



**Instructor:** Sandy Delopoulos (2003 Science Teacher Workshop participant)

**School District:** Bradley Beach

**Lesson Title:** Introduction to Isotopes

**Grade:** 8

**Subject:** Science with social studies and literature connection

**Overview:** To introduce concepts using story, note taking and activities.

**Objectives:** To understand isotopes and uses.

**Material:** Paper, beads, glue, rulers, reference books.

**Procedure:**

1. Introduce concept of isotope (explain meaning; show, on board, isotopes of hydrogen: protium, deuterium and tritium).
2. To pique interest: tell story of race for atomic bomb production during WWII between Nazi and US (Nazis needed deuterium, "heavy water", for a chain reaction). (Information from  $E=MC^2$  by David Bodanis).
3. Continue discussion of isotopes: on board draw three models of carbon isotopes. Students take notes: copy models + "Isotopes of an element - # of protons do not change; # of neutrons change."
  - Carbon 12 = 6P + 6N
  - Carbon 13 = 6P + 7N
  - Carbon 14 = 6P + 8N
4. Reinforcement: students choose an element (randomly generated slips of paper with a different element on each paper). They look up information about the isotopes for that element (using web searches, library, relevant books in classroom made available to students by teacher, or text). They receive a large piece of oak tag and divide it into at least 3 segments. In each segment, they will use 3 different color beads representing electrons, protons, and neutrons and fill in chart as seen in example below and glue onto charts in appropriate places: (for individual work or for work in pairs.)

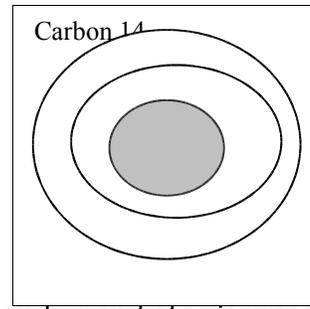
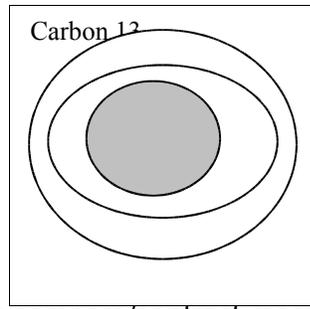
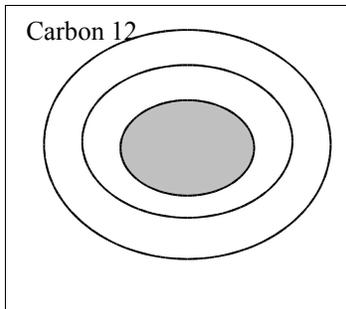
#### Isotopes of Carbon

Bead color:

Protons [ ● ]

Neutrons [ ● ]

Electrons [ ● ]



5. Follow-ups/continuation: compare/contrast mass number and atomic mass; fill in chart with four columns labeled 'Term', 'Definition', 'characteristics', 'Example'. And/or lessons on radioisotopes, carbon-14 dating, etc.

Story of atomic bomb can also be referred to or be used as a lead in for topic of nuclear fission, radioactivity, etc.