Quantum Theory & Atomic Structure:

•PhET http://phet.colorado.edu/simulations/sims.php?sim=Wave_on_a_String Wave on a String, (Mark Hayden already uses this one), shows a string attached at one end, and lets students move the free end of a string to change the frequency, wavelength, and amplitude.

• http://lectureonline.cl.msu.edu/~mmp/applist/Spectrum/s.htm lets students slide through different wavelengths and frequencies on the electromagnetic spectrum, a graphic related to the EM's use pops up (e.g. for X-ray, and X-ray of a hand pops up)

• http://lectureonline.cl.msu.edu/~mmp/kap29/Bohr/app.htm AND http://www.walter-fendt.de/ph11e/bohrh.htm show a Bohr model simply (no transitions), but correlates ring position with energy on energy level diagram.

•http://www.mhhe.com/physsci/astronomy/applets/Bohr/applet_files/Bohr.html , "Bohr Model applet" shows an animated Bohr model, and lets students choose the starting energy level and ending energy level for an electron transition on the Bohr model. Energy absorptions/ emissions are shown, as well as the band on the emission or absorption spectrum each transition is represented by.

•http://jersey.uoregon.edu/vlab/elements/Elements.html shows the absorption and emission spectra for all the elements—click on an element to see its spectrum.

• http://chemconnections.org/Java/RGB/example1.html shows the color that results when you mix different color emissions (not pigments)—answers the question as to why the emission spectrum of an element with many different color bands gives off what we perceive as one color. Only Red, Blue, and Green are mixed in this applet.

• http://lectureonline.cl.msu.edu/~mmp/kap28/PhotoEffect/photo.htm devoted to the photoelectric effect, allows you to

• http://ir.chem.cmu.edu/applets/pertable.php (perhaps better as a supplement to lecture that can be used as review), shows the correct atomic orbital diagram to the right of the periodic table when you click on any particular element.

• http://lectureonline.cl.msu.edu/~mmp/period/electron.htm also shows the electron configuration for the elements—students slide a bar to move through from lower to higher atomic number elements.

Bonding, Hybridization, & Shape

•http://www.mhhe.com/physsci/chemistry/essentialchemistry/flash/hybrv18.swf (a flash file), this hybridization animation shows how various orbitals are combined, mixed to produce same shape, size hybridized orbitals. You can click on the hybridization you would like to see.

• http://www.edinformatics.com/interactive_molecules/ shows a bunch of (I think they are either Chime or some other molecular modeling software) molecules—not an applet, but quite a good resource when discussing intermolecular forces, network covalent bonding, etc. It steps students through what to do to answer various questions.

• http://antoine.frostburg.edu/cgi-bin/senese/tutorials/isomer/index.cgi?n=3&list=401|400|400|400|400| Students build isomers.

Reactions, Stoichiometry, Rates

• http://www.chem.ox.ac.uk/vrchemistry/livechem/transitionmetals_content.html (from Loreen Holstein, thanks!) lets students choose metal ions and other reagents and watch the videotaped reaction (especially good if you don't have access to a lab or chemical).

•http://ir.chem.cmu.edu/applets/stoich.php uses a bar graph approach to showing the concept of limiting reagents.

•PhET http://phet.colorado.edu/simulations/sims.php?sim=Reactions_and_Rates Reactions and Rates—in the sample POGIL, shows a simple A + BC reaction happening in a container, along with a potential energy graph. Students can manipulate temperature, starting orientation of one particle, and concentration to see the effect on reaction speed.

Kinetic Molecular Theory, Gases, Physical states

•PhET http://phet.colorado.edu/simulations/sims.php?sim=Gas_Properties "Gas Properties" (Loreen already uses this one and we like it too)—in the sample POGIL, shows a canister of gas with moving atoms. The applet lets students change pressure, temperature, gravity and number of moles (of two types of gases).

•http://intro.chem.okstate.edu/1314F00/Laboratory/GLP.htm , "Gas Law Program" is similar to the PhET applet, it also shows a canister of gas with moving atoms and a nearby Boltzmann distribution of the particle speeds. The applet lets students change pressure, temperature, and number of moles (of two types of gases). There is an inquiry exercise linked to the page, which can be tweaked.

•http://chemconnections.org/Java/molecules/index.html "Molecules in Motion" allows you to adjust the mass and temperature and see the effect on the motion of gases. Two windows are shown side by side for better comparison.

• http://www.chm.davidson.edu/ChemistryApplets/KineticMolecularTheory/Pressure.html a more passive animation lets you infer the effect of mass on speed.

• http://comp.uark.edu/~jgeabana/mol_dyn/KinThI.html shows how the motion of a gas falls into a Maxwell-Boltzman distribution.

•PhET http://phet.colorado.edu/simulations/sims.php?sim=States_of_Matter "States of Matter' allows you to adjust volume and temperature to observe changes in measured pressure and physical state of a container filled with noble gas, water, or oxygen. A phase diagram is also shown.

• http://lectureonline.cl.msu.edu/~mmp/period/phase.htm shows what elements are gases, liquids, and solids on the periodic table at various temperatures. Students slide from low to high temperature and see the periodic table change.

Solutions & Titrations

•PhET http://phet.colorado.edu/simulations/sims.php?sim=Salts_and_Solubility , Salts and Solubility (Loreen already uses this one and we like it too), shows a shaker with salt (i.e. ionic compound) and water, and lets students shake the shaker to put the compound in water where you can see the compound dissociate and the ions move freely.

•http://www.paccd.cc.ca.us/instadmn/physcidv/chem_dp/intersections/titrate/TitrationLab.html shows a virtual titration lab where students choose appropriate indicators and choose the sample and titrant they will use in the lab. Very good for introducing the basics of the lab procedure and apparati.

•http://users.skynet.be/eddy/titratie.swf (another flash file), this titration exercise shows a titration setup, a molecular level view of what is happening during a neutralization, and a titration graph. Students press to add 5 mL of titrant at a time and observe changes in the sample color, the molecular view, and the graph.

•http://lrs.ed.uiuc.edu/students/mihyewon/chemlab_experiment.html is a virtual lab for acid-base titration. This is an excellent virtual lab—the color of the sample in the Erlenmeyer even has shades of color to indicate overtitration. The setup allows for various trials and different outcomes depending on the sample you choose and the amount of titrant added. The correct calculation is given at the end of the activity.

Periodic Table & Properties

•http://www.rsc.org/education/teachers/learnnet/ptdata/table/index.htm (from Loreen Holstein--thanks!) shows a general periodic table that kids can explore to see the s, p, d, f blocks, generate graphs of atomic mass, electronegativity, year of discovery vs. atomic number, and much more. This is VERY broad, and would benefit greatly from some guided questions, but it is a very good site for exploration.

•http://www.chem.uoa.gr/applets/AppletPerTable/Appl_PerTable2.html (from Mark Hayden--thanks!), "Periodic Table—Correlation of Numerical Properties of Elements" lets students choose elements on a periodic table to generate correlation plots of numerically quantified properties (e.g. melting point, atomic number).

Miscellaneous

• http://lectureonline.cl.msu.edu/~mmp/applist/decay/decay.htm this Radioactive Decay applet allows students to change the half life and watch how a sample of atoms (represented by red dots) decays with different half lives.

• http://micro.magnet.fsu.edu/primer/java/scienceopticsu/powersof10/index.html this Powers of Ten applet (or more like tutorial) allows students to connect the number to an object (e.g. the size of a universe—picture are given)

PhET for Chemistry—all of these are pretty excellent and very "wow, fun!"-ish (yes, that is an adjective)

http://phet.colorado.edu/simulations/index.php?cat=Chemistry

A

Alpha Decay

B

Balloons & Buoyancy
Balloons and Static Electricity
Blackbody Spectrum

G

Gas Properties (already described above)
The Greenhouse Effect

M

Microwaves
Models of the Hydrogen Atom (Loreen already uses this one), shows the predicted behavior according to various models such as the Plum Pudding model, the Bohr model, and Schrodinger's model.

N

Neon Lights and Other Discharge Lamps
Nuclear Fission

P

pH Scale
Photoelectric Effect

R

Radio Waves & Electromagnetic Fields
Reactions & Rates (already above)
Reversible Reactions
Rutherford Scattering

S

Salts & Solubility (already above)
States of Matter (already above)

W

Wave on a String (already above)

Other Subjects:

Biology

http://learn.genetics.utah.edu/content/begin/dna/ (from Loreen Holstein—thanks!), "Transcription and Translation"—click on the center "interactive explore" activity has children transcribe and translate a protein.