**Part 1: Elements & Compounds / Mixtures & Pure Substances**

Name:

1. Match each particle diagram (A-H) with its correct description. Questions may have more than one answer.

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* 1. a mixture of compounds only \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	2. a mixture of elements only \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	3. a pure substance \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	4. a mixture of elements and compounds \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Part 2: Atomic Models**

1. What important contribution did each scientist below make to our understanding of atoms?
	1. Dalton
	2. Thomson
	3. Rutherford
	4. Chadwick
	5. Bohr
2. Which scientists would have drawn the following pictures to represent their models of the atom?

|  |  |  |  |
| --- | --- | --- | --- |
| http://images.tutorcircle.com/cms/images/44/bohr-model-of-calcium.png | http://quantummechanics.mchmultimedia.com/wp-content/uploads/2011/08/PlumbPuidding-300x182.png | http://www.affordablehousinginstitute.org/blogs/us/Probability_atom_small.jpg | http://upload.wikimedia.org/wikipedia/commons/thumb/e/e8/Rutherford_atomic_planetary_model.svg/220px-Rutherford_atomic_planetary_model.svg.png |

**Part 3: Basic Atomic Structure**

1. Compare and contrast protons, neutrons, and electrons in terms of their (1) location, (2) charge, and (3) relative mass.
2. Draw a Bohr model for a neutral atom of fluorine.
3. How can an atom be neutral if it contains particles that have positive and negative charges?

**Part 4: Isotopes**

1. Which of the following are isotopes of nitrogen? Circle all that apply.

$$ $$

1. According to your answer(s) to the previous question, how are the isotopes of nitrogen alike? How are they different?
2. Complete the table below.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Nuclear Symbol** | **Atomic #** | **Mass #** | **# of Protons** | **# of Neutrons** | **# of Electrons** | **Isotope Name** |
| $$$$ |  |  |  |  |  |  |
|  |  |  | 29 | 35 |  |  |
|  |  |  |  |  |  | Bromine-81 |
| $$$$ |  |  |  |  |  |  |
|  |  |  |  |  |  | Iron-57 |
|  | 28 | 62 |  |  |  |  |

**Part 5: Nuclear Reactions**

1. What is a nuclear reaction?
2. Why do radioactive atoms emit radiation?
3. What happens when radioactive atoms undergo radioactive decay? What is usually the result?
4. Identify the missing particle in the following nuclear reactions and identify the type of nuclear reaction that occurs.

|  |  |  |
| --- | --- | --- |
|  | **Nuclear Equation** | **Type of Nuclear Reaction** |
| a. |  |  |
| b. |  |  |
| c. |  |  |
| d. |  |  |
| e.  |  |  |

1. Which type of radioactive particle is the most dangerous? Why?
2. What is the difference between nuclear fusion and fission?
3. Which one of the two processes is used in nuclear power plants?
4. Which process fuels (occurs in) the Sun and other stars?
5. Which process is responsible for forming the first 92 elements on the Periodic Table?
6. What is a radioactive half-life?
7. Actinium-226 has a half-life of 29 hours. If 100 mg of actinium-226 disintegrates over a period of 58 hours, how many mg of actinium-226 will remain? Show/label your work.
8. Thallium-201 has a half-life of 73 hours. If 1.0 mg of thallium-201 remains after a period of 6.0 days and 2 hours, how many mg of thallium-201 were originally in the sample? Show/label your work.