Starter #07

Chapter 33

1) **Why did Wilhelm Roentgen call his discovery "X-rays"?**
   They were of an unknown nature. Usually we use X for unknowns
2) **What are the three main types of radioactivity?**
   Alpha Particles, Beta Particles, and Gamma Rays
3) **What is the unit for absorbed radiation and what does it mean?**
   RAD = Radiation Absorbed Dose
4) **What is the unit for radiation dosage on potential damage and what does it mean?**
   REM = Roentgen Equivalent Man
5) **What is the level of radiation dosage that is dangerous to humans?**
   500 rem is the 50% lethal dose
6) **What is one use of radiation that helps humans?**
   X-Ray, Radiation Treatment, Radioactive Tracers
7) **What is the name of the force that holds the nucleus together?**
   Strong Nuclear Force
8) **All nuclei with more than how many protons are radioactive?**
   82 – Lead is the last nucleus that is not radioactive.

Quiz #07

Chapter 33

1) **What is the formula and charge for an alpha particle (α)?**

$$\alpha = {}^{4}_{2}He^{+2}$$

2) **What is the formula and charge for a beta particle (β)?**

$$\beta = {}^{0}_{-1}e^{-}$$

3) **List the three types of radiation from least dangerous to most dangerous:**

Alpha, Beta, Gamma

4) **Explain why the most and least dangerous are what they are:**

Alpha has largest mass, so it has the least penetrating power

Gamma has no mass, so it has the most penetrating power

5) **What can stop an alpha particle?**

Skin or piece of paper

6) **What can stop a beta particle?**

Wood or metal foil

7) **What can stop gamma ray?**

Feet of concrete or several inches of lead can stop most of it

Starter #08

Chapter 33

1) **What is a half-life?**

   The time it takes for half the quantity of a radioactive isotope to decay

2) **What are the 5 types of radiation detectors discussed in the book?**

   Geiger Counter, Cloud Chamber, Bubble Chamber, Spark Chamber, Scintillation Counter

3) **What is transmutation?**

   The changing of one chemical element to another

4) **What are the two basic types of natural transmutation?**

   Alpha Decay & Beta Decay

5) **Who was the first person to artificially transmutate an element?**

   Ernest Rutherford in 1919

6) **What is carbon dating and how far back can it work?**

   The use of measuring the current level of radioactivity of a carbon-based artifact to determine its age using the half-life of Carbon-14

Quiz #08

Chapter 33

1) **Silicon-32 has a half-life of 170 years. What percent of a sample of Silicon-32 will be left after 680 years?**

$$680\ years \left| \frac{1\ half\ life}{170\ years} \right| = 4\ H.L. = \left(\frac{1}{2}\right)^4 = \frac{1}{16} = 6.25\%$$

2) **The half-life of Carbon-14 is 5730 years. If you find a fossilized leaf in your back yard that contains 12.5% of the Carbon-14 a living organism should have, how long ago did the leaf die?**

$$0.125 = \frac{1}{8} = \left(\frac{1}{2}\right)^3 = 3\ H.L. \left| \frac{5730\ years}{1\ H.L.} \right| = 17{,}190\ years\ ago$$

3) **Show the alpha decay of Uranium-238 ($^{238}_{92}U$)**

$$^{238}_{92}U \rightarrow {}^{234}_{90}Th + {}^{4}_{2}He$$

4) **Show the beta decay of Potassium-40 ($^{40}_{19}K$)**

$$^{40}_{19}K \rightarrow {}^{40}_{20}Ne + {}^{0}_{-1}e$$