Chemistry: Isotopes & Atomic Mass Computer Simulation Lab

Explore both tabs of the Isotopes & Atomic Mass simulation with your partner for a few minutes. You can access the computer simulation at http://phet.colorado.edu/en/simulation/isotopes-and-atomic-mass or by using the link found under the lesson 3 resources on the Unit 4 webpage. You will design an online investigation to answer the research questions below.

Research Questions
1. Why aren’t all of an element’s atoms identical to each other?
2. How are isotopes of the same element similar to each other and how are they different from each other in terms of atomic number, mass number, number of protons, number of neutrons and number of electrons?
3. How do you determine an element’s average atomic mass?
4. How can you tell an element’s most abundant isotope or isotopes by looking at its average atomic mass on the periodic table?
5. How do you write the atomic symbol (aka isotope symbol) for an isotope?
6. How do you write the hyphen notation for an isotope?

Hypotheses
Write your hypotheses for each research question on the appropriate section of your Lab Note Sheet(s).

Procedure
Develop a procedure for using the computer simulation to collect data that will help you answer the research questions. Write this step-by-step procedure on the appropriate section of your Lab Note Sheet(s).

Data
Determine the data you will need to collect in order to determine the answers to the research questions. Create your data table(s) on the appropriate section of your Lab Note Sheet(s).

Data Analysis
Draw graphs of and/or perform calculations on your data to help answer the research questions. Use separate sheets. Graphs can be done on Excel or manually using graph paper.

Conclusions
Use your data from the investigation to answer the following questions. Be sure to specifically reference your data.
1. Why aren’t all of an element’s atoms identical to each other?
2. How are isotopes of the same element similar to each other and how are they different from each other in terms of atomic number, mass number, number of protons, number of neutrons and number of electrons?

3. How are isotopes of different elements different from each other?

4. Do you expect isotopes of the same element to have the same chemical and physical properties or different ones? Explain your answer. [Remember, the role each subatomic particle has in the element.]

5. How do you determine an element’s average atomic mass? Show how you calculated the average atomic mass for three different elements.

6. How can you tell an element’s most abundant isotope or isotopes by looking at its average atomic mass on the periodic table? Predict the most abundant isotope or isotopes for calcium, strontium and bromine.
7. How do you write the atomic symbol (aka isotope symbol) for an isotope? Explain each part of the symbol and give examples for isotopes of the same element and examples for isotopes of different elements.

8. How do you write the hyphen notation for an isotope? Explain each part of the notation and give examples for isotopes of the same element and examples for isotopes of different elements.

9. How is an element’s chemical symbol (the symbol you see on the periodic table) different from its atomic symbol?

10. When do you think it would be important to use the atomic symbol instead of the chemical symbol?

11. How is an element’s name (the name you see on the periodic table) different from its hyphen notation?

12. When do you think it would be important to use the hyphen notation instead of the chemical name?