

Name
Chemistry
Monster Review

Any question listed as italics and bold is for honor chem. only.

Google at your own risk 😊

1. Precipitation
2. Gas evolution:
3. Meter:
4. Liter:
5. Sublimation:
6. Vapordeposition:
7. Condensation:
8. Solidification:
9. ***Oxidation:******
10. ***Reduction:******
11. ***Reducing agent:******
12. ***Oxidation state:******
13. Voltage:
14. Current:
15. Cathode:
16. Suspension:
17. Alloy:
18. Concentrated:
19. Solvent:
20. Supersaturated:
21. Ionic Bond
22. Molecule
23. Formula Unit
24. Polar covalent bonding
25. Electronegativity
26. Dipole
27. Polar
28. Covalent bond
29. Nomenclature

30. FORMULA	NAME
31. KMnO_4	potassium permanganate
32. CuCl_2	copper (II) chloride
33. $\text{H}_2\text{S}_{(aq)}$	hydrosulfuric acid
34. $\text{H}_3\text{PO}_{4(aq)}$	phosphoric acid
35. SF_6	sulfur hexafluoride
36. NH_4ClO	ammonium hypochlorite
37. CuCl	copper (I) chloride
38. H_2O	water
39. KOH	potassium hydroxide
40. HBrO_2	bromous acid

41. NAME	FORMULA
42. Copper II nitrate	$\text{Cu}(\text{NO}_3)_2$
43. Oxygen tetrafluoride	OF_4
44. Hydrofluoric acid	HF
45. Sulfuric acid	H_2SO_4
46. Sodium sulfate	Na_2SO_4
47. Aluminum oxide	Al_2O_3
48. Nitrous acid	HNO_2
49. Water	H_2O
50. Magnesium Fluoride	MgF_2
51. Boron trifluoride	BF_3

52. In your own words explain how a molecule becomes polar. (What are the two factors, explain.)

① covalent molecule. must have N, O, or F

② must be asymmetrical

53. $138.5 \text{ K} = -134.5 \text{ }^\circ\text{C}$

54. $32^\circ\text{F} = 0^\circ\text{C} = 273 \text{ K}$

55. $212^\circ\text{F} = 100^\circ\text{C} = 373 \text{ K}$

56. $1500 \text{ C} = 1773 \text{ K}$

57. $160 \text{ Torr} = 0.21 \text{ Atm}$

$$\frac{160 \text{ torr}}{760 \text{ torr}} = 0.21 \text{ atm}$$

$$58. 150 \text{ mmHg} = \frac{0.197}{1} \text{ atm} \quad \frac{150 \text{ mmHg}}{760 \text{ mmHg}} = 0.197 \text{ atm}$$

$$59. 30 \text{ in Hg} = \frac{762}{1} \text{ mmHg} \quad \frac{30 \text{ in Hg} \times 25.4 \text{ mmHg}}{1 \text{ in Hg}} = 762 \text{ mmHg}$$

Determine if the following are chemical or physical reactions

60. Log burning in campfire.

chemical

61. Getting your hair cut.

physical

62. Camera flash going off.

chemical

63. Lightning bug flashing

chemical

64. Gaseous vapor escaping from a can of pop.

physical

65. Solid water vapor forming on a leaf in the early morning during winter.

physical

Convert the following

$$66. 150 \text{ cm} \rightarrow \text{m} \quad \frac{150 \text{ cm}}{100 \text{ cm}} = 1.5 \text{ m}$$

$$67. 250 \text{ lbs.} \rightarrow \text{oz.} \quad \frac{250 \text{ lbs} \times 16 \text{ oz}}{1 \text{ lbs}} = 4000 \text{ oz}$$

68. 250000. Inches \rightarrow kilometers

$$\frac{250,000 \text{ in} \times 2.54 \text{ cm}}{1 \text{ in}} \times \frac{1 \text{ m}}{100 \text{ cm}} \times \frac{1 \text{ km}}{1000 \text{ m}} = 6.35 \text{ km}$$

For the following determine the number of molecules

$$69. 9.8 \text{ moles of } \text{O}_2 \quad \frac{6.02 \times 10^{23}}{1 \text{ mol}} = 5.9 \times 10^{24} \text{ molecules } \text{O}_2$$

$$70. 5 \text{ moles of } \text{H}_2\text{O} \quad \frac{6.02 \times 10^{23}}{1 \text{ mol}} = 3.01 \times 10^{24} \text{ molecules } \text{H}_2\text{O}$$

71. For the following determine the amount of moles

$$72. 2.3 \times 10^{12} \text{ molecules of H}_2 \left| \frac{1 \text{ mol}}{6.02 \times 10^{23}} \right. = 3.8 \times 10^{-12} \text{ molecules H}_2$$

$$73. 3.2 \times 10^{28} \text{ molecules of C}_2\text{H}_4 \left| \frac{1 \text{ mol}}{6.02 \times 10^{23}} \right. = 5.3 \times 10^4 \text{ molecules C}_2\text{H}_4$$

For the following determine the Formula Weight (in grams/mole)

74. H₂ 2 g/mol

75. Na₂SO₄

Na	- 2 × 23 =	46	}	142 g/mol
S	1 × 32 =	32		
O	4 × 16 =	64		

76. NaOH

Na	23	}	40 g/mol
O	16		
H	1		

For the following determine the mass (in grams)

$$77. 5.3 \text{ moles of O}_2 \left| \frac{32 \text{ g}}{1 \text{ mol}} \right. = 170 \text{ g O}_2$$

78. 45.2 moles Fe₂O₃

5 × 2	3 × 16	}	160 g/mol
↓	↓		
10	48		

$$45.2 \text{ mol Fe}_2\text{O}_3 \left| \frac{160 \text{ g}}{1 \text{ mol}} \right. = 7,230 \text{ g Fe}_2\text{O}_3$$

For the following determine the amount of moles found in each mass

$$79. 22 \text{ grams of O}_2 \left| \frac{1 \text{ mol}}{32 \text{ g}} \right. = 0.69 \text{ mol O}_2$$

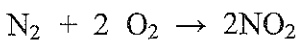
$$80. 126 \text{ grams of Fe}_2\text{O}_3 \left| \frac{1 \text{ mol}}{160 \text{ g}} \right. = 0.79 \text{ mol Fe}_2\text{O}_3$$

$$72 + 12 + 96 = 180$$

$$81. \frac{305.6 \text{ grams of } C_6H_{12}O_6}{180g} \times \frac{1 \text{ mol}}{180g} = 1.70 \text{ mol } C_6H_{12}O_6$$

$\begin{matrix} 6 \times 12 & 12 & 6 \times 16 \\ \swarrow & | & \searrow \\ & 180 & \end{matrix}$

For the following determine the amount of moles using the following equation



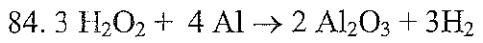
82. If one used 6 moles of O_2 , how many moles of NO_2 would be formed?

$$\frac{6 \text{ mol } O_2}{2 \text{ mol } O_2} \times \frac{2 \text{ mol } NO_2}{2 \text{ mol } O_2} = 6 \text{ mol } NO_2$$

83. If one formed 4.2 moles of NO_2 , how many moles of N_2 are needed?

$$\frac{4.2 \text{ mol } NO_2}{2 \text{ mol } NO_2} \times \frac{1 \text{ mol } N_2}{2 \text{ mol } NO_2} = 2.1 \text{ mol } N_2$$

Determine the mass (grams) using the following equation

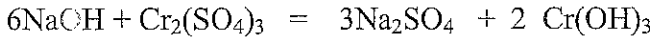


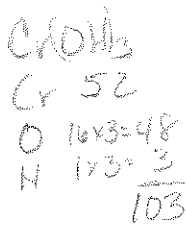
$$\frac{54 + 48}{102}$$

85. 90.2 grams of Al was added to an excess of hydrogen peroxide, how much aluminum oxide was formed?

$$\frac{90.2g Al}{27g Al} \times \frac{1 \text{ mol Al}}{27g Al} \times \frac{2 \text{ mol } Al_2O_3}{4 \text{ mol Al}} \times \frac{102g Al_2O_3}{1 \text{ mol } Al_2O_3} = 170g Al_2O_3$$

86. Determine the Limiting Reagent, the amount of product (in grams), and the amount of the excess reagent remaining after the reaction





I	0.45	0.09		
S	-0.45	-0.075	+0.225	+0.15
E	0	0.015	0.225	0.15

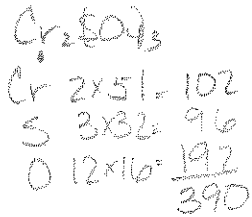
87. How much Cr(OH)₃ was produced (in grams) when 18 grams of NaOH

limiting reagent

was added to 38.2 grams of Cr₂(SO₄)₃?

18g NaOH / 40g / 1mol NaOH = 0.45 mol NaOH
38.2g Cr₂(SO₄)₃ / 390g / 1mol Cr₂(SO₄)₃ = 0.097 mol Cr₂(SO₄)₃

0.15 mol Cr(OH)₃ / 103g / 1mol = 15g Cr(OH)₃



38.2g Cr₂(SO₄)₃ / 390g Cr₂(SO₄)₃ / 1mol Cr₂(SO₄)₃ = 0.097 mol Cr₂(SO₄)₃

88. A car tire is inflated to 1710 mmHg at 6°C. The temperature goes up over the next 9 days to 50°C. What is the new pressure of the tire.

$\frac{P_1}{T_1} = \frac{P_2}{T_2}$
 $\frac{1710 \text{ mmHg}}{279 \text{ K}} = \frac{X}{323 \text{ K}}$ [X = 1980 mmHg]

EXCESS
0.015 mol Cr₂(SO₄)₃ / 390g / 1mol = 5.9g Cr₂(SO₄)₃

89. A bike tire can only contain 2 atm of pressure. Explain three ways in which the pressure of the tire could exceed the 2 atm.

$\frac{PV}{nT} = \frac{PV}{nT}$

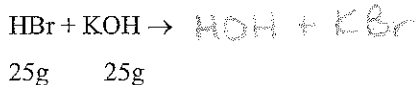
- increase moles (amount) of gas (pump in more air)
- decrease volume (step on tire)
- increase temperature

FILL IN THE BLANK:

- An acid, in the end will have to produce H₃O⁺ ions.
- A base, in the end will have to produce OH⁻ ions.
- Hydronium ion = H₃O⁺ = H⁺. (two different ways of writing.)
- In a neutral solution the [H⁺] ions = 1x10⁻⁷ M
- In an Acidic solution the [H₃O⁺] ions is greater than OH⁻.
- In a basic solution the [OH⁻] is greater the [H₃O⁺]
- Phenolphthalein is a common acid base indicator
- In acidic solutions phenolphthalein is clear.
- In basic solutions phenolphthalein is pink.
- The sum of the pH and pOH equals 14.
- When calculating pH the range of acidic values are 0 to less than 7

In the following questions determine the pH. Indicate whether the substance is acidic, basic, and neutral.

- [H⁺] ions = 1.0 x 10⁻⁷ pH = 7
- pOH = 11.2 pH = 14 - 11.2 = 2.8
- [H⁺] = 1.62 x 10⁻⁴ pH = -log 1.62 x 10⁻⁴ = 3.8
- [OH⁻] = 3.72 x 10⁻¹¹ pOH = -log 3.7 x 10⁻¹¹ = 10.4 pH = 14 - 10.4 = 3.6
- [H⁺] = 1.0E-5 pH = -log 1.0E-5 = 5



	HBr	KOH	→	HOH	KBr
I	0.31	0.45		0	0
S	-0.31	-0.31		+0.31	+0.31
E	0	0.14		0.31	0.31

106. Complete and balance the previous reaction.

25g HBr / 81 = 0.31 mol

25g KOH / 56g = 0.45 mol

107. Each reactant has the same mass. Why don't the reactants balance out to neutral.

The reactants have different molar masses, and therefore have different amounts (in moles.)

108. What type of reaction is this?

neutralization (solubility)

109. Which of the two reactants is limiting?

HBr (see ISE table)

110. How much salt can be produced?

$$0.31 \text{ mol KBr} \left| \frac{119 \text{ g}}{\text{mol}} \right. = 37 \text{ g KBr}$$

111. How much excess is left over?

$$0.14 \text{ mol KOH} \left| \frac{56 \text{ g}}{1 \text{ mol}} \right. = 7.8 \text{ g KOH}$$

Titration:

You have discovered a unknown bottle of acid. You need to figure out the concentration.

You have collected a 15mL sample of the acid. After a titration, the neutralization reaction required 26mL of .5 M NaOH. Answer the following questions.

112. How many moles of NaOH were used?

$$0.5 \text{ M} = \frac{x \text{ mol}}{0.025} \quad x = 0.013 \text{ mol NaOH}$$

	Acid	Base
mol	0.013	0.013
L	0.05	0.026
M	0.87	0.5

113. How many moles of OH⁻ were used?

0.013 mol OH⁻

114. How many moles of H⁺ ions were consumed?

0.013 mol H⁺

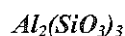
115. What is the molarity of the acid?

$$\frac{0.013 \text{ mol}}{0.015 \text{ L}} = 0.87 \text{ M}$$

116. What is the pH of the unknown solution?

$$\text{pH} = -\log 0.87 = 0.06$$

SALTS:



~~117.~~ Which of the following salts are neutral?

~~118.~~ Which of the following salts are acidic?

~~119.~~ Which of the following salts are basic?

120. Cations can produce acidic/ basic or neutral?

Solutions

121. 10.0 moles of NaCl dissolve in 10 L of H₂O. Determine the Molarity.

$$\frac{10 \text{ mol}}{10 \text{ L}} = 1 \text{ M NaCl}$$

→ 122. 5.0 moles of solute dissolved in 2.5kg solvent. Determine molality.

$$\frac{5 \text{ mol}}{2.5 \text{ kg}} = 2 \text{ molal}$$

123. 15.0 grams of NaNO₃ dissolved in 250mL H₂O. Determine the M

$$\frac{15 \text{ g}}{23 \text{ g} + 44 \text{ g}} = 0.176 \text{ mol} \quad \frac{0.176 \text{ mol}}{0.250 \text{ L}} = 0.706 \text{ M}$$

→ 124. 150.0 g of AgNO₃ dissolved in 250 mL of H₂O Determine the m.

$$\frac{150 \text{ g AgNO}_3}{170 \text{ g}} = 0.88 \text{ mol} \quad m = \frac{\text{mol}}{\text{kg}} = \frac{0.88 \text{ mol}}{0.250 \text{ kg}} = 0.35 \text{ m}$$

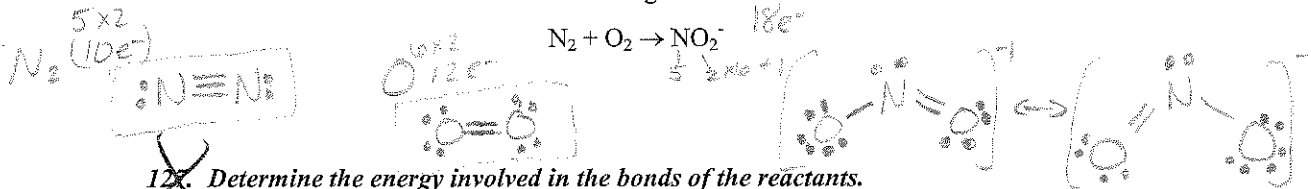
125. You need 1 liter of .005M Crystal Violet for an experiment. How many grams CV do you need. The molecular mass of CV is 407.5g/mol.

$$0.005 \text{ M} = \frac{x}{1 \text{ L}} \quad x = 0.005 \text{ mol CV} \times \frac{407.5 \text{ g}}{1 \text{ mol}} = 2.04 \text{ g CV}$$

126. In your stock room you have 40 grams of AgNO₃. What is the total volume of 1.5 M Concentration can you make?

$$\frac{40 \text{ g AgNO}_3}{170 \text{ g}} = 0.24 \text{ mol} \quad 1.5 \text{ M} = \frac{0.24 \text{ mol}}{x \text{ L}} \quad x = 0.16 \text{ L}$$

Draw a Lewis structures for each individual in the following reaction.



~~127. Determine the energy involved in the bonds of the reactants. (Using bond energies worksheet)~~

~~128. Determine the energy involved in the bonds of the products. (Using bond energies worksheet)~~

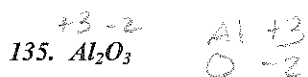
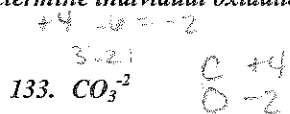
~~129. Determine the ΔH from the bond energies. (Bonds broken – bonds formed)~~

~~130. Draw a graph depicting an exothermic reaction. Label the ΔH and the Ea.~~

~~131. Draw a graph depicting an endothermic reaction. Label the ΔH and the Ea.~~

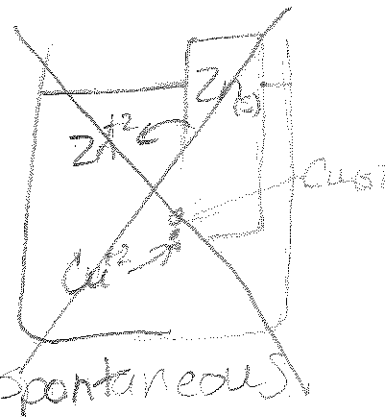
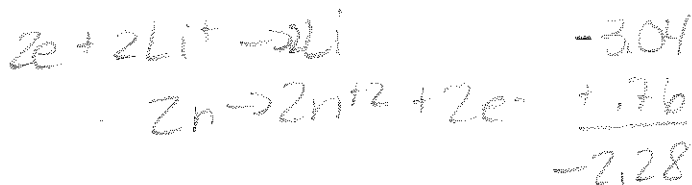
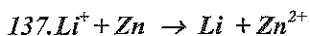
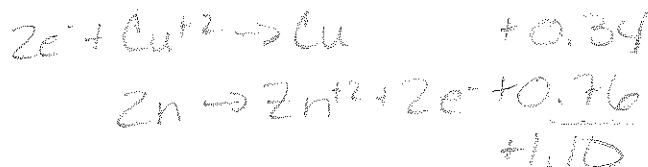
~~132. On a very hot day, in Wisconsin, cities along Lake Michigan are 15-20 degrees cooler than other regions of the state. Why?~~

Determine individual oxidation states



BALANCE THE FOLLOWING REACTIONS:

Determine the Voltage and draw a cell for each.

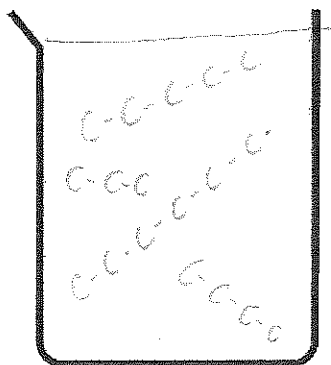


non spontaneous

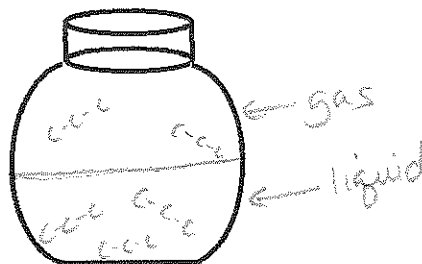
Chemistry Concepts Review

Name _____

1. Crude oil is a mixture of all different hydrocarbon chains. In the beaker below draw a representative particulate drawing of what you think would correctly show what crude oil looks like.

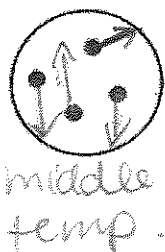


2. Propane, a fuel used for gas grills, commonly referred to as liquid propane. In the picture below, show a pictorial version of this tank (half full). Include all aspects of propane (C-C-C) in the tank.

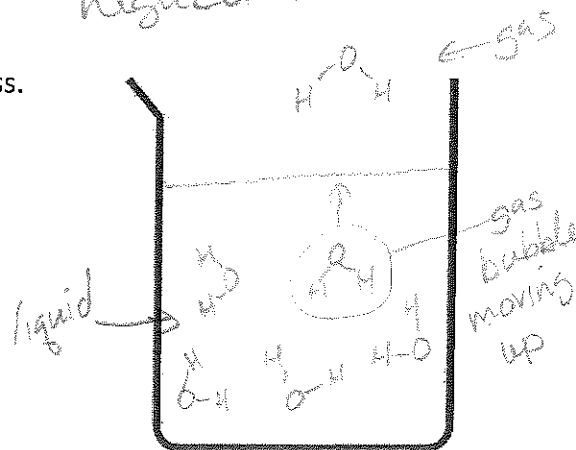


3. The three samples of identical gas molecules below all have the same internal pressure. Rank the samples from lowest temperature to highest temperature, and add arrows of appropriate size to illustrate the average kinetic energy of the molecules in the samples.

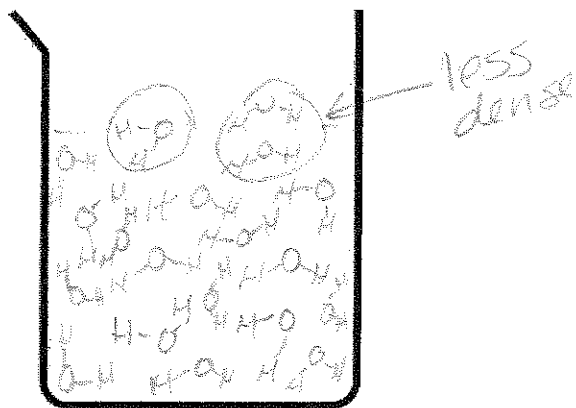
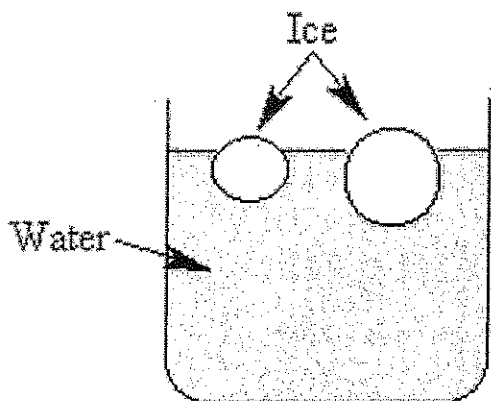
same pressure



4. Water is boiling draw a picture of the molecules in this process.



5. a. Ice is floating in this problem due to?
 b. In the beaker to the right draw a molecular view of the picture on the left.

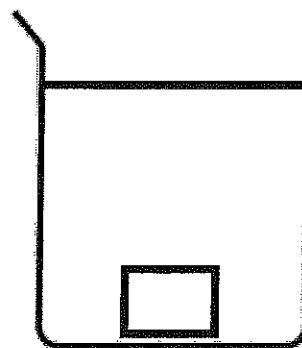


7. A person burns wooden pellets for heat in the winter. Answer the following questions:
 If a person burns 1 ton of wooden pellets:

- a. What are the products of the burning? $CO_2 + H_2O$
 b. $(some CO + C (ash))$
 b. The total mass of the products is greater, equal or less than 1 ton.

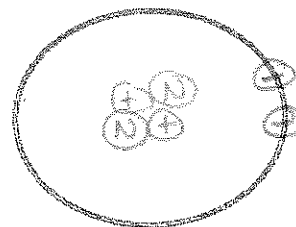
Law of Conservation of Mass
 Reactants mass = Product mass

8. A hot block is added to room temperature water
 (True/false) Block lost same quantity water gained.
 (True/false) Block and water will end at same temperature.
 (True/false) The water will end up hotter than the block.

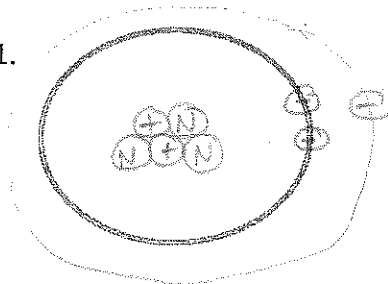


9. Draw an atom of helium with a mass number 4 and a charge of neutral.

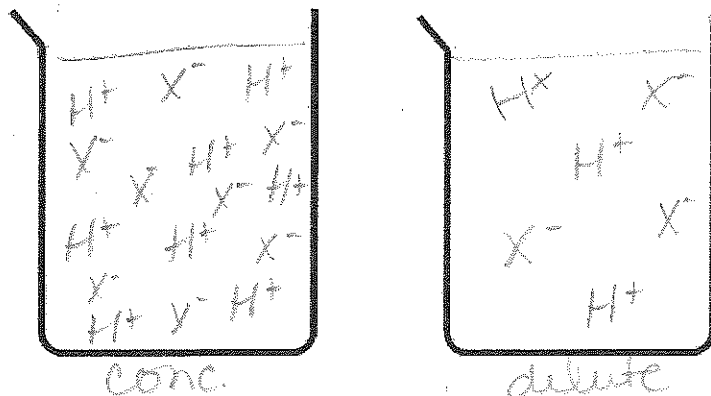
\oplus = proton
 \ominus = neutron
 \ominus = electron



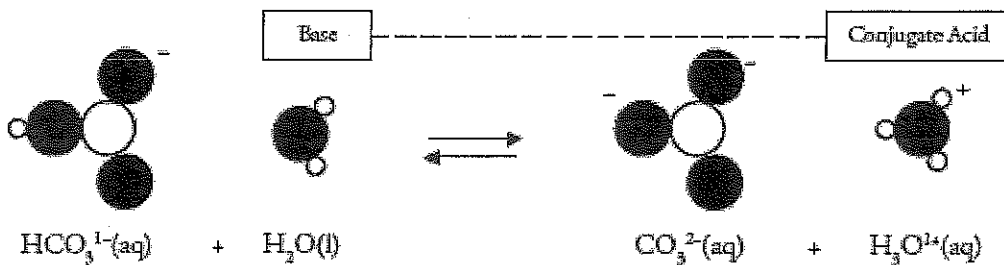
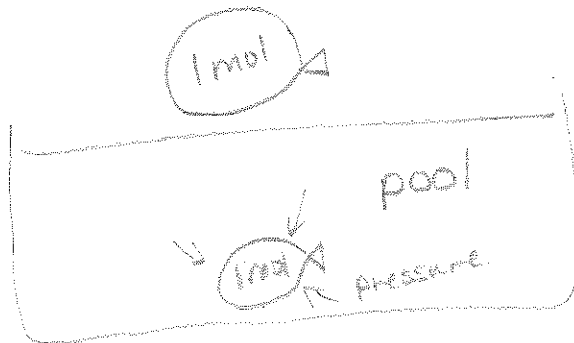
10. Draw a helium atom with a mass number of 5 and a charge of -1.



11. The two beakers below contain acidic solutions. 1st one is concentrated and 2nd is a dilute acid. Draw a particulate view of each.



12. A balloon contains 1 mole of helium gas; This balloon is pulled to the bottom of a pool. Draw both of these balloons, using particulate representations of the molecules each of the balloons.



13. All acid-base reactions have two conjugate acid-base pairs. One conjugate acid-base pair in the reaction in Model 3 is H_3O^+/H_2O . List the other acid-base pair in the reaction.



14. Why is HCO_3^- considered the "acid" part of the pair in the reaction in Model 3?

HCO_3^- is the proton donor (to become CO_3^{2-})

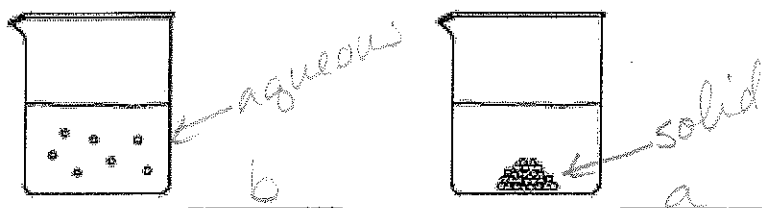
15. Why is CO_3^{2-} considered the "base" part of the pair in the reaction in Model 3?

CO_3^{2-} gain H^+ (proton) in the reverse reaction (proton acceptor)

16.

1. Which illustration below represents

- a. solute particles in a solid state in water?
- b. solute particles in an aqueous state?



17. Predict what would happen to the mass of solid solute sitting on the bottom of the beaker in when the following changes occur.

a. More water is added to the beaker.

more solute will dissolve

b. The beaker is heated (assume no evaporation occurs).

solubility increases with ↑ Temperature
more solute dissolves

c. The beaker is allowed to sit uncovered for two days and some water evaporates.

solvent decreases
solute will come out of solution (precipitate)
to maintain equilibrium