Chemistry
Chapter 28 Study Guide

1. Isotopes whose nuclei are unstable enough to go through nuclear change are called

2. The process by which unstable nuclei give off radiation is called

3. The penetrating rays and particles emitted by a radioactive source are called

Study Fig. 28.2

4. Why do the beta particles curve toward the positive plate?

Why do the gamma rays not curve at all?

6 During alpha decay (a type of radioactive decay), the nucleus emits a particle consisting of

7. What are the two ways an alpha particle can be written in a nuclear equation?

8. What happens to the atomic number of the remaining nucleus during alpha decay?
What happens to mass number?

9. Study the equation for the alpha decay of U-238 near the top of p. 843. How does the mass number on the left compare to the sum of the mass numbers on the right?
atomic numbers?

10. What happens to a neutron during beta decay?

11. What are the two symbols used for beta particles in nuclear reactions?

12. Study the beta decay for C-14 near the bottom of p. 843. Answer the questions in problem 9 for this reaction.

13. _____ radiation is high-energy electromagnetic radiation given off by a nucleus that needs to get rid of excess energy

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Page 844 Answers 1-3
1. Radioactivity is the process by which an atomic nucleus gives off radiation. Radioactive decay is the process in which an unstable nucleus disintegrates.
2.

	Alpha	Beta	Gamma

a. Mass	4 amu	1/1837	0
b. Charge	2+	1-	0
c. Penetrating power	low	moderate	high

3. The nucleus undergoes change.

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14. _____ is the time required for one-half of the nuclei of a radioisotope sample to decay to products.

15. Study Fig. 28.8 on p. 849. How many alpha particles are produced as a single U-238 isotope decays to Pb-206?

How many beta? How many gamma rays?
What isotope has the longest half-life? shortest half life?

16. How can the age of uranium containing minerals be determined? (Page 849)

17. The conversion of an atom of one element to an atom of another element is called _____

Page 851: Answers 8 and 10
8.

10. 5.25 years

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18. What is **nuclear fission**?

19 What is **nuclear fusion**? Page 855

20. Which process is going on in the sun that provides the earth with energy?

Page 856 Answers 11-15
11. Fission involves splitting nuclei into smaller fragments. This is a reliable,

controllable source of energy but poses operational dangers and produces radioactive wastes. Fusion occurs when two nuclei combine to produce a nucleus of greater mass. Fusion reactions require very high temperatures and are difficult to contain.
12.Fission is controlled through neutron moderation an neutron absorption. The heat produced is removed from the reactor core and is used to generate steam to drive a turbine. The spinning turbine generates electricity.
13.A nuclear chain reaction involves the splitting of atomic nuclei that release energetic neutrons that split more nuclei.
14.by using neutron moderation and neutron absorption
15. abundant, cheap fuels and no radioactive waste products

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21. What is ionizing radiation? is radiation with enough energy to knock electrons off some atoms of the bombarded substance to produce ions.
Why do you think th word "ionizing" is used to describe this type of radiation?

22. Study Fig. 28.19 and answer the question at the end of the caption.

Page 861 Answers 16, 17, 20 and 21
16.Geiger counters detect beta radiation that ionizes gas in the counter's tube, producing a current and an audible or visible signal. Scintillation counters use a phosphors to convert a potion of the energy from ionizing radiation into easily detectable signals. Scintillation counters detect all types of ionizing radiation. Film badges are enclosed layers of photographic film that are develop to reveal the strength and type of radiation exposure.
17. Radioisotopes can be used to analyze samples for age and content; study chemical reactions, molecular structure, and agricultural assimilation of herbicides, pesticides, and fertilizers; and diagnose and treat diseases.
20. No, because a Geiger counter cannot detect alpha radiation.
21. The seed can be placed at the location of the tumor, which minimizes the effect on normal cells, and there are no radioactive waste products to be disposed of.

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28. **a.** mass number: unchanged; atomic number: increases by 1
b. mass number: decreases by 4; atomic number: decreases by 2
c. mass number and atomic number: unchanged

36. 6.3 x 10 -1 mg
42. Ionizing radiation, such as x-rays and gamma radiation, has sufficient energy to remove electrons fro the atoms it hits.