



# 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.

## Procedure

1. Explain properties of subatomic properties as follows:

Sub atomic Particles	Charge	Location	Relative Mass
Proton	Positive	Nucleus	1 u
Neutron	Neutral	Nucleus	1 u
Electron	Negative	Electron Cloud	$5.45 \times 10^{-4}$ u

2. Identify Protons (red marbles) Neutrons (blue marbles) and Electrons (yellow marbles)
3. Group 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=kBbRR3exyRYELe06jZAm2W9Fgcu141JWPYH9uKGN45sjtAPAiDMsbSauBLNoZ0NL\\_-pDpLGTB-WaZJ2IJZOpQ&ge457\\_\\_gevi=RhwnQC\\_W9G4L4kyXrhY1hA&prodid=4688&tabid=168](http://www.cpo.com/home/Default.aspx?&ge457__geka=kBbRR3exyRYELe06jZAm2W9Fgcu141JWPYH9uKGN45sjtAPAiDMsbSauBLNoZ0NL_-pDpLGTB-WaZJ2IJZOpQ&ge457__gevi=RhwnQC_W9G4L4kyXrhY1hA&prodid=4688&tabid=168)