

# Unit 12: solutions

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unit 12

Chem 30A: Solutions to end of chapter problems not found in text.

## Chapter 5:

88. solvent: alcohol solute: water

90. No. NaCl is an ionic solid that only dissolves in a polar solvent like H<sub>2</sub>O.

92. Motor oil → solute; gasoline → solvent.

## Chapter 6:

18. 1 mole of Ca<sup>2+</sup> and 2 moles of Cl<sup>-</sup>

\* can use "moles" or "mols"

68. a)  $\frac{2.50 \text{ mol}}{5.00 \text{ L}} = 0.50 \text{ M H}_2\text{SO}_4$

b)  $\frac{0.200 \text{ mol}}{0.0184 \text{ L}} = 10.8 \text{ M C}_2\text{H}_5\text{OH}$   
← convert to liters

70. a)  $0.250 \text{ L} \times \frac{2.50 \text{ mol K}_2\text{Cr}_2\text{O}_7}{1 \text{ L}} = 0.625 \text{ mol K}_2\text{Cr}_2\text{O}_7$

$0.625 \text{ mol} \times \frac{294.2 \text{ g K}_2\text{Cr}_2\text{O}_7}{1 \text{ mol}} = 183.9 \text{ grams of K}_2\text{Cr}_2\text{O}_7$   
← molecular mass from PT

b)  $0.020 \text{ L} \times \frac{0.0100 \text{ mol KMnO}_4}{1 \text{ L}} = 0.002 \text{ mol KMnO}_4$

#70 b (continued)

$$0.002 \text{ mol} \times \frac{206 \text{ g KMnO}_4}{1 \text{ mol}} = 0.412 \text{ grams of KMnO}_4$$

$$72. \frac{2.50 \text{ mol}}{1 \text{ L}} = \frac{1.05 \text{ mol}}{x}; \quad x = 0.42 \text{ Liters or } 420 \text{ mL}$$

74. 205g of  $\text{C}_6\text{H}_{12}\text{O}_6$  contains 1.14 mol of  $\text{C}_6\text{H}_{12}\text{O}_6$ 

$$\text{MW}(\text{C}_6\text{H}_{12}\text{O}_6) = 180 \text{ g/mol}; \quad 205 \text{ g} \times \frac{1 \text{ mol}}{180 \text{ g}} = 1.14 \text{ mol C}_6\text{H}_{12}\text{O}_6$$

$$\frac{4.25 \text{ mol}}{1 \text{ Liter}} = \frac{1.14 \text{ mol}}{x}; \quad x = 0.268 \text{ Liters or } 268 \text{ mL}$$

76. note: the volume % and mass % are the same because we will assume that their densities are nearly 1.0 g/mL

$$(a) \quad 58.0 \text{ mL} / 625 \text{ mL} \Rightarrow 0.0928 \times 100 \Rightarrow 9.3\%$$

$$(b) \quad 79.1 \text{ mL} / 755 \text{ mL} \Rightarrow 0.105 \times 100 \Rightarrow 10.5\%$$

$$78. \frac{5.5 \text{ g KOH}}{100 \text{ g solution}} = \frac{x \text{ KOH}}{125 \text{ g}}; \quad x = 6.88 \text{ g KOH}$$

for 125g of aqueous solution, you would need 6.88g of KOH.

$$80. \frac{30.0 \text{ mL}}{100 \text{ mL}} = \frac{x}{500 \text{ mL}}; \quad x = 150 \text{ mL}$$

80.(continued)

Add 150mL of isopropyl alcohol to 350mL of water so that the total volume is 500mL.

Chapter 7 :

38. Hydrogen iodide, HI, is a strong acid.

40. Methylamine,  $\text{CH}_3\text{NH}_2$ , is a weak base.