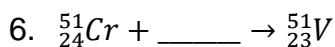
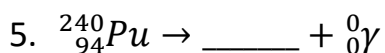
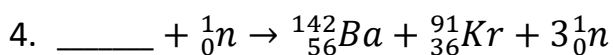
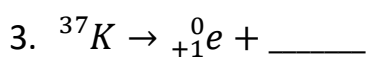
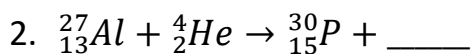
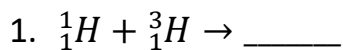


Name \_\_\_\_\_ Date \_\_\_\_\_

**Classifying Nuclear Reactions****Directions:** Determine the following nuclear reactions as either **alpha, beta, gamma, or electron capture.****Directions:** Complete the following nuclear equations so that they are balanced for both mass and nuclear charge, **then determine the type of nuclear reaction as either alpha, beta, gamma, or electron emission.**

Name \_\_\_\_\_ Date \_\_\_\_\_

**Balancing Nuclear Reactions****Directions:** Complete the following nuclear equations so that they are balanced for both mass and nuclear charge.**Directions:** Write a balanced equation for each of the following nuclear changes. You must supply the missing product in each equation.

7. Uranium-238 emits an alpha particle.

8. Four hydrogen-1 nuclei combine and release two positrons.

9. The decay of  ${}^{53}_{26}\text{Fe}$  by beta emission.

10. Write the balanced nuclear equation for the fusion reaction between a lead-208 nucleus and an iron-58 nucleus. One of the two products is a neutron.

Name \_\_\_\_\_ Date \_\_\_\_\_

**Nuclear Chemistry Concepts****Directions:** Match the following descriptions with the correct term.

- |  |                       |
|--|-----------------------|
| ____ 1. A procedure that uses positrons to detect many different medical disorders           | a. rad                |
| ____ 2. A unit used to measure the amount of radiation absorbed by the body                  | b. CAT scans          |
| ____ 3. The annual amount of radiation to which a person is normally exposed                 | c. Roentgen           |
| ____ 4. A unit used to measure the amount of damage done to a body                           | d. radioactive dating |
| ____ 5. Used to approximate the age of an object using the half-life of radioactive isotopes | e. 100–300 mrem       |
| ____ 6. Used in radiation therapy for cancer patients  | f. rem                |
| ____ 7. Used in smoke detectors  | g. Cobalt-60          |
| ____ 8. Shows cross-sectional views of the body  | h. Americium-241      |
| ____ 9. A unit used to express gamma radiation in the air                                    | i. PET                |

**Directions:** Determine if each item pertains to **alpha ( $\alpha$ ), beta ( $\beta$ ), or gamma ( $\gamma$ ) radiation.**

- \_\_\_\_\_ 1. Carries an electric charge of 0  
 \_\_\_\_\_ 2. Heaviest of the three particles  
 \_\_\_\_\_ 3. Electrons  
 \_\_\_\_\_ 4. No mass  
 \_\_\_\_\_ 5. Not blocked by lead or concrete  
 \_\_\_\_\_ 6. Carries an electric charge of 2+  
 \_\_\_\_\_ 7. Blocked by paper  
 \_\_\_\_\_ 8. Blocked by metal foil  
 \_\_\_\_\_ 9. Photons  
 \_\_\_\_\_ 10.  ${}^4_2\text{He}$

**Directions:** Determine if each item pertains to **fusion, fission, or both.**

- \_\_\_\_\_ 1. Breaking apart of a large nucleus  
 \_\_\_\_\_ 2. Used in nuclear weapons  
 \_\_\_\_\_ 3. Used in nuclear power plants  
 \_\_\_\_\_ 4. Nuclei combine to form a larger stable nucleus  
 \_\_\_\_\_ 5. Energy is released  
 \_\_\_\_\_ 6. Doesn't produce radioactive waste  
 \_\_\_\_\_ 7. Requires high pressure and temperature to occur

Name \_\_\_\_\_ Date \_\_\_\_\_

### Half-Life Practice

**Directions:** Solve the following half-life problems.

1. Carbon-14 has a half-life of 5730 years. How much of a 500g sample would be left after 22,920 years? \_\_\_\_\_ How many half-lives will have occurred when the sample is 125g? \_\_\_\_\_
2. Iodine-131 has a half-life of 8.07 days and is used to treat thyroid problems. After 24.21 days, how much of a 200g sample will be left? \_\_\_\_\_ How many days will it take until the sample is only 6.25g? \_\_\_\_\_
3. Polonium-216 takes 0.16 seconds for half of any sample to decay. You have a 5000kg sample of polonium-216 that has been "around" for 1 min 4 sec. How much actual polonium-216 is in your sample? \_\_\_\_\_
4. The half-life of thorium-234 is 24.1 days. How much time must pass for one-eighth of a given amount of this radioactive isotope to remain? \_\_\_\_\_
5. The half-life of  $^{232}\text{Th}$  is  $1.4 \times 10^{10}$  years. If there are 25.0g of the sample left after  $2.8 \times 10^{10}$  years, how many grams were in the original sample? \_\_\_\_\_
6. There are 5.0g of  $^{131}\text{I}$  left after 40.35 days. How many grams were in the original sample if its half-life is 8.07 days? \_\_\_\_\_