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Name:_____ Class:_____ Date:_____

Chapter 02 - Radiation Concepts

Multiple Choice

1. The unit of mass is the
   a. megabyte.
   b. kg.
   c. liter.
   d. cc.

ANSWER: b
POINTS: 1
DIFFICULTY: Easy
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
DATE CREATED: 2/4/2019 9:27 PM
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2. An electron is ____ charged and has a mass of ____ amu(s).
   a. negatively; 1.673×10^{-27}
   b. negatively; 0.000548
   c. neutral; 1
   d. positively; 0.000548

ANSWER: b
POINTS: 1
DIFFICULTY: Medium
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
DATE CREATED: 2/4/2019 11:32 PM
DATE MODIFIED: 2/4/2019 11:38 PM

3. The orderly arrangement of elements in the periodic table is based upon
   a. atomic weights.
   b. mass number.
   c. neutron number.
   d. atomic number.

ANSWER: d
POINTS: 1
DIFFICULTY: Easy
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
DATE CREATED: 2/4/2019 11:35 PM
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4. Photon wavelength is
   a. inversely proportional to photon velocity.

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b. directly proportional to photon frequency.
c. inversely proportional to photon frequency.
d. is not related to frequency.

ANSWER: c
POINTS: 1
DIFFICULTY: Medium
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
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5. All of the following are true of electromagnetic energies **EXCEPT**:
a. They are illustrated as sinusoidal waves.
b. They possess both wave and particle characteristics.
c. The relationship between frequency and wavelength is direct and proportional.
d. They are arranged in an orderly spectrum according to frequency and wavelength.

ANSWER: c
POINTS: 1
DIFFICULTY: Medium
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
DATE CREATED: 2/4/2019 11:39 PM
DATE MODIFIED: 2/4/2019 11:41 PM

6. The maximum number of electrons found in any energy level (shell) at any point in time is calculated by the formula
a. $N = Z \times e^2$.
b. $W = F \times D$.
c. $N = amu \times Z$.
d. $2n^2$.

ANSWER: d
POINTS: 1
DIFFICULTY: Medium
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
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7. The sum of protons and neutrons in a nucleus is called the
a. atomic mass unit.
b. atomic weight.
c. quantum number.
d. mass number.

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ANSWER: d
POINTS: 1
DIFFICULTY: Easy
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
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8. Groups of the periodic table
   a. represent elements with the same outer electron configuration.
   b. are horizontal.
   c. represent elements with the same atomic density.
   d. all have the same electron binding energies.

ANSWER: a
POINTS: 1
DIFFICULTY: Medium
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
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9. Carbon has an atomic number of 6. One of its isotopes has a mass number of 14. The number of neutrons in this isotope is
   a. 6.
   b. 8.
   c. 14.
   d. 19.

ANSWER: b
POINTS: 1
DIFFICULTY: Medium
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
DATE CREATED: 2/4/2019 11:46 PM
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10. A period in the periodic table is
   a. represented by a column.
   b. vertical.
   c. the principal quantum number.
   d. determined by the valence electrons.

ANSWER: c
POINTS: 1
DIFFICULTY: Medium

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11. In the excitation process, electrons in an atom are moved to a/an ____ energy state.
    a. lower
    b. higher
    c. incomplete
    d. ionization

ANSWER: b
POINTS: 1
DIFFICULTY: Medium
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
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DATE MODIFIED: 2/4/2019 11:50 PM

12. The maximum number of electrons in a period with a principal quantum number of 4 is
    a. 6.
    b. 8.
    c. 18.
    d. 32.

ANSWER: d
POINTS: 1
DIFFICULTY: Medium
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
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13. Isotopes have ____ mass numbers and ____ atomic numbers.
    a. the same; the same
    b. the same; different
    c. different; the same
    d. different; different

ANSWER: c
POINTS: 1
DIFFICULTY: Easy
QUESTION TYPE: Multiple Choice
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14. In a vacuum, electromagnetic radiation
    a. has a velocity equal to the speed of light.
    b. x-ray energy may be bent by a crystalline lens.
    c. causes ionizations of air molecules.
    d. is altered by a strong magnetic field.

ANSWER: a
POINTS: 1
DIFFICULTY: Difficult
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
DATE CREATED: 2/5/2019 12:06 AM
DATE MODIFIED: 2/5/2019 12:07 AM

15. If the photon frequency of electromagnetic radiation is increased tenfold, then the
    a. velocity will increase times 10.
    b. velocity will decrease to 10.
    c. wavelength will increase times 10.
    d. wavelength will decrease to 1/10.

ANSWER: d
POINTS: 1
DIFFICULTY: Medium
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
DATE CREATED: 2/5/2019 12:08 AM
DATE MODIFIED: 2/5/2019 12:09 AM

16. Electromagnetic radiation with a frequency of 2,000 hertz would have a wavelength of
    a. 1/2,000 cm.
    b. 1.5×10^{-7} cm.
    c. 1.5×10^{7} cm.
    d. cannot be determined.

ANSWER: c
POINTS: 1
DIFFICULTY: Medium
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
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17. The atomic number is the number of ____ contained in the nucleus.
    a. neutrons
    b. electrons

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c. protons
d. positrons

ANSWER: c
POINTS: 1
DIFFICULTY: Easy
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
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18. An isotope of boron has 5 protons and 6 neutrons. The atomic number of boron is
a. 11.
b. 10.
c. 6.
d. 5.

ANSWER: d
POINTS: 1
DIFFICULTY: Medium
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
DATE CREATED: 2/5/2019 12:15 AM
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19. An element with an atomic number of 22 has how many electrons in the second principal quantum number level (L shell)?
a. 22
b. 10
c. 8
d. 2

ANSWER: c
POINTS: 1
DIFFICULTY: Medium
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
DATE CREATED: 2/5/2019 12:18 AM
DATE MODIFIED: 2/5/2019 12:19 AM

20. Calculate the velocity of red light with a wavelength of approximately 4.0 nm (nm = 10^{-9}).
a. 7.5×10^{-1} nm/sec
b. 7.5×10^{18} nm/sec
c. 1.2×10^{-17} nm/sec
d. 1.2×10^{1} nm/sec

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ANSWER: b
POINTS: 1
DIFFICULTY: Difficult
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
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21. The nuclear components that distinguish one element from another are the
    a. neutrons.
    b. protons.
    c. gamma particles.
    d. beta particles.

ANSWER: b
POINTS: 1
DIFFICULTY: Medium
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
DATE CREATED: 2/5/2019 12:21 AM
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22. An atom has an atomic number of 18 and a mass number of 38. Letting P = the number of protons and N = the number of neutrons, which of the following atoms is the isotope of this atom?
    a. P = 18, N = 20
    b. P = 18, N = 21
    c. P = 20, N = 18
    d. none of the above

ANSWER: b
POINTS: 1
DIFFICULTY: Difficult
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
DATE CREATED: 2/5/2019 12:23 AM
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23. If the frequency of a wave is 1,000 hertz and is traveling at 50,000 m/sec, then its wavelength is
    a. 0.05 m.
    b. 0.5 m.
    c. 5 m.
    d. 50 m.

ANSWER: d
POINTS: 1
DIFFICULTY: Difficult

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HAS VARIABLES: False
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24. According to the "rule of octets,"
    a. eight energy levels have electrons.
    b. eight protons occupy the outermost shell.
    c. the valence shell is chemically inert.
    d. both a and c.

ANSWER: c
POINTS: 1
DIFFICULTY: Difficult
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
DATE CREATED: 2/5/2019 12:28 AM
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25. Which of the following is **not a basic characteristic** of the wave equation?
    a. velocity
    b. wavelength
    c. frequency
    d. energy

ANSWER: d
POINTS: 1
DIFFICULTY: Medium
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
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26. If an electron is gained or lost from an atom, that atom becomes
    a. an ion.
    b. a new element.
    c. an isotope.
    d. radioactive.

ANSWER: a
POINTS: 1
DIFFICULTY: Easy
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
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27. All of the following are energy forms **EXCEPT**
    a. sound.
    b. thermal.
    c. electrical.
    d. nuclear.

ANSWER: a
POINTS: 1
DIFFICULTY: Medium
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
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28. Quarks may behave according to the ____ theory.
    a. string
    b. quantum
    c. octet
    d. electromagnetic

ANSWER: a
POINTS: 1
DIFFICULTY: Medium
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
DATE CREATED: 2/5/2019 12:34 AM
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29. All of the following are true of the substance glucose ($C_6H_{12}O_6$) **EXCEPT**:
    a. The smallest subdivision of this molecule is glucose.
    b. It is a compound.
    c. It consists of three elements.
    d. It may be broken down into one atom of glucose.

ANSWER: d
POINTS: 1
DIFFICULTY: Difficult
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
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30. When comparing iodine (Z = 53) with barium (Z = 56),
    a. barium has a lower k-shell binding energy.
    b. iodine has more neutrons.

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c. iodine has five (5) orbitals with electrons.
d. barium has fewer protons.

ANSWER: c
POINTS: 1
DIFFICULTY: Difficult
QUESTION TYPE: Multiple Choice
HAS VARIABLES: False
DATE CREATED: 2/5/2019 12:38 AM
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Matching

Match the following atomic structure characteristics with the correct statement or definition.

a. electron b. neutron
c. proton d. binding energy
e. kinetic energy f. atomic mass
g. atomic number h. isotope

DIFFICULTY: Medium
QUESTION TYPE: Matching
HAS VARIABLES: False
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31. entirely concentrated in the nucleus
ANSWER: f
POINTS: 1

32. increases as the number of electrons and protons increases
ANSWER: d
POINTS: 1

33. A change in the number of these changes the identity of the element.
ANSWER: c
POINTS: 1

34. possesses a negative charge and minute mass
ANSWER: a
POINTS: 1

35. A gain or loss of this atomic particle creates an isotope.
ANSWER: b
POINTS: 1

36. Electrons moving around in specific orbitals demonstrate this energy.
ANSWER: e

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POINTS: 1

Match the following items relating to the periodic table with the correct statement.

a. tungsten b. valence
c. molybdenum d. iodine
e. barium f. lead
g. families (groups) h. periods

DIFFICULTY: Difficult
QUESTION TYPE: Matching
HAS VARIABLES: False
DATE CREATED: 2/5/2019 1:57 AM
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37. elements having the same chemical characteristics
ANSWER: g
POINTS: 1

38. Its k-shell binding energy is −33.17 keV.
ANSWER: d
POINTS: 1

39. It is determined by the number of electrons in the outermost shell of an atom.
ANSWER: b
POINTS: 1

40. It has a mass number of 207.
ANSWER: f
POINTS: 1

41. Elements having the same principal quantum number are in this order.
ANSWER: h
POINTS: 1

42. an “L” to “K” transition would yield 31.45 keV of energy
ANSWER: e
POINTS: 1

Match the following items relating to the electromagnetic spectrum with the correct statement.

a. infrared energy b. gamma rays
c. radio waves d. ultraviolet energy
e. excitation f. lambda
g. amplitude h. velocity

DIFFICULTY: Medium
QUESTION TYPE: Matching
HAS VARIABLES: False

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43. the transference of energy to an atom
ANSWER: e
POINTS: 1

44. can be long wavelengths in kilometers
ANSWER: c
POINTS: 1

45. an expression of wavelength
ANSWER: f
POINTS: 1

46. the product of frequency and wavelength
ANSWER: h
POINTS: 1

47. expressed as the height of the wave
ANSWER: g
POINTS: 1

48. highly penetrating based upon frequency
ANSWER: b
POINTS: 1

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