

The Mission: Make accurate three-dimensional models of the **nuclei** of the isotopes of carbon.

The Requirements: Your project must be a **presentation** using the following guidelines:

- 1.) The models must be three dimensional and as close to the actual shape of a nucleus as possible. This means you must research the shape and the arrangement of particles in the nucleus. **EVERY aspect of your project (color, size, shape, etc.) is important and will count toward your grade. (See the grade sheet below.)**
- 2.) Protons and neutrons must be sized to the scale of your choosing; however, neutrons may be no larger than 0.5 cm in diameter. They can be smaller, but not larger. *(Hint: protons and neutrons aren't smushed!)*
- 3.) Color is extremely important! *(Hint: for example, ask yourself, "How many kinds of protons are there?")*
- 4.) Each nucleus must be labeled with the name of the isotope. At least one p^+ and n^0 in each isotope must be labeled.
- 5.) You must include a legend or key that is color coded. The key must also be attached to the project.
- 6.) The legend/key must contain the number of p^+ and n^0 .
- 7.) Your project must be neatly presented. DO NOT merely place your project on a sheet of poster or cardboard. Make it a very neat presentation that you might find for sale in a science geek store!
- 8.) The entire project may not be larger than $1.0 \times 10^3 \text{ cm}^3$ in total volume. The smaller the overall presentation is the better. Do not make your presentation overly large. **(I'm talking I want the whole thing SMALL, people!)**
- 9.) BONUS: You may earn extra credit by building your project around a theme. Each isotope must fit in with the theme. **The theme cannot be chemistry related.** (Think of things that have parts of a whole, or that have the same number in them as the number of isotopes, etc.)

Materials: You must use clay or similar modeling substances to make your isotopes; however, DO NOT USE PLAY DOUGH or any other substance that cracks when it dries. Your project must be assembled so that it will last long enough for me to grade. Do not spend a lot of money on this project.

Your Grade: This project will count as a lab grade. Your project will be graded in five areas:

- 1.) Accuracy - do your models contain the correct number of p^+ and n^0
- 2.) Accuracy - does your **key** contain the correct number of p^+ , n^0 , and e^- for each isotope
- 3.) Accuracy - are the p^+ and n^0 in your models the correct size and **color**
- 4.) Neatness - are the p^+ and n^0 round, are your labels and legend neat, is your project a presentation

SAMPLE GRADE SHEET: **(Read carefully, especially the sentence at the bottom!!)**

	CARBON-12	CARBON-13	CARBON-14	TOTAL
# Protons (7 pt. X 3 = 21)				
# Neutrons (7 pt. X 3 = 21)				
Key - p^+ , n^0 (18)				
SIZE OF PARTICLES (15 points total)				
COLOR (15 points total)				
NEATNESS (10 points total)				
DEDUCTIONS**				
BONUS: Theme (Up to 5 points)				

**Projects are to be made with clay or similar modeling compound. Twenty (20) points will be deducted from those not made with clay. A minimum of 10 points, up to 20 points, will be deducted from projects that are too large.