Honors PS Chemistry Name_____Period_____

Section 4.4 and Chapter 25: Radioactivity (Nuclear Chemistry) from the Glencoe Chemistry book.

Chapter 18: Radioactivity from the Glencoe Physical Science book.

Directions: Using this assignment as a guide, read Chapter 18 from the Physical Science book (pages 536-556). The book is linked to my calendar on February 28. Answer the questions as you read the chapters.

Radioactivity (pages 538-540)

A. In most atoms, a strong force is able to keep the nucleus permanently together making the nucleus _____.

1. When the force is not strong enough to hold the nucleus together, the nucleus can _____ and give off energy.

2. This process of _____ is called radioactivity.

B. Large nuclei tend to be _____ and can break apart.

1. All nuclei that contain more than 83 _____ are radioactive. Can other nuclei that contain fewer than 83 protons be radioactive?

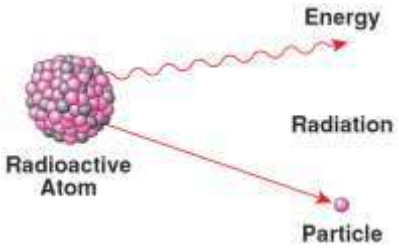
2. Elements make in the laboratory are called _____. Are these elements stable?

Label the following $\rightarrow {}^{14}_{6}C \leftarrow$

C. What is the difference between carbon-12 and carbon-14 (beside the number 12 and 14)?

1. Carbon-12 and carbon-14 have the same number of protons in their nuclei; therefore, they are called _____.

2. Which one, carbon-12 or carbon-14, is radioactive?



Radioactive Half-Life and Radioactive Dating (pages 544-545)

A. If an element is radioactive, the nuclei will decay.

1. The time required for half of the sample to decay is the _____ of that isotope.

2. The nucleus left after the isotope decays is called the _____.

3. What is the half-life of

a) hydrogen-3?

b) iodine-131?

c) polonium-211?

B. The radioactive isotope carbon-14 is used to estimate the ages of _____ and _____ remains.

C. _____ can be used to estimate the ages of rock.

D. What is the percentage of radioactive nuclei left after 3 half-lives pass? (Hint: half of the sample decays at the end of each 'half-life'.)

Measuring Radiation and Background Radiation (pages 548-550)

A. What is the name of a device that measures amount of radiation? _____

1. It produces an _____ when it detects a charged particle?

2. The intensity of radiation present is determined by the number of _____ or _____ of light each second.

B. Low-level radiation is emitted by naturally occurring radioactive isotopes found in Earth's _____, _____, and _____. Also traces of naturally occurring radioactive isotopes are found in _____, _____, and _____ consumed by all animals and plants.

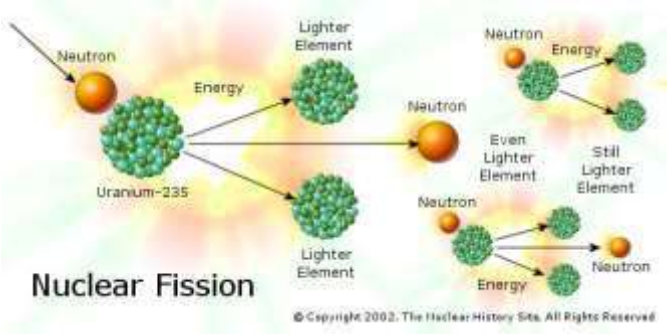
C. The largest source of background radiation comes from the decay of _____ gas. It is produced by in the Earth's crust by the decay of _____. This gas can seep into houses and especially basements from the surrounding soil and rocks.

D. Radon gas exposure can lead to cancer. Do you have a radon reduction system in your home? _____ Radon gas levels are very high in Brookings County. If you have a basement, ask your parents if you have a radon reduction system in your home or have ever tested for radon gas levels in your basement.

Nuclear Fission and Nuclear Fusion (pages 551-553)

A. The process of splitting a nucleus is called _____. What does the word fission mean? _____

B. Only large nuclei, such as the nuclei of _____ and _____, can undergo nuclear fission. A nuclear fission reaction creates a tremendous amount of _____.



C. What is the equation that relates mass and energy?

D. Small amounts of mass can be converted into an enormous amount of energy.

1. For example, if one gram of mass can be converted into about _____ J of energy.

2. Splitting one uranium-235 nucleus can produce about _____ times more energy than reacting one molecule of _____.

E. Two nuclei with low masses are combined to form one nucleus of larger mass in a process called _____.

F. Fusion _____ atomic nuclei together whereas fission _____ nuclei apart.

G. The sun is mainly composed of _____.

1. The energy given off by the sun is created by the fusion of _____ nuclei into _____.

2. As the sun ages, _____ nuclei are used up as they are converted into _____.

3. Eventually, all of the hydrogen will be converted to helium, but not for another _____ years.

Directions: Write a contextual definition for each of the following vocabulary terms using pages 536-556 (Chapter 18) from the Physical Science book or pages 105-107 (Section 4.4) and 804-831 (Chapter 25) from the Chemistry book. All terms are in the book (not necessarily in **bold**) except those designated with an asterisk*. Identify the page # from the chapter that the term was found on (not the glossary from the back of the book). Either book may be used.

radioactivity page #_____

strong force page #_____

isotope page #_____

alpha particle page #_____

beta particle page #_____

gamma rays page #_____

half-life page #_____

radioactive dating page #_____ **(radiochemical dating)**

Geiger counter page #_____

background radiation page #_____

nuclear fission page #_____

chain reaction page #_____

nuclear fusion page #_____