Name: _____ Period: _____ Date: _____

Chapter 11 Test 2012-2013

All questions are worth one point each
Multiple Choice - *Identify the letter of the choice that best completes the statement or answers the question.*

____ 1. Carbon-14 forms Nitrogen-14 by
a. gamma decay.
b. alpha decay.
c. beta decay.
d. none of the above

____ 2. During nuclear _____, great amounts of energy are produced from very small amounts of mass.
a. fission
b. excitation
c. expansion
d. transfiguration

____ 3. When U-235 splits, it usually emits
a. no particles at all.
b. three neutrons.
c. many electrons.
d. many protons.
e. one neutron.

____ 4. In general, the nucleus of a <u>small atom</u> is stable. In this kind of atom, _____
a. the strong nuclear force is **much weaker** than the electric force.
b. the strong nuclear force is **much greater** than the electric force.
c. the strong nuclear force **equals** the electric force.
d. the strong nuclear force and the electric force are **both attractive**.

____ 5. When Uranium (92 protons) emits an alpha particle, the nucleus left behind has
a. 92 protons.
b. 89 protons.
c. 88 protons.
d. 91 protons.
e. 90 protons.

____ 6. The half-life of a radioactive material is the amount of time it takes for
a. all the sample to decay.
b. half the sample to decay into something else.
c. the age of an artifact to be calculated.
d. detectable radiation to be absorbed by a sample.

____ 7. The type of radiation that will penetrate farthest into a material is
a. a beta particle.
b. an alpha particle.
c. a gamma ray.
d. They all penetrate material the same distance.

____ 8. When radium-226 decays to form radon-222, the radium nucleus emits a(an)
a. alpha particle.
b. gamma ray.
c. beta particle.
d. electron.

____ 9. The **atomic number** of an atom or ion refers to the number of
   a. neutrons, protons, and electrons
   b. neutrons.
   c. protons.
   d. electrons.

____ 10. Radioactivity is the process in which an unstable atomic nucleus emits _____ or energy
   a. light
   b. heat
   c. charged particles
   d. sound

____ 11. Which radiation has **no charge**?
   a. alpha
   b. gamma
   c. beta

____ 12. The force that holds the nucleus **together** is the
   a. gravitational force.
   b. strong nuclear force.
   c. electric force.
   d. nucleonic force.

____ 13. The half-life of Illudium Phosdex is 5 years. After about 15 years, how much of a sample of will be left?
   a. $\frac{1}{10}$
   b. $\frac{1}{4}$
   c. $\frac{1}{2}$
   d. $\frac{1}{8}$

____ 14. The discovery of radioactivity by Henri Becquerel involved a _____
   a. Geiger counter
   b. Piece of film
   c. Bubble chamber
   d. Electroscope

____ 15. Many people work near a source of nuclear radiation. To measure the amount of exposure they personally have to radiation **over a long time**, they most likely will use a
   a. Flux Capacitor
   b. radon kit.
   c. lead shield.
   d. dosimeter.

____ 16. Transmutation is a radioactive decay that changes the _____ in the nucleus.
   a. number of electrons
   b. number of protons
   c. number of neutrons

____ 17. Uranium-235, Uranium-238, and Uranium-239 are all different
   a. isotopes.
   b. ions.
   c. elements.
   d. none of the above

____ 18. An element will decay to another element with a **higher** atomic number if it emits
   a. an alpha particle.
   b. a beta particle.
   c. a gamma ray.
   d. a proton.
   e. none of the above

____ 19. What type of nuclear decay produces a Helium nucleus?
   a. electron decay
   b. alpha decay
   c. gamma decay
   d. beta decay

____ 20. Which type of radioactive decay occurs when the atomic number **increases by one**?
   a. alpha decay
   b. gamma decay
   c. positron decay
   d. beta decay

____ 21. Which of the following is an example of a transmutation?
   a. Thorium-234 undergoes gamma decay
   b. Uranium-238 is bombarded with a neutron to produce uranium-239.
   c. Potassium-38 emits a beta particle and forms argon-38.

____ 22. The rate of a chain reaction in a nuclear **reactor** is controlled by
   a. control rods.
   b. fuel moderators.
   c. uranium rods.
   d. nucleons.

Completion - *Complete each sentence or statement.*

23. An alpha particle is the same as a(an) _____ nucleus.

24. Name the **other three** properties of radiation.
_causes fluorescent items to glow_____, _____

_____, _____

25. Write all three types of nuclear radiation **in the order of their penetration ability** from weakest to strongest. _____ _____ _____
Weakest Strongest

26. In a chain reaction, _____ are released and these cause a series of other fission reactions.

27. Strong nuclear forces act on the _____ and _____ but not the _____

28. In the symbol $^{4}_{2}$He, the superscript *4* is the _____ _____ for helium, and the subscript *2* is the _____ _____ for helium.

29. A sample of a radioisotope had a mass of 200.0 g. After exactly 40 days, 12.5 g of the sample remained. The half-life of the isotope is _____ days.

.

Matching

a. cosmic rays
b. 5730 years
c. alpha
d. 4.5 Billion years
e. beta
f. Geiger counter
g. Curie
h. gamma
i. Cyclotron

____ 30. Source of background radiation
____ 31. Radiation that emits a high energy wave
____ 32. Radiation that emits an electron
____ 33. Device that measures radiation
____ 34. Radiation that emits a Helium particle

Short Answer

35. Alpha-emitting substances, such as radon gas, can be a serious health hazard only if they are

_____ or _____

36. In terms of **forces**, when does a nucleus become radioactive? (Your answer must include forces)

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37. Balance the following nuclear equation

$$^{234}_{91}\text{Pa} \rightarrow {}^{234}_{92}\text{U} + \_\_\_\_\_$$

Other

38. What type of nuclear radiation completes the following decay equation?

$$^{218}_{84}\text{Po} \rightarrow {}^{214}_{82}\text{Pb} + \_\_\_\_\_$$

39. What type of nuclear radiation completes the following decay equation?

$$^{210}_{83}\text{Bi} \rightarrow {}^{210}_{84}\text{Po} + \_\_\_\_\_$$