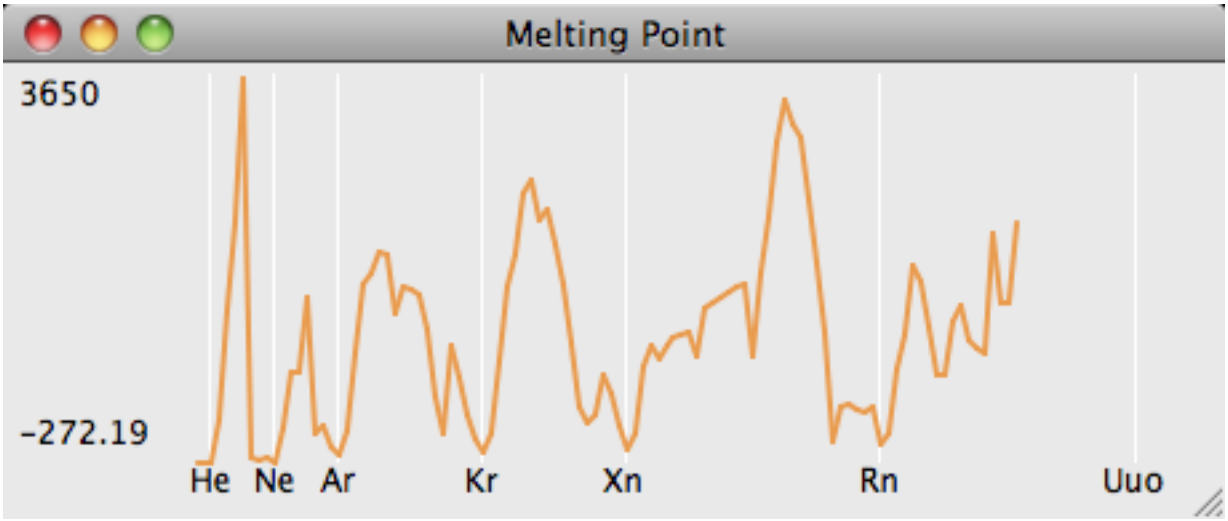
chemical formula into this box, and the molecular weight will be calculated for you. For example, entering H2O will compute the molecular weight of water. The text is case sensitive, so table salt must be entered as NaCl not NACL or nacl.

You can enter parenthesis in your formula, such as (H2O2)2

You can also enter in a hydrated compound using the • symbol (option 8 on your keyboard). An example: CuSO4•5H2O

Graphing Properties

Under the **File** menu is an option to graph the current view. Selecting this opens a window which shows a plot of the selected property against atomic number. The following picture shows a plot of the covalent radius:



Values of adjacent elements with known values are connected with a line. If an element is surrounded by two other elements with unknown values, it's value appears as an isolated dot.

X-Ray Energies Graph Window

By selecting **X-Ray Energies** from the **File** menu, you can get a graph showing the various fluorescence and edge energies for the elements. The range of the horizontal (energy) axis can be changed, allowing you to zoom in on particular energy ranges. Positioning the cursor over a line shows the element, and the edge or fluorescence energy and type. Popup menus allow only specific transitions or edges to be displayed, removing unecessary clutter.

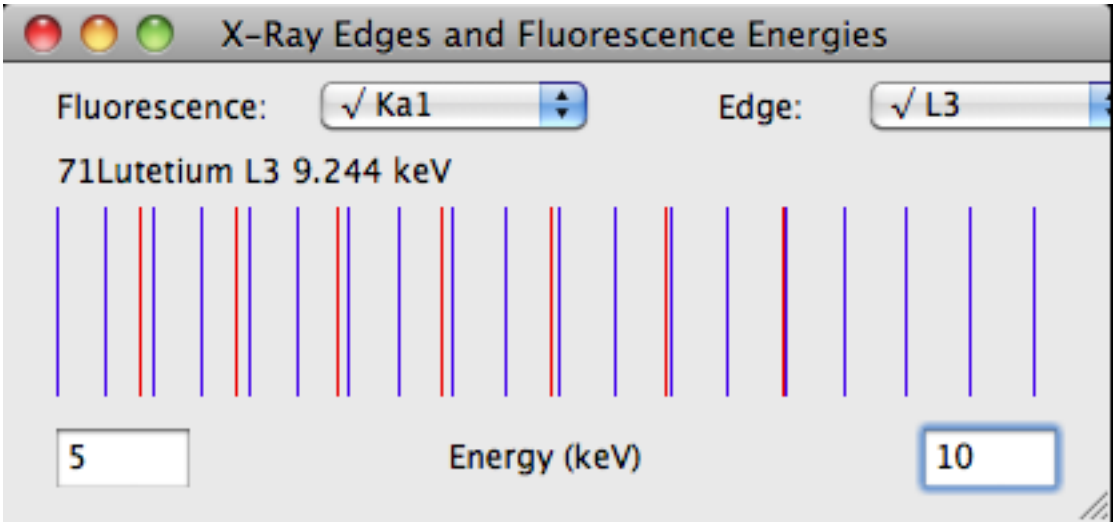


Table Of Nuclides

By selecting **Nuclides Table** from the **File** menu, you'll be presented with a large window showing all of the nuclides (isotopes) available. Clicking on one of them will bring up the window containing detailed information, such as nuclear spin, decay energies, etc. Here's a small portion of the table, the full table of course is huge, since Atoms To Go has information regarding about 1600 nuclides!

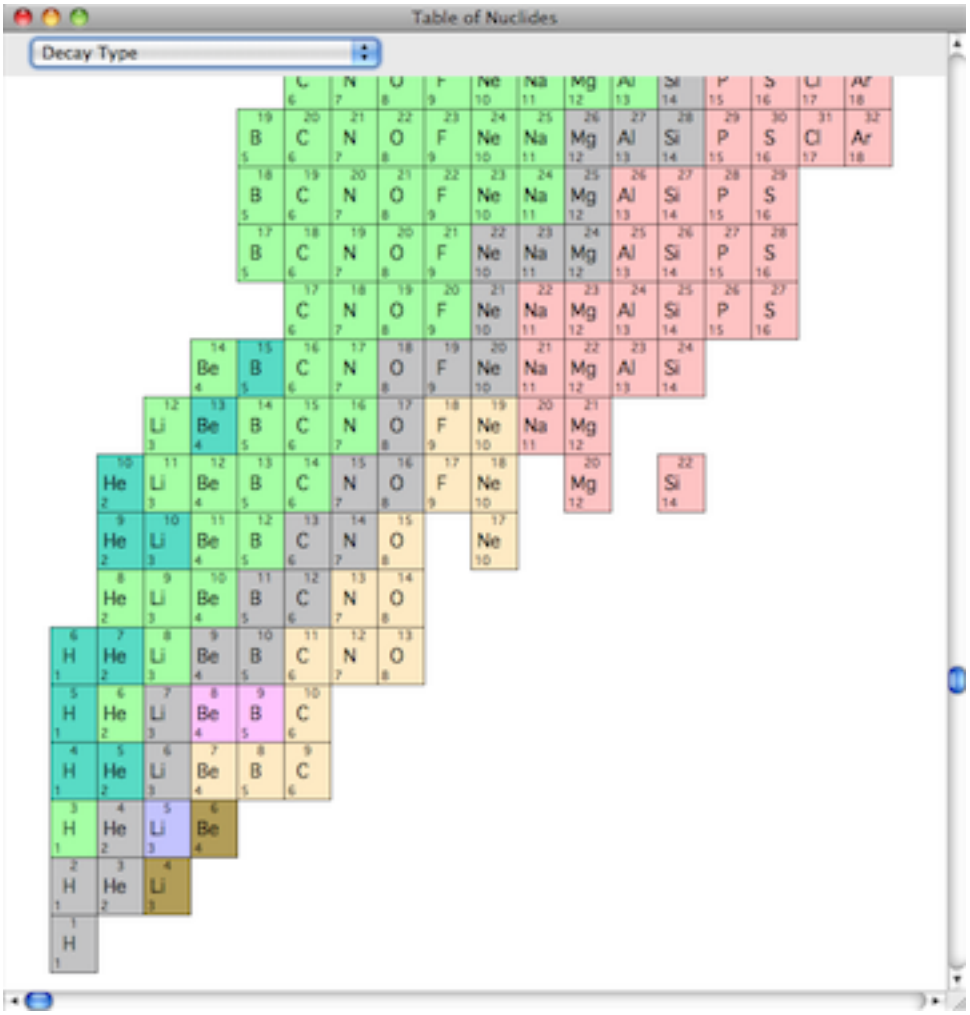
Color Code for Nuclides Table:

Stable	- Gray
Beta Decay	- Green
Alpha Decay	- Blue
Positron Decay	- Red
Electron Capture	- Orange
Double Alpha Decay	- Purple

Isometric - Tan
Spontaneous Fission - Yellow
Neutron Emission - Aqua
Proton Emission - Brown

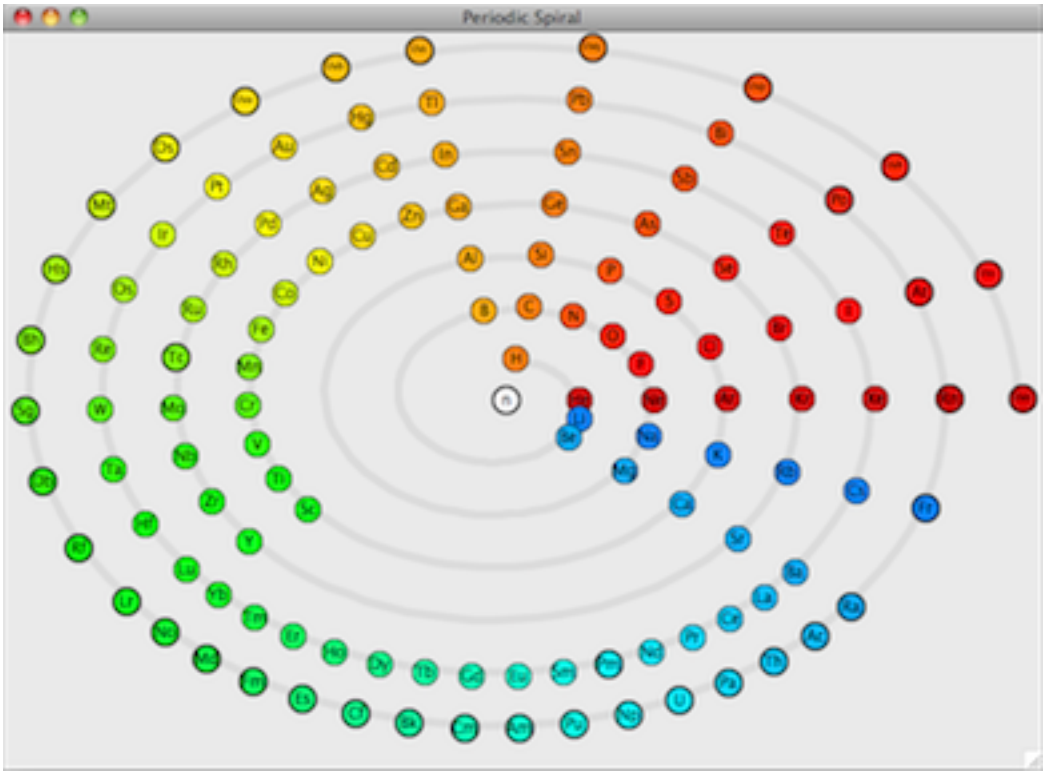
A popup menu in the upper left corner of the window allows you to change the display from decay mode to one of several other types of information:

Atomic Mass
Half Life
Binding Energy
Mass Excess
Q Value
Magnetic Moment
Electric Moment



Periodic Spiral

By selecting **Periodic Spiral** from the **File** menu, you'll be presented with a large window showing an alternate presentation for the periodic table of elements.



In this presentation, the neutron is in the center, and the elements spiral outwards. Each radial line from the center is similar to a group or column in the standard table. One advantage over the traditional table is that there are no “edges” on each line or period, the elements continuously flow one after the other, much as they do in nature.

Decay Tree Window

By clicking the **Decay Tree** button in an isotope window, you will display a window that shows the decay path until a stable nuclide is reached. This is only useful for radioactive nuclides, of course.