Chem 30 Unit 2 MS2 Practice Test

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

1. A chemical bond results from the mutual attraction of the nuclei of atoms and
   a. electrons.  
   b. protons.  
   c. neutrons.  
   d. dipoles.

2. What type of bond is the C-F bond in CF₄? (electronegativity values: C = 2.5, F = 4.0)
   a. non polar covalent  
   b. polar covalent  
   c. ionic  
   d. pure covalent

3. What type of bond is the Ca-N bond in Ca(NO₃)₂? (electronegativity values: Ca = 1.0, N = 3.0)
   a. non polar covalent  
   b. polar covalent  
   c. ionic  
   d. pure covalent

4. What type of bond is the Si-I bond in SiI₂? (electronegativity values: S= 2.5, I = 2.5)
   a. non polar covalent  
   b. polar covalent  
   c. ionic  
   d. pi

5. Which of the following is an example of a molecular formula?
   a. NaCl  
   b. Na₃PO₄  
   c. C  
   d. CCl₄

6. The chemical formula for water, a covalent compound, is H₂O. This formula is an example of a(n)
   a. formula unit.  
   b. Lewis structure.  
   c. ionic formula.  
   d. molecular formula.

7. In a crystal, the valence electrons of adjacent ions
   a. repel each other.  
   b. attract each other.  
   c. neutralize each other.  
   d. have no effect on each other.

8. A compound that vaporizes readily at room temperature is most likely to be a(n)
   a. molecular compound.  
   b. ionic compound.  
   c. metal.  
   d. brittle compound.

9. Because the particles in ionic compounds are more strongly attracted than in molecular compounds, the
   melting points of ionic compounds are
   a. equal for all ionic compounds.  
   b. lower than melting points of molecular compounds.  
   c. higher than melting points of molecular compounds.  
   d. approximately equal to room temperature.

10. A metallic bond forms when positive ions attract
    a. stationary electrons.  
    b. nonvalence electrons.  
    c. cations.  
    d. mobile electrons.
11. Because metallic bonds permit one plane of ions to slide past another without breaking bonds, metals are
   a. brittle.                     c. nonreflective.
   b. malleable.                  d. poor conductors of electricity.

12. The hybridized orbitals responsible for the bent shape of the water molecule are
   a. 1s² 2s².                    c. sp³.
   b. ps¹.                        d. 2s² sp².

13. The strong forces of attraction between the positive and negative regions of molecules are called
   a. dipole-dipole forces.       c. lattice forces.
   b. London forces.              d. orbital forces.

14. The intermolecular attraction between a hydrogen atom bonded to a strongly electronegative atom and the
    unshared pair of electrons on another strongly electronegative atom is called
   a. electron affinity.          c. hydrogen bonding.
   b. covalent bonding.           d. electronegativity.

15. The following molecules contain polar bonds. The only nonpolar molecule is
   a. HCl.                        c. CO₂.
   b. H₂O.                        d. NH₃.

16. Iodine monochloride (ICl) has a higher boiling point than bromine (Br₂) partly because iodine monochloride
    is a(n)
   a. nonpolar molecule.          c. crystal.
   b. ion.                        d. polar molecule.

17. The type of covalent bond that doesn’t allow rotation is called a _____ bond.
   a. delta                        c. pi
   b. sigma                       d. gamma

18. Which intermolecular force is the strongest?
   a. London dispersion forces    c. hydrogen bonding
   b. dipole-dipole forces        d. ion-dipole

19. Rank the following from lowest to highest boiling point:
   a. CH₄ < C₄H₁₀ < HF < He          c. He < CH₄ < C₄H₁₀ < HF
   b. C₄H₁₀ < HF < He < CH₄        d. HF < CH₄ < C₄H₁₀ < He

20. In general, most substances are
   a. least dense in the liquid state.    c. less dense as solids than as liquids.
   b. more dense as gases than as solids. d. most dense in the solid state.

21. The difference between crystalline and amorphous solids is determined by
   a. temperature changes.
   b. pressure when the substances are formed.
   c. amount of order in particle arrangement.
   d. strength of molecular forces.
22. What type of crystal consists of positive metal cations surrounded by valence electrons that are donated by the metal atoms and belong to the crystal as a whole?
   a. ionic  
   b. covalent network  
   c. metallic  
   d. covalent molecular  

23. Which of the following is NOT a property of covalent network crystals?
   a. high conductivity  
   b. hardness  
   c. high melting point  
   d. brittleness  

24. Which of the following statements about ionic crystals is NOT correct?
   a. Their structure consists of positive and negative ions arranged in a regular pattern.  
   b. The strong binding forces between the positive and negative ions in their structure give them certain properties.  
   c. Their ions can be monatomic or polyatomic.  
   d. They consist of molecules held together by intermolecular forces.  

25. Diethyl ether's boiling point is about 35°C at 1 atm. At 1.5 atm, what will ether's approximate boiling point be?
   a. −10°C  
   b. 20°C  
   c. 40°C  
   d. 100°C  

26. What is the critical pressure?
   a. the pressure at which all substances are solids  
   b. the pressure at which the attractive forces in matter break down  
   c. the highest pressure under which a solid can exist  
   d. the lowest pressure under which a substance can exist as a liquid at the critical temperature  

27. When a liquid freezes,
   a. heat must be added.  
   b. the temperature will decrease.  
   c. heat must be removed.  
   d. the volume will remain constant.  

28. When you finish a bottle of olive oil, you leave it upside down for a day to catch as much as you can before throwing away the bottle. This best describes which concept?
   a. capillary action  
   b. surface tension  
   c. covalent bonding  
   d. viscosity  

29. Why doesn't water in lakes and ponds of temperate climates freeze solid during the winter and kill nearly all the living things it contains?
   a. Water is colourless.  
   b. Ice floats.  
   c. The molar heat of fusion of ice is relatively low.  
   d. Water contracts as it freezes.  

30. You are trying to determine the identity of a gas. A 275 mL vile contains 28.0 g at 12.0 atm and -181.18°C. What is the gas?
   a. Cl₂  
   b. CO₂  
   c. SO₂  
   d. COCl₂
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1. Identify the phase of this substance at
   a) 87°C and 0.5 atm
   b) 0.8 atm and 115°C
   c) 385°C and 235 atm
   d) 13 atm and -15°C
   e) what happens if the pressure of a) is dropped to 0.009 atm?
   f) what happens if b) is cooled to 15°C?
   g) what happens if the pressure of d) drops to 0?

2. When 254 L at 2.37 atm is compressed to 199 L at constant temperature, what is the new pressure of the gas?

3. A 5.63 L balloon at 17.4°C expands to 6.69 L when heated under constant pressure. What temperature is the balloon now in°C?

4. A car tire at -22.8°C and 2.05 atm runs and heats up to 15.6°C. What is the new pressure of the tire in psi if the volume is constant? (1 atm = 14.696 psi)

5. Adele can hold 7.51 g of air in her lungs at 0.990 atm and 34.8°C. What is the volume of her lungs? (assume air is 100% nitrogen gas)
Answers:

MUTLIPLE CHOICE

1. ANS: A
2. ANS: B
3. ANS: C
4. ANS: A
5. ANS: D
6. ANS: D
7. ANS: A
8. ANS: A
9. ANS: C
10. ANS: D
11. ANS: B
12. ANS: C
13. ANS: A
14. ANS: C
15. ANS: C
16. ANS: D
17. ANS: C
18. ANS: D
19. ANS: C
20. ANS: D
21. ANS: C
22. ANS: C
23. ANS: A
24. ANS: D
25. ANS: C
26. ANS: D
27. ANS: C
28. ANS: D
29. ANS: B
30. ANS: C

1. a) liquid
   b) gas
   c) supercritical fluid
   d) solid
   e) it will vapourize
   f) it will condense
   g) it will sublime

2. 3.03 atm
3. 72°C
4. 2.36 atm, 34.7 psi
5. 6.84 L