

Week 10 Assignment

Part A:

A. Watch Nuclear Science and Radioactivity and answer questions pertaining to it:

<https://www.youtube.com/watch?v=zmwIQK1DqQk>

1. In this demonstration, what instrument was used to measure radioactivity?
Geiger counter
2. What element was used to make the numbers of the watch glow in the dark?
Radium
3. A) Two forms of radiation are produced by this element. What are they?
Alpha radiation
Gamma radiation

B) Which form of radiation was detected by the instrument?
Gamma radiation

B. Watch the Concepts of Isotopes and answer questions pertaining to it:

<https://www.youtube.com/watch?v=oLnuXpf4hsA>

1. What subatomic particles affect the mass of an atom?
 - a. Protons
 - b. Neutrons
 - c. Electrons
 - d. Protons and Neutrons**
 - e. Neutrons and Electrons
2. Which isotope of Hydrogen was the heaviest? Why, what causes it to be heavier than the others?

Tritium -This is because it has a higher number of neutrons compared to the other isotopes

C. Watch the Radiation of Objects and answer questions pertaining to it:

https://www.youtube.com/watch?v=pmo_w-dQ4JE

1. What was the element that was measured in the fertilizer?
Potassium -40
2. What was the element that was measured in the camping lantern?

Thorium

3. A) What was the element that was measured in the smoke detector?

Americium-241

- B) What kinds of radiation does this element emit?

Alpha raduation

- C) What happened when the paper was placed between the instrument and the smoke detector? How is this result used in smoke detectors in homes?

The radiation levels drop since alpha particles cannot tpenetrate a piece of paper. At home the smoke detectors have Aplastic cover hence this prevents the alpha particle escaping and making the smoke detector safe for usu in homes .

Part B:**Multiple Choice**

1. Which particle has a negative charge?

A. Alpha particle
B. Positron
C. Neutron
D. Beta particle

2. Which particle has the same mass as an electron, but a positive electric charge?

A. Alpha particle
B. Gamma photon
C. Proton
D. Positron

3. Which of the following gives the correct order for energies of portions of the electromagnetic spectrum?

A. radio > visible light > gamma > ultraviolet > infrared
B. visible light > ultraviolet > infrared > radio > gamma
C. radio > infrared > ultraviolet > gamma > visible light
D. gamma > ultraviolet > visible light > infrared > radio

4. Which of the following affects the half-life of a radioactive sample?

A. The age of sample
B. The size of the sample
C. The temperature of the sample
D. None of these

5. Which radioactive element, if ingested, is primarily incorporated into bone tissue?

- A. Uranium
 - B. Radon
 - C. Radium**
 - D. Thorium
6. The process that generates energy in the sun and stars is
- A. Fusion**
 - B. Fission
 - C. β -emission
 - D. Positron emission
7. The process where an atomic nucleus is split into two smaller nuclei and a large amount of energy is produced is called
- A. Fusion
 - B. Fission**
 - C. β -emission
 - D. Positron emission
8. An Isotope is defined as an atom of the same element that has a different number of _____?
- A. Protons
 - B. Neutrons**
 - C. Electrons
 - D. Protons and Neutrons
9. Which of the following is not a unit used to measure radioactivity?
- A. Geiger**
 - B. Curie
 - C. Becquerel
 - D. All of the above are units used to measure radioactivity.

MATH PROBLEMS and SHORT ANSWER QUESTIONS – Show your Work:

10. For the Isotope $^{67}_{31}\text{Ga}$
- A. What is the atomic number?
31 Number of proton
 - B. What is the mass number?
67
 - D. What is the number of protons?
31
 - D. What is the number of neutrons?
 $67-31=36$

11. For the Isotope $^{85}_{38}\text{Sr}$

A. What is the atomic number?

38

B. What is the mass number?

85

C. What is the number of protons?

38

E. What is the number of neutrons?

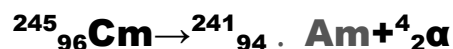
47

12. Give two examples of common radioisotopes used in medicine. Be sure to write the full name of the isotope (As an example from the previous question $^{85}_{38}\text{Sr}$ can be written as Sr – 85) and state what the isotope is used for.

A. **Thallium-201 chloride** Isotope is used for **Detection of coronary artery disease.**

B. **Iodine-131** Isotope is used for **used to treat thyroid cancer**

13. Curium – 245 is an alpha emitter. Write the equation for the nuclear reaction and identify the product nucleus.



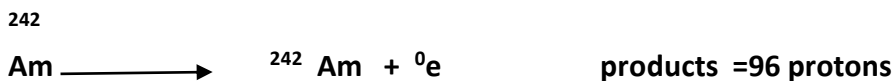
Nucleus= 94 protons

147 neutrons

14. In the equation $^{228}_{90}\text{Th} \rightarrow ^{228}_{91}\text{Pa} + X$ which particle is represented by X?

Beta

15. Americium – 242 is a beta emitter. Write an equation for this nuclear reaction and identify the product nucleus.

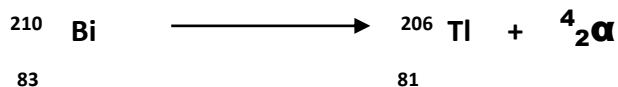


95 **96** **-1** **146 neutrons**

16. Bismuth – 210 is an alpha emitter. Write an equation for this nuclear reaction and identify the product nucleus.

Name(s): _____

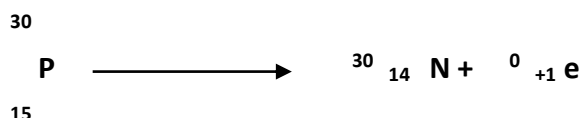
CHM 1020 W10



Product proton 81

neutron = 125

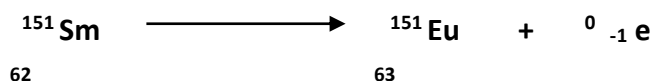
17. Phosphorus – 29 is a positron emitter. Write an equation for this nuclear reaction and identify the product nucleus.



14 PROTON

16 NEUTRONS

18. Samarium – 151 is a beta emitter. Write an equation for this nuclear reaction and identify the product nucleus.



PROTONS 63

NEUTRON = 88

19. How much of a 24-gram sample of Radium-226 will remain unchanged at the end of three half-life periods?

24-----12-----6-----3

Answer 3g

20. Iodine – 125 emits gamma rays when it decays to Tellurium-125 and has a half-life of 60 days. If a 0.020 g pellet of iodine – 125 is implanted into a prostate gland, how much iodine – 125 remains there after one year?

Mass remaining = $1/2^n$ (Original mass)

$$n=366/60= 6.1$$

$$1/68.59* (0.02) =0.0002916g$$

Name(s): _____

CHM 1020 W10

21. Barium – 122 has a half-life of 2 minutes. Suppose you obtain a sample weighing 10.0 g and it takes 10 minutes to set up an experiment. How many grams of Barium – 122 will remain at the point when you begin the experiment?

$10/2 = 5$ decays

10-----5-----2.5-----1.25-----0.625-----0.3125

Answer 0.3125g

22. A normal adult jawbone contains 200 mg of Carbon-14 in a living person. If scientists found a jawbone that only had 50mg of Carbon-14, how old is the bone? (The half-life of C-14 is 5730 years).

Decay 200-----100-----50

Answer (5730*2)=11460