IB Chem-I/Diff. Chem.: Solutions Wkst 1 Name: Answer Key

Be sure to show all your work. Circle the correct answer

1. The salt concentration inside a living cell is about 0.15 M. How many moles of NaCl are present in 50.0 mL of this cytoplasmic solution?

a) 0.0175 mol b) 0.15 mol c) 7.5 mol d) 15 mol e) 0.0075 mol

$$\frac{50.0\text{ mL Cyt}}{} \left| \frac{1\text{ L}}{1000\text{ mL}} \right| \frac{0.15\text{ mol NaCl}}{1\text{ L Cyt}} = 0.0075\text{ mol NaCl}$$

2. Determine the molarity of a concentrated nitric acid, HNO_3, aqueous solution, which is 70% nitric acid by mass and has a density of 1.41 g/mL.

a) 11.7 M b) 15.7 M c) 0.42 M d) 8.5 M e) 16.7 M

$$\frac{70\text{ g HNO}_3}{100\text{ g HNO}_3\text{ (aq)}} \left| \frac{1\text{ mol HNO}_3}{63.02\text{ g HNO}_3} \right| \frac{1.41\text{ g HNO}_3\text{(aq)}}{1\text{ mL HNO}_3\text{(aq)}} \left| \frac{1000\text{ mL}}{1\text{ L}} \right. = 15.7\text{ M HNO}_3$$

3. What is the molarity of a hydrochloric acid (HCl) solution if 50.00 mL of this acid requires 16.80 mL of 0.1008 M NaOH for neutralization?

$$HCl + NaOH \rightarrow NaCl + H_2O$$

a) 0.1016 M b) 0.3000 M c) 0.1008 M d) 0.03387 M e) 0.06774 M

$$\frac{16.80\text{ mL NaOH}}{} \left| \frac{1\text{ L}}{1000\text{ mL}} \right| \frac{0.1008\text{ mol NaOH}}{1\text{ L NaOH (aq)}} \left| \frac{1\text{ mol HCl}}{1\text{ mol NaOH}} \right| \frac{}{50.0\text{ mL}} \left| \frac{1000\text{ mL}}{1\text{ L}} \right. = 0.03387\text{ M}$$

4. What volume of 0.500 M NaOH solution must be diluted to prepare 200 mL (2.00×10^2) of 0.200 M NaOH?

a) 80.0 mL b) 12.5 mL c) 20.0 mL d) 40.0 mL e) 1.00 mL

$M_1V_1 = M_2V_2$

$$V_1 = \frac{M_2V_2}{M_1} \qquad \frac{0.200\text{ M NaOH}}{} \left| \frac{200\text{ mL}}{} \right| \frac{}{0.500\text{ M}} = 80.0\text{ mL}$$

5. What is the molarity of a solution that contains 20.0 g of NaOH dissolved in 400 mL (4.00×10^2) of solution?

a) 12.5 M b) 1.25 M c) 50.0 M d) 1.52 M e) 0.00125 M

$$\frac{20.0\text{ g NaOH}}{} \left| \frac{1\text{ mol NaOH}}{40.00\text{ g NaOH}} \right| \frac{}{400\text{ mL}} \left| \frac{1000\text{ mL}}{1\text{ L}} \right. = 1.25\text{ M NaOH}$$

6. What mass of glucose ($C_6H_{12}O_6$) is required to prepare 500 g of a 5.0 % glucose solution by mass aqueous intra-venous solution?

a) 27.0 g b) 24.6 g c) 26.7 g d) 25.0 g e) 18.0 g

$$\frac{500\text{ g Glc (aq)}}{} \left| \frac{5.0\text{ g Glc}}{100\text{ g Glc (aq)}} \right. = 25.0\text{ g Glc}$$