CHEMISTRY I HONORS – 3RD 9 WEEKS TEST – CH 11-15 & 18

28

Select the best answer.

1)

The standard molar volume of a gas is all of the following except

a) the volume occupied by 1 mol of a gas at STP.

b) equal for all gases under the same conditions.

c) 22.4 L at STP.

d) dependent upon the size of the molecules.

2)

A 1.00 L sample of a gas has a mass of 1.25 g at STP. What is the mass of 1 mol of this gas?

a) a little less then 1.0 g

b) 1.25 g

c) 22.4 g

d) 28.0 g

3)

Calculate the approximate volume of a 0.600 mol sample of gas at 15.0°C and a pressure of 1.10 atm.

a) 12.9 L

b) 22.4 L

c) 24.6 L

d) 129 L

4)

The equation for the complete combustion of methane is $CH_4(g) + 2O_2(g) \rightarrow 2H_2O(g) + CO_2(g)$. If 50 L of methane at STP are burned, what volume of carbon dioxide will be produced at STP?

a) 16.6 L

b) 25 L

c) 50 L

d) 100 L

5)

Chlorine is produced by the reaction $2HCl(g) \rightarrow H_2(g) + Cl_2(g)$. How many grams of HCl (36.5 g/mol) must be used to produce 10 L of chlorine at STP?

a) 15.8 g

b) 30.2 g

c) 32.6 g

d) 36.5 g

Element	Atomic mass
Argon	39.948
Bromine	79.904
Carbon	12.011
Chlorine	35.453
Fluorine	18.998
Helium	4.0026
Hydrogen	1.0079
Nitrogen	14.007
Oxygen	15.999

6)

How many times greater is the rate of effusion of molecular fluorine than that of molecular bromine at the same temperature and pressure?

a) 2
b) 3
c) 4
d) 7

7)

The equilibrium vapor pressure of a liquid is

a) the same for all liquids.
b) measured only at 0°C.
c) constant for a particular liquid at all temperatures.
d) the pressure exerted by a vapor in equilibrium with its liquid at a given temperature.

8)

At a given temperature, different liquids will have different equilibrium vapor pressures because

a) the energy of the particles is the same for different liquids.
b) diffusion rates differ for the liquids.
c) the attractive forces between the particles differ among liquids.
d) they cannot all be in equilibrium at once.

9)

Why would a camper near the top of Mr. Everest find that water boils at less than 100°C?

a) There is greater atmospheric pressure than at sea level.
b) The flames are hotter at that elevation.
c) There is less atmospheric pressure than at sea level.
d) The atmosphere has less moisture.

10)

During boiling, the temperature of a liquid

a) remains constant.
b) increases.
c) decreases.
d) approaches the standard boiling point.

11)

The triple point of a substance is the temperature and pressure conditions at which

a) density is greatest.
b) states of a substance coexist at equilibrium.
c) equilibrium cannot occur.
d) kinetic energy is at a minimum.

12)

What is the boiling point of water at standard pressure?

a) 100°C
b) 112°C
c) 212°C
d) 200°C

13)

The molar heat of fusion for water is 6.008 kJ/mol. How much energy would be required to melt 94.0 g of ice?

a) 0.869 kJ
b) 81.7 kJ
c) 31.3 kJ
d) 282. kJ

14)

Which of the following is an electrolyte?

a) sodium chloride
b) sugar
c) water
d) glass

15)

Which of the following does NOT increase the rate of dissolving a solid in water?

a) raising the temperature
b) stirring
c) using larger pieces of solid
d) crushing the solid

16)

In the expression *like dissolves like*, the word *like* refers to similarity in molecular

a) mass.
b) size.
c) energy.
d) polarity.

17)

The solubility of gases in liquids

a) always increases with increasing pressure.

b) sometimes increases with increasing pressure.

c) always decreases with increasing pressure.

d) does not depend on pressure.

18)

Effervescence is the

a) dissolution of gas in liquid.

b) escape of gas from a gas-liquid solution.

c) escape of gas from a container of gas.

d) escape of solid from a solid-liquid solution.

19)

What is the molarity of a solution that contains 125 g NaCl in 4.00 L solution?

a) 0.535 M

b) 2.14 M

c) 8.56 M

d) 31.3 M

20)

What is the molality of a solution that contains 31.0 g HCl in 5.00 kg water?

a) 0.062 *m*

b) 0.425 *m*

c) 0.170 *m*

d) 15.5 *m*

21)

How many moles of ions are produced by the dissociation of 1 mol of $MgCl_2$?

a) 0

b) 1 mol

c) 2 mol

d) 3 mol

22)

When solutions of two ionic compounds are combined and a solid forms, the process is called

a) hydration.

b) precipitation.

c) solvation.

d) dissociation.

General Solubility Guidelines

1. Most sodium, potassium, and ammonium compounds are soluble in water.
2. Most nitrates, acetates, and chlorates are soluble.
3. Most chlorides are soluble, except those of silver, mercury(I), and lead. Lead(II) chloride is soluble in hot water.
4. Most sulfates are soluble, except those of barium, strontium, and lead.
5. Most carbonates, phosphates, and silicates are insoluble, except those of sodium, potassium, and ammonium.
6. Most sulfides are insoluble, except those of calcium, strontium, sodium, potassium, and ammonium.

23)

Which of the following pairs of solutions produce a precipitate when combined?

a) $Cu(NO_3)_2$ and NaCl

b) $Fe(NO_3)_3$ and $MgCl_2$

c) $Cu(NO_3)_2$ and K_2CO_3

d) $CaCl_2$ and $NaNO_3$

24)

What is the net ionic equation for the precipitation reaction between copper(II) chloride and sodium hydroxide?

a) $Cu^{2+}(aq) + 2OH^-(aq) \rightarrow Cu(OH)_2(s)$

b) $Na^+(aq) + Cl^-(aq) \rightarrow NaCl(s)$

c) $Cu^{2+}(aq) + 2OH^-(aq) + 2Cl^-(aq) \rightarrow Cu(OH)_2(s) + 2Cl^-(aq)$

d) $Cu^{2+}(aq) + 2Cl^-(aq) + 2Na^+(aq) + 2OH^-(aq) \rightarrow Cu(OH)_2(s) + 2NaCl(s)$

25)

What is the boiling-point elevation of a solution made from 20.0 g of a nonelectrolyte solute and 300.0 g of water? The molar mass of the solute is 50.0 g and $K_b = 0.51°C/m$.

a) 0.13°C

b) 0.38°C

c) 0.42°C

d) 0.68°C

26)

What is the approximate freezing-point depression of a 0.020 *m* aqueous NaBr solution?

a) –0.0093°C

b) –0.019°C

c) –0.037°C

d) –0.074°C

27)

Acids generally release H_2 gas when they react with

a) nonmetals.
b) semimetals.
c) active metals.
d) inactive metals.

28)

Which of the following is NOT a strong acid?

a) HNO_3
b) CH_3COOH
c) H_2SO_4
d) HCl

29)

Which of the following is a strong base?

a) NH_3
b) aniline
c) NaOH
d) acetate ion

30)

A Brønsted-Lowry base is a(n)

a) producer of OH^- ions.
b) proton acceptor.
c) electron-pair donor.
d) electron-pair acceptor.

31)

In the reaction $HF + H_2O \leftrightharpoons H_3O^+ + F^-$, a conjugate acid-base pair is

a) F^- and H_2O.
b) HF and F^-.
c) H_3O^+ and HF.
d) HF and H_2O.

32)

The substances produced when $KOH(aq)$ neutralizes $HCl(aq)$ are

a) $HClO(aq)$ and $KH(aq)$.
b) $KH_2O^+(aq)$ and $Cl^-(aq)$.
c) $H_2O(l)$ and $KCl(aq)$.
d) $H_3O^+(aq)$ and $KCl(aq)$.

33)

At equilibrium,

a) the forward reaction rate is lower than the reverse reaction rate.

b) the forward reaction rate is higher than the reverse reaction rate.

c) the forward reaction rate is equal to the reverse reaction rate.

d) no reactions take place.

34)

A very high value of *K* indicates that

a) equilibrium is reached slowly.

b) products are favored.

c) reactants are favored.

d) equilibrium has been reached.

35)

An equilibrium mixture of SO_2, O_2, and SO_3 gases at 1500K is determined to consist of 0.344 mol/L SO_2, 0.172 mol/L O_2, and 0.56 mol/L SO_3. What is the equilibrium constant for the system at this temperature? The balanced equation for this reaction is $2SO_2(g) + O_2(g) \leftrightharpoons 2SO_3(g)$.

a) 0.41

b) 2.8

c) 6.7

d) 15

36)

If the pressure on the equilibrium system $2CO(g) + O_2(g) \leftrightharpoons 2CO_2(g)$ is increased,

a) the quantity of $CO(g)$ increases.

b) the quantity of $CO_2(g)$ decreases.

c) the quantity of $CO_2(g)$ increases.

d) the quantities in the system do not change.

37)

If the temperature of the equilibrium system $CH_3OH(g) + 101\ kJ \leftrightharpoons CO(g) + 2H_2(g)$ increases,

a) $[CH_3OH]$ increases and $[CO]$ decreases.

b) $[CH_3OH]$ decreases and $[CO]$ increases.

c) $[CH_3OH]$ increases and $[CO]$ increases.

d) the concentrations in the system do not change.

38)

What is the solubility in mol/L of copper(II) sulfide, CuS? Its K_{sp} value is 6.3×10^{-36}.

a) 5.5×10^{-13}

b) 4.1×10^{-14}

c) 9.9×10^{-16}

d) 2.5×10^{-18}

39)

Calculate the ion product for mixing 100.0 mL of 0.0030 M $CaCl_2$ with 100 mL of 0.0020 M Na_2CO_3. K_{sp} for $CaCO_3$ is 1.4×10^{-8}. Does a precipitate form?

a) 1.8×10^{-9}; no

b) 1.8×10^{-9}; yes

c) 1.5×10^{-6}; no

d) 1.5×10^{-6}; yes

Place the answers for 40-45 on the essay portion of the front side of your answer sheet. Be sure to number each question and show work if necessary.

40. Write the dissociation reaction for lead II bromide. Be sure to show ALL states of matter

41. Write the ionization reaction of chlorous acid. Be sure to show water as a reactant.

42. Give the equilibrium expression for # 40.

43-45. Name and give the formulas for any three (3) strong acids.

Do the following on the back side of your answer sheet in the essay portion. Number from 46 to 58, so I can easily tell how many properties you have given.

46-55 Give chemical and/or physical properties (up to 10 of them) of water. Be sure to be specific when you can (ie: give the values if you should know them, don't just say high or low) and be sure to use proper units.

56. Find the pH of a solution whose $[H_3O^+] = 1.0 \times 10^{-5}$ m

57. Find the $[OH^-]$ for # 56

58. Find the pH of a 2.5×10^{-4} m solution of KOH.