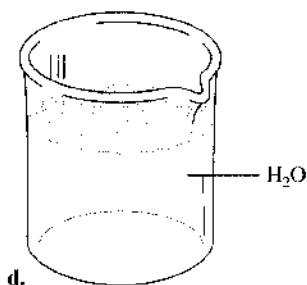
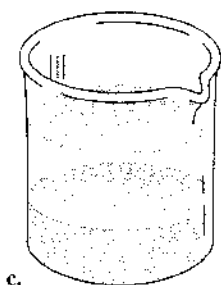
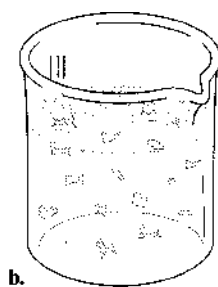
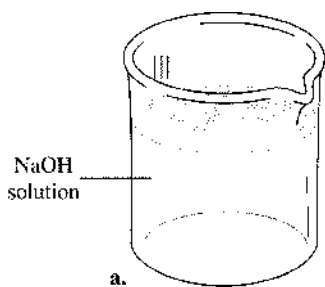


Q1 and Q2 Review large CHEMISTRY

Multiple Choice

Identify the choice that best completes the statement or answers the question.

- ____ 1. $E = hv$ relates the following
 a. Energy to Planck's constant & wavelength c. Speed of light to Planck's constant and freq.
 b. Speed of light to freq. & wavelength d. Energy to Planck's constant and freq.
- ____ 2. Quantitative observations are recorded using
 a. numerical information. c. non-numerical information.
 b. a control. d. a system.
- ____ 3. The abbreviation that represents a volume unit is
 a. mL. c. mm.
 b. mg. d. cm.
- ____ 4. To calculate the density of an object,
 a. multiply its mass and its volume. c. divide its volume by its mass.
 b. divide its mass by its volume. d. divide its mass by its area.



- ____ 5. The homogeneous mixture in the illustration above is in container
 a. a. c. c.
 b. b. d. d.
- ____ 6. "In any chemical or physical process, energy is neither created nor destroyed" is a statement of the
 a. law of conservation of energy. c. law of physical and chemical change.
 b. law of conservation of mass. d. system.

- ____ 7. Poor precision in scientific measurement may arise from
- the standard being too strict.
 - human error.
 - limitations of the measuring instrument.
 - both human error and the limitations of the measuring instrument.
- ____ 8. To two significant figures, the measurement 0.0255 g should be reported as
- 0.02 g.
 - 0.025 g.
 - 0.026 g.
 - 2.5×10^2 g.
- ____ 9. The dimensions of a rectangular solid are measured to be 1.27 cm, 1.3 cm, and 2.5 cm. The volume should be recorded as
- 4.128 cm^3 .
 - 4.12 cm^3 .
 - 4.13 cm^3 .
 - 4.1 cm^3 .
- ____ 10. Expressed in scientific notation, 0.0930 m is
- 93×10^{-3} m.
 - 9.3×10^{-3} m.
 - 9.30×10^{-2} m.
 - 9.30×10^{-4} m.
- ____ 11. When 6.02×10^{23} is multiplied by 9.1×10^{-31} , the product is
- 5.5×10^{-8} .
 - 5.5×10^{54} .
 - 5.5×10^{-7} .
 - 5.5×10^{-53} .
- ____ 12. For electromagnetic radiation, c (the speed of light) equals
- frequency minus wavelength.
 - frequency plus wavelength.
 - frequency divided by wavelength.
 - frequency times wavelength.
- ____ 13. Because c , the speed of electromagnetic radiation, is a constant, the wavelength of the radiation is
- proportional to its frequency.
 - equal to its frequency.
 - inversely proportional to its frequency.
 - double its frequency.
- ____ 14. The distance between two successive peaks on adjacent waves is its
- frequency.
 - wavelength.
 - quantum number.
 - velocity.
- ____ 15. A quantum of electromagnetic energy is called a(n)
- photon.
 - electron.
 - excited atom.
 - orbital.
- ____ 16. The energy of a photon is related to its
- mass.
 - speed.
 - frequency.
 - size.
- ____ 17. The emission of electrons from metals that have absorbed photons is called the
- interference effect.
 - photoelectric effect.
 - quantum effect.
 - dual effect.
- ____ 18. A line spectrum is produced when an electron moves from one energy level
- to a higher energy level.
 - to a lower energy level.
 - into the nucleus.
 - to another position in the same sublevel.
- ____ 19. If electrons in an atom have the lowest possible energies, the atom is in the

- a. ground state.
- b. inert state.
- c. excited state.
- d. radiation-emitting state.

- ____ 20. The change of an atom from an excited state to the ground state always requires
- a. absorption of energy.
 - b. emission of electromagnetic radiation.
 - c. release of visible light.
 - d. an increase in electron energy.
- ____ 21. The region outside the nucleus where an electron can most probably be found is the
- a. electron configuration.
 - b. quantum.
 - c. s sublevel.
 - d. electron cloud.
- ____ 22. According to the quantum theory of an atom, in an orbital
- a. an electron's position cannot be known precisely.
 - b. an electron has no energy.
 - c. electrons cannot be found.
 - d. electrons travel around the nucleus on paths of specific radii.
- ____ 23. How many quantum numbers are needed to describe the energy state of an electron in an atom?
- a. 1
 - b. 2
 - c. 3
 - d. 4
- ____ 24. The main energy levels of an atom are indicated by the
- a. orbital quantum numbers.
 - b. magnetic quantum numbers.
 - c. spin quantum numbers.
 - d. principal quantum numbers.
- ____ 25. An electron for which $n = 4$ has more ____ than an electron for which $n = 2$.
- a. spin
 - b. particle nature
 - c. energy
 - d. wave nature
- ____ 26. The set of orbitals that are dumbbell shaped and directed along the x , y , and z axes are called
- a. d orbitals.
 - b. p orbitals.
 - c. f orbitals.
 - d. s orbitals.
- ____ 27. A spherical electron cloud surrounding an atomic nucleus would best represent
- a. an s orbital.
 - b. a p_x orbital.
 - c. a combination of p_x and p_y orbitals.
 - d. a combination of an s and a p_x orbital.
- ____ 28. The major difference between a $1s$ orbital and a $2s$ orbital is that
- a. the $2s$ orbital can hold more electrons.
 - b. the $2s$ orbital has a slightly different shape.
 - c. the $2s$ orbital is at a higher energy level.
 - d. the $1s$ orbital can have only one electron.
- ____ 29. The p orbitals are shaped like
- a. electrons.
 - b. circles.
 - c. dumbbells.
 - d. spheres.

- ____ 30. The letter designations for the first four sublevels with the maximum number of electrons that can be accommodated in each sublevel are
- $s:2, p:4, d:6$, and $f:8$.
 - $s:1, p:3, d:5$, and $f:7$.
 - $s:2, p:6, d:10$, and $f:14$.
 - $s:1, p:2, d:3$, and $f:4$.
- ____ 31. The *total* number of orbitals that can exist at the second main energy level is
- 2.
 - 3.
 - 4.
 - 8.
- ____ 32. At $n = 1$, the total number of electrons that could be found is
- 1.
 - 2.
 - 6.
 - 18.
- ____ 33. If 8 electrons completely fill a main energy level, what is n ?
- 2
 - 4
 - 8
 - 32
- ____ 34. The statement that an electron occupies the lowest available energy orbital is
- Hund's rule.
 - the Aufbau principle.
 - Bohr's law.
 - the Pauli exclusion principle.
- ____ 35. "Orbitals of equal energy are each occupied by one electron before any is occupied by a second electron, and all electrons in singly occupied orbitals must have the same spin" is a statement of
- the Pauli exclusion principle.
 - the Aufbau principle.
 - the quantum effect.
 - Hund's rule.
- ____ 36. The statement that no two electrons in the same atom can have the same four quantum numbers is
- the Pauli exclusion principle.
 - Hund's rule.
 - Bohr's law.
 - the Aufbau principle.
- ____ 37. The Aufbau principle states that an electron
- can have only one spin number.
 - occupies the lowest available energy level.
 - must be paired with another electron.
 - must enter an s orbital.
- ____ 38. The element with electron configuration $1s^2 2s^2 2p^6 3s^2 3p^2$ is
- Mg ($Z = 12$).
 - C ($Z = 6$).
 - S ($Z = 16$).
 - Si ($Z = 14$).
- ____ 39. The electron configuration for the carbon atom (C) is $1s^2 2s^2 2p^2$. The atomic number of carbon is
- 3.
 - 6.
 - 11.
 - 12.
- ____ 40. The electron notation for aluminum (atomic number 13) is
- $1s^2 2s^2 2p^3 3s^2 3p^3 3d^1$.
 - $1s^2 2s^2 2p^6 3s^2 2d^1$.
 - $1s^2 2s^2 2p^6 3s^2 3p^1$.
 - $1s^2 2s^2 2p^9$.
- ____ 41. The number of electrons in the highest energy level of the argon atom (atomic number 18) is
- 10.
 - 6.

- b. 2. d. 8.

_____ 42. If an element has an octet of electrons in its highest main energy level, there are _____ electrons in this level.
a. 2 c. 10
b. 8 d. 32

_____ 43. An element with 8 electrons in its highest main energy level is a(n)
a. octet element. c. Aufbau element.
b. third period element. d. noble gas.

_____ 44. Most of the volume of an atom is occupied by the
a. nucleus. c. electrons.
b. nuclides. d. protons.

_____ 45. Isotopes are atoms of the same element that have different
a. principal chemical properties. c. numbers of protons.
b. masses. d. numbers of electrons.

_____ 46. An aluminum isotope consists of 13 protons, 13 electrons, and 14 neutrons. Its mass number is
a. 13. c. 27.
b. 14. d. 40.

_____ 47. Carbon-14 (atomic number 6), the radioactive nuclide used in dating fossils, has
a. 6 neutrons. c. 10 neutrons.
b. 8 neutrons. d. 14 neutrons.

_____ 48. Phosphorus-33 (atomic number 15) contains
a. 33 protons. c. 33 neutrons.
b. 18 neutrons. d. 18 protons.

_____ 49. The number of atoms in 1 mol of carbon is
a. 6.022×10^{22} . c. 5.022×10^{22} .
b. 6.022×10^{23} . d. 5.022×10^{23} .

_____ 50. The mass of 1 mol of chromium (atomic mass 51.996 amu) is
a. 12 g. c. 51.996 g.
b. 198 g. d. 6.02×10^{23} g.

_____ 51. The mass of 2.0 mol of oxygen atoms (atomic mass 16.00 amu) is
a. 16 g. c. 48 g.
b. 32 g. d. 64 g.

_____ 52. A prospector finds 39.39 g of pure gold (atomic mass 196.9665 amu). She has
a. 1.204×10^{23} atoms of Au. c. 4.306×10^{23} atoms of Au.
b. 2.308×10^{23} atoms of Au. d. 6.022×10^{23} atoms of Au.

_____ 53. A sample of tin (atomic mass 118.71 amu) contains 3.01×10^{23} atoms. The mass of the sample is
a. 3.01 g. c. 72.6 g.
b. 59.3 g. d. 11 g.

_____ 54. Which of the following is *not* a chemical change?
a. rusting c. melting
b. igniting d. burning

- _____ 55. A state of matter in which a material has no definite shape but has a definite volume is the _____ state.
- a. gas
 - b. liquid
 - c. plasma
 - d. solid
- _____ 56. The liquid state of matter can be described as
- a. having definite shape and definite volume.
 - b. having neither a definite shape nor a definite volume.
 - c. having lost electrons owing to energy content.
 - d. having a definite volume but not a definite shape.
- _____ 57. A solid substance is
- a. always frozen regardless of its container.
 - b. always a crystal regardless of its container.
 - c. always the same shape regardless of its container.
 - d. always losing particles regardless of its container.
- _____ 58. Plasma is the fourth state of matter. In the plasma state
- a. atoms gain electrons.
 - b. atoms lose electrons.
 - c. atoms form molecules.
 - d. atomic nuclei break down.
- _____ 59. What happens to the energy in a substance when it changes state?
- a. It is destroyed.
 - b. It is changed into matter.
 - c. It changes form, but is neither destroyed nor increased.
 - d. The energy remains unchanged.
- _____ 60. If a mixture is uniform in composition, it is said to be
- a. homogeneous.
 - b. chemically bonded.
 - c. heterogeneous.
 - d. a compound.
- _____ 61. A homogeneous mixture is also called
- a. chemically bonded.
 - b. a compound.
 - c. a solution.
 - d. a solute.
- _____ 62. If a mixture is not uniform throughout, it is called
- a. homogeneous.
 - b. heterogeneous.
 - c. chemically bonded.
 - d. a solution.
- _____ 63. Which concept in Dalton's atomic theory has been modified?
- a. All matter is composed of atoms.
 - b. Atoms of different elements have different properties and masses.
 - c. Atoms can combine in chemical reactions.
 - d. Atoms cannot be divided.
- _____ 64. When an electrical current passed through a glass tube, it caused the surface of the tube directly across from the cathode to glow. Scientists concluded that
- a. a magnetic field was produced.
 - b. the particles of the beam were negatively charged.
 - c. there was gas in the tube.
 - d. atoms were indivisible.

- _____ 65. The deflection of cathode rays in Thomson's experiments was evidence of the _____ nature of electrons.
- a. wave
 - b. charged
 - c. particle
 - d. spinning
- _____ 66. Whose series of experiments identified the nucleus of the atom?
- a. Rutherford
 - b. Dalton
 - c. Chadwick
 - d. Bohr
- _____ 67. An atom is electrically neutral because
- a. neutrons balance the protons and electrons.
 - b. nuclear forces stabilize the charges.
 - c. the numbers of protons and electrons are equal.
 - d. the numbers of protons and neutrons are equal.

Problem

68. If the wavelength is 230 nm, calculate the frequency.
69. If the frequency is 2.3×10^{10} Hz, calculate the energy of the photon.
70. Identify where the visible light spectrum falls on the electromagnetic spectrum. This type of radiation has a higher frequency than _____, _____, and _____.

It has a lower frequency than _____, _____, and _____.

List the order of the colors in the visible light spectrum from longest wavelength to shortest.