Chapter 8 Homework Answer Key

Chapter 8 - 41, 51, 53, 55, 63, 66, 69, 71, 73, 74, 75, 78, 81, 83, 89, 92, 101, 102, 107, 108, 109, 115, 116.

66) Use the solubility rules listed in Section 8.3B to predict whether each of the following ionic compounds is soluble in H_2O.

a) $Al(NO_3)_3$ $\Rightarrow$ NO_3^- always **Soluble**

b) $NaHCO_3$ $\Rightarrow$ Na^+ group 1A always **Soluble**

c) $Cr(OH)_2$ $\Rightarrow$ OH^- usually **Insoluble**

d) $LiOH$ $\Rightarrow$ Li^+ group 1A always **Soluble**

e) $CuCO_3$ $\Rightarrow$ CO_3^{2-} usually **Insoluble**

f) $(NH_4)_2SO_4$ $\Rightarrow$ NH_4^+ always **Soluble**

g) $Fe(OH)_3$ $\Rightarrow$ OH^- usually **Insoluble**

h) $(NH_4)_3PO_4$ $\Rightarrow$ NH_4^+ always **Soluble**

74) What is the molarity of a solution prepared using the given amount of solute and total volume of solution?

a) 2.4 mol of NaOH in 1.50 L of Solution

$$\text{Molarity} = \frac{\text{moles}}{\text{L sol}} = \frac{2.4 \text{ moles}}{1.50 \text{ L}} = \boxed{1.6 \text{ moles/L NaOH}}$$

b) 0.48 mol KNO_3 in 750 mL of Solution

$$\frac{0.48 \text{ mol}}{750 \text{ mL Sol}} \times \frac{1000 \text{ mL Sol}}{1 \text{ L Sol}} = \boxed{0.64 \text{ moles/L } KNO_3}$$

c) 25.0 g KCl in 650 mL of Solution

$$\frac{25.0 \text{ g KCl}}{650 \text{ mL Sol}} \times \frac{1 \text{ mole KCl}}{74.55 \text{ g KCl}} \times \frac{1000 \text{ mL Sol}}{1 \text{ L Sol}} = \boxed{0.52 \text{ mols/L KCl}}$$

d) 10.0 g of Na_2CO_3 in 3.8 L solution

$$\frac{10.0 \text{ g } Na_2CO_3}{3.8 \text{ L Sol}} \times \frac{1 \text{ mole } Na_2CO_3}{105.99 \text{ g } Na_2CO_3} = \boxed{0.025 \text{ mole/L } Na_2CO_3}$$

78) How many moles of solute are contained in each solution?

a) 250 mL of a 0.55 M $NaNO_3$ solution

$$250\ mL\ sol \times \frac{1\ L\ sol.}{1000\ mL\ sol.} \times \frac{0.55\ moles\ NaNO_3}{1\ L\ sol} = 0.1375\ moles$$

$$= \boxed{0.14\ moles\ NaNO_3}$$

b) 145 mL of a 4.0 M HNO_3 solution

$$145\ mL\ sol \times \frac{1\ L\ sol}{1000\ mL\ sol} \times \frac{4.0\ moles\ HNO_3}{1\ L\ sol} = \boxed{0.58\ moles\ HNO_3}$$

c) 6.5 L of a 2.5 M HCl solution

$$6.5\ L\ sol \times \frac{2.5\ moles\ HCl}{1\ L\ sol} = 16.25\ moles\ HCl$$

$$= \boxed{16\ moles\ HCl}$$

92) How many milliliters of a 5.0 M sucrose solution would be needed to prepare each solution?

$C_1V_1 = C_2V_2$ | $C_1 = 5.0\ M$

Solve for V_1 ⇒ Don't forget to convert to mL

a) 45 mL of a 4.0 M sol.

$$V_1 = \frac{C_2V_2}{C_1} = \frac{(4.0\ M)(45\ mL)}{(5.0\ M)} = \boxed{36\ mL\ solution}$$

b) 150 mL of a 0.5 M sol

$$V_1 = \frac{C_2V_2}{C_1} = \frac{(0.5\ M)(150\ mL)}{(5.0\ M)} = 15\ mL\ sol$$

$$\boxed{20\ mL\ sol}$$

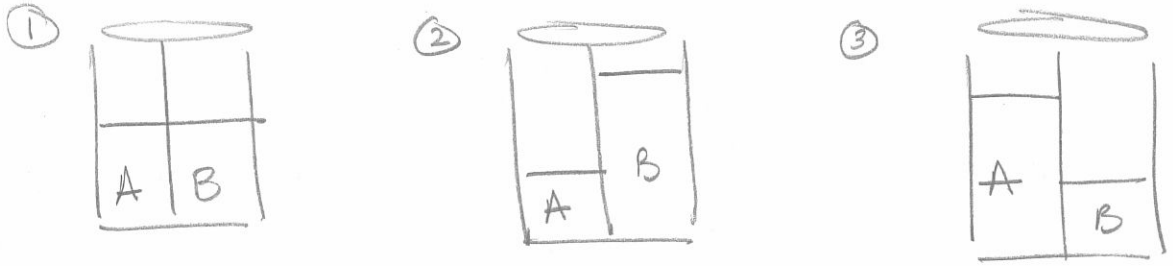
c) 1.2 L of a 0.025 M sol

$$V_1 = \frac{C_2V_2}{C_1} = \frac{(0.025\ M)(1.2\ L)}{(5.0\ M)} \times \frac{1000\ mL\ sol}{1\ L\ sol} = \boxed{6.0\ mL\ sol}$$

d) 750 mL of a 1.0 M sol

$$V_1 = \frac{C_2V_2}{C_1} = \frac{(1.0\ M)(750\ mL)}{(5.0\ M)} = \boxed{150\ mL\ sol}$$

102) A flask contains two solutions of equal volume separated by a semipermeable membrane. Which diagram represents the final level of the liquids when A & B contain each of the following solutions?



H_2O will move from Lower Conc. to Higher Conc.

⟹ Larger Volume will be Higher Conc. Side as entropy tries to make conc. the same.

	A	B	Correct Diagram
a)	10% (w/v) glucose	20% (w/v) glucose	2
b)	0.20 M NaCl 0.40 OsM	0.30 M glucose 0.30 OsM	3
c)	pure H_2O	5% (w/v) glucose	2
d)	2.0 M NaCl	pure H_2O	3
e)	3% (w/v) Sucrose	1% (w/v) Sucrose	3

108) A patient receives 750 mL of a 10.% (w/v) aqueous glucose solution. (a) How many grams of glucose does the patient receive? (b) How many moles of glucose (180.2 g/mol) does the patient receive?

$$\text{Conc.} = 10\%(w/v) = \frac{10\text{ g glucose}}{100\text{ mL Sol}}$$

$$\text{Volume} = 750\text{ mL}$$

a) mL $\longrightarrow$ g

$$750\text{ mL} \times \frac{10\text{ g glucose}}{100\text{ mL Sol}} = \boxed{75\text{ g glucose}}$$

b) mL $\longrightarrow$ g $\longrightarrow$ moles

$$750\text{ mL} \times \frac{10\text{ g glucose}}{100\text{ mL Sol}} \times \frac{1\text{ mol glucose}}{180.2\text{ g glucose}} = 0.41620\text{4 mol}$$

$$= \boxed{0.42\text{ mol glucose}}$$

116) A bottle of Vodka labeled "80 proof" Contains 40.% (v/v) ethanol in water. How Many mL of ethanol are contained in 250 mL Vodka?

$$\text{Conc. } 40\% \text{ v/v} = \frac{40 \text{ mL alcohol}}{100 \text{ mL Vodka}}$$

$$250 \text{ mL Vodka} \times \frac{40. \text{ mL alcohol}}{100 \text{ mL Vodka}} = 100 \text{ mL alcohol}$$

$$= \boxed{1.0 \times 10^{2} \text{ mL ethanol}}$$