**Unit II Study Guide**

**Define the following:**

* Ion –
* Cation –
* Anion –
* Isotope –
* Fission –
* Fusion –

**Ions and Isotopes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Name | Symbol | Mass | Charge | Protons | Neutrons | Electrons |
| Strontium |  | 87 | +2 |  |  |  |
| Iodine |  | 125 | -1 |  |  |  |
| Silicon |  | 29 | 0 |  |  |  |
| Calcium |  | 40 | +2 |  |  |  |
|  | C | 14 |  |  |  | 10 |
| Aluminum |  |  |  |  | 15 | 10 |
| Copper |  |  |  |  | 34 | 27 |
|  |  |  |  | 35 | 44 | 36 |
|  |  | 15 | -2 | 8 |  |  |

**Average atomic mass:**

1. Why is the atomic mass on the periodic table not a whole number?
2. Why is the mass number of an isotope a whole number?
3. Cerium has three common isotopes. If the abundance of 142Ce is 0.01%, the abundance of 141Ce is 0.71%, and the abundance of 140Ce is 99.28%, what is the average atomic mass of cerium?
4. There are two isotopes of potassium: K-39 and K-40. Since potassium’s reported average atomic mass is 39.10, which of the two isotopes are more abundant? (\*\*For a challenge, determine the percentages corresponding with the two masses.)

**Nuclear Decay:**

1. 269 Hs 🡪4 He + \_\_\_\_\_\_\_\_
2. 235 Pa 🡪235 U + \_\_\_\_\_
3. 139 La 🡪4 He + \_\_\_\_\_
4. 75 Se 🡪0-1e + \_\_\_\_\_
5. 6 Li 🡪0-1e +\_\_\_\_\_
6. When an isotope undergoes beta decay, what is one of the products?
7. When an isotope undergoes alpha decay, what is one of the products?
8. Rank the three types of decay from least to most dangerous.
9. Which type of nuclear decay is pure energy?
10. What type of nuclear reaction takes place on the sun?

**Half-Life:**

1. Six grams of Thallium-205 decay to 0.375 grams in one hour. What is the half-life of this isotope?
2. How many grams of Polonium-209 are left after twelve hours if the sample began with 200 grams and Polonium-209 has a half-life of three hours?
3. How long does it take for 20 grams of Actinium-227 to decay to 1.25 grams if one half-life is 4 years?
4. If after twenty minutes, there is only 1 mg left of a 16 mg sample of U-240, what is the half-life?
5. Pa-231 has a half-life of 27 hours. If 500 mg of Pa-231 disintegrates over a period of 54 hours, how many mg of Pa-231 will remain?
6. The half-life of an isotope is 4 years. How many years would it take for a 8.0 mg sample to decay until only 0.50 mg of it remains?

Make sure you know: Atomic structure, isotopes, ions, how to determine numbers of the subatomic particles, average atomic mass, nuclear decay reactions, and half-life equations. Remember that anything in your notes may be on the test!