Modeling Atomic Structure

Target Grades
9-12

Time
One 50 minute of class period

Objectives
- Students will be able to explain location, charge, and mass of subatomic particles
- Students will be able to distinguish among isotopes and ions.

Purpose
Use of CPO Atom Model to build atoms and demonstrate properties of subatomic particles.

Materials
- Each station will have a CPO Atom Building Game

Procedure
1. Explain properties of subatomic properties as follows:

<table>
<thead>
<tr>
<th>Subatomic Particles</th>
<th>Charge</th>
<th>Location</th>
<th>Relative Mass</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proton</td>
<td>Positive</td>
<td>Nucleus</td>
<td>1 u</td>
</tr>
<tr>
<td>Neutron</td>
<td>Neutral</td>
<td>Nucleus</td>
<td>1 u</td>
</tr>
<tr>
<td>Electron</td>
<td>Negative</td>
<td>Electron Cloud</td>
<td>5.45 x 10^-4 u</td>
</tr>
</tbody>
</table>

2. Identify Protons (red marbles) Neutrons (blue marbles) and Electrons (yellow marbles)
3. Groups students (4 to 5 a group)
4. Have groups make carbon 12
5. Rotate between groups and have students explain the make up of carbon-12
6. Add 1 blue marble and have students identify structure (Carbon-13 isotope)
7. Add one yellow marble and have students identify structure (Carbon ion with -1 charge)
8. Add one red marble and have students identify structure (nitrogen -14)
9. Repeat these steps with other isotopes and ions.

Observations
- Students are able to visual and kinesthetic build models of atoms, isotopes, and ions.

Conclusions
- Supports understanding of how changing subatomic particles in an atom affects the atom.

Extension
- Have students research various stable isotopes of elements and compare to radioactive isotopes

Class Discussion Questions
- What does adding or removing protons from/to the nucleus do?
- What does adding or removing neutrons from/to the nucleus do?
- What does adding or removing electrons from/to the atom do?

Additional Resources
http://www.cpo.com/home/Default.aspx?ge457__geka=kBbRR3exyRYELe06jZAm2W9Fgcu141JWPYH9uKGN45sjtAPAIbSomSbSauBLNa0NL_-pDpLGtB-WaZj2IlZoPQ&ge457__gevi=RhwnQc_W9G4L4kyXrhY1hA&prodid=4688&tabid=168