**Physical Science Test #2 Study Guide**

**Chapter 17 and 19** – **Atoms and Periodic Table**

1. Draw a picture of a nitrogen atom. Your drawing should include the correct number of protons, electrons, and neutrons. The electrons should be placed in the appropriate levels of the electron cloud.

1. What do the numbers after the word “chlorine” represent?   
     
   **Chlorine – 35 and Chlorine – 37**
2. What is an isotope?

1. Find the number of neutrons in **Chlorine – 35 and Chlorine – 37**
2. . An isotope of mercury has 80 protons and 120 neutrons. What is its mass number?

1. How many electrons, protons and neutrons are contained in each of the following isotopes?

199Pb  P = E = N =

82

helium – 8 P = E = N =

1. Fill in the table:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Element** | **Atomic #** | **Atomic Mass** | **# of protons** | **# of electrons** | **# of neutrons** |
|  |  |  | 29 | 29 | 36 |
| Sulphur |  |  |  |  |  |
|  |  |  | 8 |  | 10 |

1. Is the charge of a nucleus positive, negative or neutral?
2. Is the charge of an atom positive, negative or neutral?
3. Atoms A and B both have a mass number of 14. Atom A has 8 neutrons and atom B has an atomic number of 7. Are atoms A and B isotopes or different elements?

**Electron Cloud Structure**

*Draw the cloud structure for the following elements*

**Carbon Fluorine Lithium Sulfur**

**Electron Dot Diagram (Lewis Dot diagram)**

*Write the electron dot diagram for the following elements*

**Beryllium Chlorine Neon Silicon**

**Chapter 19: Elements and their Properties**

1. Explain the difference between malleable and ductile. What type of elements have these properties?
2. Describe properties of metals and nonmetals.
3. What is a metalloid? Describe properties of metalloids.

1. Fill in the table:

|  |  |  |
| --- | --- | --- |
|  |  | **Location on the Periodic Table** |
| **Metals** | **Alkali** | *Group #* |
| **Alkaline Earth** | *Group #* |
| **Transition** | *Location of Transition elements* |
| **Inner Transition** | *Location of Inner Transition elements* |
| **Nonmetals** | **Halogens** | *Group #* |
| **Noble Gases** | *Group #* |
| **Other Nonmetals** | *Location of all nonmetals on the periodic table* |
| **Metalloids** | *Where are they located?* | |
| **Synthetic** | *Where are they located?* | |

**CH. 18 Radioactivity – Half-life – Fusion and Fision**

1. The three types of radioactive emissions are called alpha (), beta () and gamma ()

radiation. Complete the table below with the correct information about each type.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Charge** | **Atomic Symbol** | **Can Be Stopped By** |
| Alpha |  |  |  |
| **Beta** |  |  |  |
| **Gamma** |  |  |  |

1. Complete the following nuclear reactions:
   1. 🡪\_\_\_\_\_\_\_ + 
   2.  🡪  + \_\_\_\_\_\_\_\_
   3. 🡪 \_\_\_\_\_\_+ 
   4. 🡪  + \_\_\_\_\_\_
2. When  emits a beta particle, it transforms into a new element.
   1. Write out the nuclear equation:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* 1. Fill out the chart below:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Name of the Element | Atomic Number | Atomic Mass | # Of Protons | # Of Electrons | # Of Neutrons |
| Parent  Element |  |  |  |  |  |  |
| Daughter Element |  |  |  |  |  |  |

1. Mercury -197 is used for kidney scans and has a half-life of 3 days. If a hospital orders 80g of mercury-197, how much will be left after 12 days?
2. The half-life of strontium-90 is 25 years. How much strontium-90 will remain after 100 years if the initial amount is 4.0 g?
3. If the half-life of uranium-232 is 70 years, how many half-lives will it take for 10 g of it to be reduced to 1.25 g?

| **Nuclear Fission** | **Nuclear Fusion** |
| --- | --- |
| **Definition:** | Fission is the splitting of a large atom into two or more smaller ones. | Fusion is the fusing of two or more lighter atoms into a larger one. |
| **Natural occurrence of the process:** | Fission reaction does not normally occur in nature. | Fusion occurs in stars, such as the sun. |
| **Byproducts of the reaction:** | Fission produces many highly radioactive particles. | Few radioactive particles are produced by fusion reaction, but if a fission "trigger" is used, radioactive particles will result from that. |
| **Conditions:** | Critical mass of the substance and high-speed neutrons are required. | High density, high temperature environment is required. |
| **Energy Requirement:** | Takes little energy to split two atoms in a fission reaction. | Extremely high energy is required to bring two or more protons close enough that nuclear forces overcome their electrostatic repulsion. |
| **Energy Released:** | The energy released by fission is a million times greater than that released in chemical reactions; but lower than the energy released by nuclear fusion. | The energy released by fusion is three to four times greater than the energy released by fission. |
| **Nuclear weapon:** | One class of nuclear weapon is a fission bomb, also known as an atomic bomb or atom bomb. | One class of nuclear weapon is the hydrogen bomb, which uses a fission reaction to "trigger" a fusion |

