

Key Science Concepts and Skills	
Activities Summaries	Chemistry Principles
<p><b>Activity 1: Organizing a Store</b> Students organize a store by categorizing the different items that are contained in the store and discover what to do with new items that had not been accounted for.</p>	<ul style="list-style-type: none"> <li>• Periodicity</li> <li>• Trends</li> </ul>
<p><b>Activity 2: Elements and Their Properties</b> Students determine some of the physical and chemical properties of elements and how to use this information to organize elements into families.</p>	<ul style="list-style-type: none"> <li>• Atoms</li> <li>• Physical properties</li> <li>• Chemical properties</li> <li>• Conductivity</li> <li>• Reactivity</li> </ul>
<p><b>Activity 3: Atoms and Their Masses</b> Students show why they believe in atoms and how the elements of different atoms interact with each other in a single-displacement reaction.</p>	<ul style="list-style-type: none"> <li>• Atomic mass</li> <li>• Single-displacement reaction</li> <li>• Law of Definite Proportions</li> <li>• Quantitative analysis</li> <li>• Measurements</li> <li>• Mole</li> </ul>
<p><b>Activity 4: Are Atoms Indivisible?</b> Students learn through experimentation the properties of electrons and how Rutherford's experiment determined the location of the proton. In addition to this they find that the nucleus is very dense.</p>	<ul style="list-style-type: none"> <li>• Cathode rays</li> <li>• Properties of electrons</li> <li>• Location of proton</li> <li>• Nucleus</li> <li>• Dalton's Atomic Theory</li> </ul>
<p><b>Activity 5: The Chemical Behavior of Atoms</b> Students learn that when energy is supplied to a hydrogen atom, the electron is excited to special levels and gives off light when it falls to lower levels. They also learn how to calculate the frequency of light waves and the energy of these waves.</p>	<ul style="list-style-type: none"> <li>• Hydrogen's line spectrum</li> <li>• Frequency</li> <li>• Wavelengths</li> <li>• Energy of wavelengths</li> <li>• Bohr's Atomic Model</li> <li>• Light waves</li> <li>• Spectroscopic analysis</li> </ul>
<p><b>Activity 6: Atoms with More than One Electron</b> Students discover that each element produces a unique line spectrum and that this ionization potential of the elements helps them to understand why the elements occupy certain positions on the periodic table.</p>	<ul style="list-style-type: none"> <li>• Element line spectrum</li> <li>• Ionization energy</li> <li>• Electron configuration</li> <li>• Period</li> <li>• Ion</li> </ul>
<p><b>Activity 7: How Electrons Determine Chemical Behavior</b> Students learn how to write the electron configuration for all of the elements. They also discover how the electron configuration can be used to show why families of elements behave the same with other compounds or elements.</p>	<ul style="list-style-type: none"> <li>• Electron configuration</li> <li>• Noble gases</li> <li>• Valence electrons</li> <li>• Chemical families</li> </ul>

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<p><b>Activity 8: How Atoms Interact with Each Other</b> Students learn why atoms combine in certain proportions by transferring or sharing electrons from one atom to another. Students also learn the difference between an ionic and covalent bond.</p>	<ul style="list-style-type: none"><li>• Octet rule</li><li>• Ionic bonds</li><li>• Covalent bonds</li><li>• Chemical formulas</li><li>• Binary compounds</li></ul>
<p><b>Activity 9: What Determines and Limits an Atom's Mass?</b> Students learn how to determine the atomic mass of an element and how the average atomic mass is determined from the common isotopes of an element. The activity also leads them through the factors that determine nuclear stability and how fission and fusion differ.</p>	<ul style="list-style-type: none"><li>• Atomic mass</li><li>• Isotopes</li><li>• Nucleons</li><li>• Radioactivity</li><li>• Binding energy</li><li>• Electrostatic forces</li><li>• Strong, nuclear force</li><li>• Nuclear fission</li><li>• Nuclear fusion</li></ul>