

TESTS

EXPLORING CREATION WITH
CHEMISTRY
3rd Edition



TEST FOR MODULE I



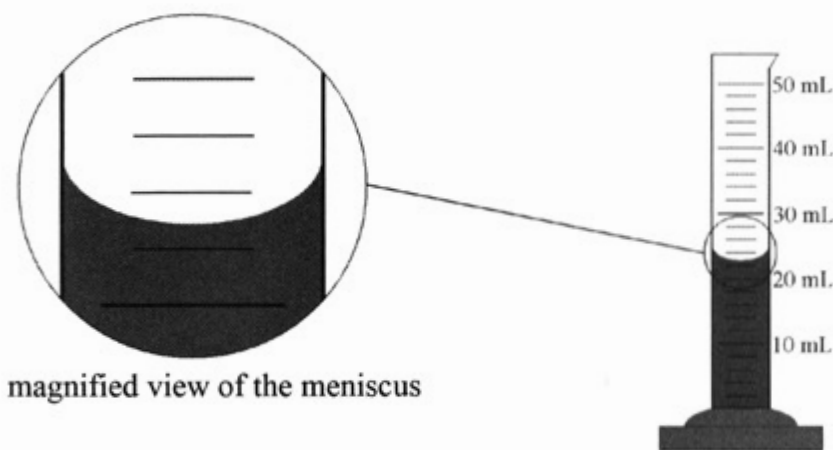
- (4 pts) Which of the following does not contain matter?
 - Air
 - Lightning
 - A golf ball
 - A balloon full of air
- (4 pts) Which of the following is equivalent to the prefix *milli*-?
 - 0.001
 - 1/1,000
 - Both a and b
 - Neither a nor b
- (4 pts) Which of the following is equivalent to the prefix *kilo*-?
 - 1/1,000
 - 100
 - 1,000,000
 - None of the above
- (4 pts) Which of the following is the correct base metric unit for volume?
 - Liter
 - Gallon
 - Cubic Meter
 - Milliliter
 - None of the above
- (4 pts) Which of the following is the correct base metric unit for mass?
 - Pound
 - Gram
 - Newton
 - None of the above
- (4 pts) Which has more mass, a 0.3 g rock or a 30.0 mg rock?
 - The 0.3 g rock
 - The 30.0 mg rock
 - Neither, they are equal in mass.
 - Cannot solve this problem because grams are not used for mass.

Using the measurements below, answer questions 7 and 8 (Answer using only 1 letter per question, please).

The following numbers are the results of several measurements of a 100.0 yard football field:

- a. 113.1 yards
- b. 102 yards
- c. 1.0×10^2 yards
- d. 99.126 yards

- 7. (4 pts) Which of these numbers represents the most precise measurement?
- 8. (4 pts) Which of these numbers is the most accurate?
- 9. (4 pts) What is the volume of the liquid in the following graduated cylinder?



- 10. (4 pts) How many cm are in 16.2 m?
 - a. 1.62 cm
 - b. 1.62×10^2 cm
 - c. 1.62×10^3 cm
 - d. 162 cm
 - e. None of the above
- 11. (4 pts) Convert the number 3,478 to scientific notation.
 - a. 3.478×10^3
 - b. 3.478×10^4
 - c. 3.478×10^5
 - d. 34.78×10^4
 - e. None of the above

12. (4 pts) Convert 0.000345 into scientific notation.
- 345×10^4
 - 345×10^{-6}
 - 3.45×10^4
 - 3.45×10^{-4}
 - None of the above
13. (4 pts) Which of the following is equivalent to 7.9010×10^{-4} ?
- 0.0007901
 - 79010
 - 0.000079010
 - 0.00079010
 - None of the above
14. (4 pts) How many significant figures does 0.00150670 have?
- 4
 - 5
 - 6
 - 7
 - 8
15. (4 pts) How many significant figures does 1,500.00 have?
- 2
 - 3
 - 4
 - 5
 - 6
16. (4 pts) How many significant figures will the answer of 134.5×42 have?
- 2
 - 3
 - 4
 - 5
 - 6
17. (4 pts) A chemist wants to add these 2 measurements together: 2.30040×10^6 mL and 7,345.6 mL. What can she report as the correct combined volume?
- 2,307,745.6 mL
 - 2,307,750 mL
 - 2,307,700 mL
 - None of the above

18. (4 pts) What is 39 °C in °F?
a. 102.2 °F
b. 3.9 °F
c. 102 °F
d. 128 °F
e. None of the above
19. (4 pts) What is 212.0 °C in K?
a. 485 K
b. 485.1 K
c. 485.15 K
d. 485.2 K
e. None of the above

Please show your entire work for the following problems.
Remember: You must have units on all numbers, and your answers must have the correct number of significant figures.

20. (6 pts) If a football field is 100.0 yards long, how many miles long is it? (1 yard = exactly 3 feet, 1 mile = 5.280×10^3 feet)
21. (6 pts) Convert 100.0 K to both Celsius and Fahrenheit.
22. (4 pts) If 1 gallon = 3.78 L, then how many gallons are equal to 20.0 L?
23. (8 pts) The volume of a sphere is given by the equation

$$V = \frac{4}{3}\pi r^3$$

$\pi = 3.1416$, and r is the radius of the sphere. If a sphere's radius is 3.1 m, what is its volume in liters? (Hint: 1 mL = 1 cm³)

TEST FOR MODULE 2



- (4 pts) The principle that matter cannot be created nor destroyed is called:
 - The law of mass conservation
 - The continuous theory of matter
 - The law of definite proportions
 - The law of multiple of proportions
 - None of the above
- (4 pts) The principle that if elements combine in different proportions, they produce different compounds is called:
 - The law of mass conservation
 - The continuous theory of matter
 - The law of definite proportions
 - The law of multiple of proportions
 - None of the above
- (4 pts) State the law of definite proportions in your own words.
- (4 pts) A chemist does 2 experiments. In one experiment, he finds that 14.0 g of nitrogen combine with 16.0 g of oxygen to make 30.0 g of a compound he calls compound A. In another experiment, the chemist finds that 48.0 g of oxygen combine with 42.0 g of nitrogen to make 90.0 g of a compound he calls compound B. The chemist states that the law of definite proportions tells him that compound A and compound B are 2 completely different compounds. Why is he wrong?
- (4 pts) Which of the following is not 1 of Dalton's 4 assumptions in his atomic theory?
 - All elements are composed of small, indivisible particles called atoms.
 - All atoms of the same element have the exact same properties.
 - Atoms of different elements have different properties.
 - Compounds are formed when atoms are joined together. Since atoms are indivisible, they can join together only in simple, whole number ratios.
 - All of the above is part of Dalton's atomic theory.

6. (6 pts) A chemist measures the mass of a chunk of wood to be 49.8 g. When the wood is decomposed, 15.0 g of water, and 12.0 g of ash, and some carbon dioxide are produced. How many grams of carbon dioxide were produced?
- 76.8 g
 - 27.0 g
 - 3.0 g
 - 22.8 g
 - None of the above
7. (3 pts) True or False: Manganese, Mn, is a nonmetal.
8. (3 pts) True or False: Xenon, Xe, is a nonmetal.
9. (4 pts) A substance that contains only one type of atom or molecule is a:
- Mixture
 - Pure substance
 - Physical substance
 - Chemical substance
 - None of the above
10. (4 pts) A substance that contains more than one type of individual atom or molecule is a:
- Mixture
 - Pure substance
 - Physical substance
 - Chemical substance
 - None of the above
11. (4 pts) Which of the following is a heterogeneous mixture?
- Italian salad dressing
 - Flat soda
 - Kool-Aid
 - Brass
 - None of the above
12. (4 pts) How can you experimentally determine if a compound is covalent?
- If it dissolves in water, then it is covalent.
 - If it decomposes into its elements, then it is covalent.
 - If it dissolves in water and then conducts electricity, then it is covalent.
 - If it will be attracted by a magnet, then it is covalent.
 - None of the above will prove a compound is covalent.

13. (4 pts) What is an ionic compound?
- A compound that will dissolve in water
 - Two nonmetal atoms bonded together
 - Two metal atoms bonded together
 - A metal and a nonmetal atom bonded together
 - None of the above
14. (4 pts) What type of compound uses the naming system consisting of prefixes like *mono-*, *di-*, and *tri-*?
- Ionic
 - Covalent
 - Both a and b
 - Neither a nor b
15. (4 pts) What type of compound uses a naming system that has *-ide* as the ending on the nonmetals?
- Ionic
 - Covalent
 - Both a and b
 - Neither a nor b
16. (4 pts) How many total atoms are in this molecule: $C_6H_{12}OH$?
- 3
 - 4
 - 19
 - 20
 - None of the above
17. (4 pts) You are told that a molecule contains a total of 17 atoms. If the formula is $C_5H_{10}Cl_x$, what must x be?
- 1
 - 2
 - 3
 - 4
 - None of the above
18. (4 pts) Which of the following compounds would conduct electricity when dissolved in water? C_3H_6ClF $C_6H_5CH_3$ CS_2 $BaSO_4$
- C_3H_6ClF
 - $C_6H_5CH_3$
 - CS_2
 - $BaSO_4$
 - CS_2 and $BaSO_4$

19. (4 pts) What is the name of N_2O_3 ?
- Nitrogen oxide
 - Dinitrogen oxide
 - Nitrogen trioxide
 - Dinitrogen trioxide
 - None of the above
20. (4 pts) What is the name of Ca_3N_2 ?
- Tricalcium dinitride
 - Tricalcium dinitrogen
 - Calcium nitride
 - Calcium nitrogen
 - None of the above
21. (4 pts) What is the chemical formula of sulfur trioxide?

Please provide all of the necessary work for the following problems.

22. (8 pts) In an experiment to determine how to make sulfur trioxide, a chemist combines 32.0 g of sulfur with 50.0 g of oxygen. She finds that she made 80.0 g of sulfur trioxide and had 2.0 g of leftover oxygen. How would the chemist make 100.0 g of sulfur trioxide so that she has no leftovers?
23. (8 pts) To make 44.0 grams of carbon dioxide, you must combine 12.0 g of carbon with 32.0 g of oxygen. If a chemist combines 120.0 g of carbon with 160.0 g of oxygen, how many grams of carbon dioxide will be made? If a substance is left over, indicate whether it is carbon or oxygen, and also determine how many grams are left over.

TEST FOR
MODULE 3

($c = 3.0 \times 10^8$ m/s, *nano-* = 1×10^{-9} , $h = 6.63 \times 10^{-34}$ J/Hz)

- (4 pts) Two positive charges will _____.
 - Attract
 - Repel
 - Cancel
 - Not be affected by one another
 - None of the above
- (4 pts) What is the overall charge on an atom that has 42 protons, 43 neutrons, and 41 electrons?
 - +1
 - 1
 - +2
 - 2
 - None of the above
- (4 pts) How many protons are in a ^{141}Ba atom?
- (4 pts) How many neutrons are in a ^{141}Ba atom?
- (4 pts) How many electrons are in a ^{141}Ba atom?
- (4 pts) Crookes's tube experiment confirmed the existence of which atomic particle?
 - Proton
 - Neutron
 - Electron
 - Nucleus
 - None of the above
- (3 pts) True or False: The atomic number tells the mass of an atom's nucleus.
- (3 pts) True or False: All atoms have an equal number of protons and electrons.
- (3 pts) True or False: Isotopes have different masses.

10. (4 pts) For ^{23}Na , the number 23 stands for the _____.
- Number of protons and neutrons
 - Mass number
 - Both a and b
 - Neither a nor b
11. (4 pts) Artificially increasing the amount of ^{235}U in order to create an atomic bomb is called _____.
- The Manhattan Project
 - The plum pudding model
 - Rutherford's experiment
 - Isotopic enrichment
12. (4 pts) Rutherford's experiment showed that _____.
- Uranium could be used for an atomic bomb
 - Electrons existed as part of the atom
 - Protons existed as part of the atom
 - As a light wave's frequency increases, the wavelength decreases
 - None of the above
13. (4 pts) Which is the heaviest: a neutron, a proton, or an electron?

Answer questions 14–16 using 2 lights of equal brightness:
a blue and a yellow light.

14. (4 pts) Which light has the longest wavelength?
- Blue
 - Yellow
 - They are both the same.
 - Not enough information to answer this question
15. (4 pts) Which light has the least amount of energy?
- Blue
 - Yellow
 - They are both the same.
 - Not enough information to answer this question
16. (4 pts) Which light has the greatest amplitude?
- Blue
 - Yellow
 - They are both the same.
 - Not enough information to answer this question

17. (4 pts) How many electrons can the s-, p-, and d-orbitals hold, respectively?
- 2, 4, and 6
 - 1, 3, and 5
 - 2, 6, and 10
 - 2, 6, and 12
 - None of the above
18. (3 pts) True or False: All forms of matter try to stay in their lowest possible energy state.

For the following problems, please provide the correct answer and the work needed to complete the problem.

19. (4 pts) What is the element with the following electron configuration? $1s^2 2s^2 2p^5$
20. (4 pts) Write the full electron configuration for Ca.
21. (4 pts) Give abbreviated electron configuration for Cl.
22. (4 pts) Give abbreviated electron configuration for Fr.
23. (8 pts) What is the frequency of light that has a wavelength of 10.0 nm?
24. (8 pts) If the energy of light emitted from an atom is 2.3×10^{-15} Joules, what is its wavelength?

TEST FOR MODULE 4



- (4 pts) The electrons that are located the highest energy level are called _____.
 - Ground state electrons
 - d-orbital electrons
 - Valence electrons
 - Excited electrons
 - None of the above
- (4 pts) What type of charge do metal ions develop in ionic compounds?
 - Positive
 - Negative
 - Neutral
 - None of the above
- (4 pts) What does the octet rule say?
 - All atoms strive to have 8 electrons.
 - All atoms strive to have 8 different orbitals.
 - Almost all atoms strive to have 8 protons.
 - Almost all atoms strive to have 8 valence electrons.
 - None of the above
- (4 pts) The dots in a Lewis structure represent the _____.
 - Bonds for each molecule
 - Entire number of electrons present for each atom
 - Valence electrons for each atom
 - Ionic nature of the molecule
 - None of the above
- (4 pts) When atoms share electrons to make a molecule, is the compound ionic or covalent?
 - Ionic compound
 - Covalent compound
- (4 pts) What is a molecule made of 2 or more nonmetal atoms?
 - Ionic compound
 - Covalent compound
- (4 pts) What is a molecule made of metal plus nonmetal atoms?
 - Ionic compound
 - Covalent compound

8. (4 pts) What is a molecule in which one atom gives its electrons to another atom?
- Ionic compound
 - Covalent compound
9. (4 pts) Zinc and copper are examples of _____.
- Nonmetals
 - Halogen
 - Ionic compounds
 - Metals
 - None of the above
10. (4 pts) A measure of how easily an atom attracts an electron to itself is called _____.
- Ionization energy
 - Electronegativity
 - Periodic property
 - Covalent nature
 - None of the above
11. (4 pts) Which periodic property increases from left to right on the periodic table?
- Ionization energy
 - Electronegativity
 - Both a and b
 - Neither a nor b
12. (4 pts) Which periodic property increases from top to bottom on the periodic table?
- Ionization energy
 - Electronegativity
 - Both a and b
 - Neither a nor b
13. (4 pts) Which gas is responsible for absorbing and protecting us from exposure to the ultraviolet light that comes from the sun?
- Nitrogen
 - Ozone
 - Oxygen
 - Argon
 - None of the above
14. (4 pts) Which of the following atoms gives up its electrons most easily?
- Mg
 - Na
 - P
 - S

15. (4 pts) Order the following atoms in terms of increasing electronegativity:
Ba, Mg, Ca, Sr
16. (4 pts) Ozone protects us from which harmful type of energy?
a. Gamma radiation
b. X-Rays
c. Microwaves
d. Ultraviolet light
17. (4 pts) Write the chemical formula for potassium arsenide. (Arsenic is abbreviated As.)
18. (4 pts) Write the chemical formula for iron (III) oxide.
19. (4 pts) What is the name of Mn_2O_3 ?
20. (4 pts) Draw the Lewis structure for Al.
21. (5 pts) Draw the Lewis structure of Br_2 .
22. (5 pts) Draw the Lewis structure of SiO_2 .
23. (5 pts) Draw the Lewis structure of OCl_2 .
24. (5 pts) Draw the Lewis structure of $FSiN$. *Note: there are 3 atoms in this molecule.*

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