Test bank chapter (4)

Choose the correct answer

1. A 50.0 mL sample of 0.436 M NH_4NO_3 is diluted with water to a total volume of 250.0 mL. What is the ammonium nitrate concentration in the resulting solution?

$M_iV_i = M_fV_f$ القانون

a) 21.8 M
b) 0.459 M
c) 2.18×10^{-2} M
d) 8.72×10^{-2} M

$M_f = \frac{50 \times 0.436}{250}$

$M_f = 0.0872 = 8.72 \times 10^{-2}$ M

2. How many milliliters would you need to prepare 60.0 mL of 0.200 *M* HNO_3 from a stock solution of 4.00 *M* HNO_3?

$M_iV_i = M_fV_f$

$V_i = \frac{0.200 \times 60}{4}$

$V_i = 3$ mL

a) 3 mL
b) 240 mL
c) 24 mL
d) 1000 mL

3. What is the concentration (M) of KC1 in a solution made by mixing 25.0 mL of 0.100 M KC1 with 50.0 mL of 0.100 M KC1?

$n_1 = MXV = 0.100 \times 0.025 = 2.5 \times 10^{-3}$ mol

$n_2 = MXV = 0.100 \times 0.05 = 5 \times 10^{-3}$ mol

#total of $n = 2.5 \times 10^{-3} + 5 \times 10^{-3}$ mol $= 7.5 \times 10^{-3}$ mol

#total of $V = V_1 + V_2 = 0.025 + 0.05 = 0.075$ L

$M = \frac{n}{V} = \frac{7.5 \times 10^{-3}}{0.075} = 0.1M$

a) 0.0500
b) **0.100**
c) 0.0333
d) 0.0250

4. What is the concentration (M) of CH_3OH in a solution prepared by dissolving 11.7 g of CH_3OH in sufficient water to give exactly 230 mL of solution?

$n = \frac{m}{MM} = \frac{11.7}{32.042} = 0.365$ mol

$M = \frac{n}{V} = \frac{0.365}{0.23} = 1.59$

$\frac{m}{MM} = MXV$

a) 11.7
b) 2.30 x 10-2
c) 0.0841
d) **1.59**

Explanation: Need to convert the grams of CH3OH to moles and then find the molarity of the solution by using the molarity formula. Do not forget to convert the ml to L.

$$11.7\text{ g } CH_3OH \times \frac{1\text{ mole } CH_3OH}{32.042\text{ g}} \times \frac{1}{0.230\text{ L}} = 1.59\text{ M}$$

$M_1V_1 + M_2V_2 = M_fV_f$

$\frac{(0.1 \times 25) + (0.1 \times 50)}{75} = \frac{M_f(75)}{75}$

$M_f = \frac{7.5}{75} = 0.1M$

5. How many grams of H_3PO_4 are in 35.1 mL of a 2.75 M solution of H_3PO_4?

a) 0.61
b) **9.46**
c) 20
d) 4.9

$M = \frac{n}{V}$ $\quad 2.75 = \frac{n}{0.0351} \Rightarrow n = 0.0965\ mol$ $\quad \left\{ n = \frac{m}{MM} \right.$ $\quad 0.0965 = \frac{m}{97.998} \Rightarrow m \simeq 9.46\ g$

Explanation: Need to convert the ml of H_3PO_4 to liters and then find the # of moles of phosphoric acid. The moles of phosphoric acid can then be converted to grams of phosphoric acid.

$$35.1\ ml \times \frac{1\ L}{1000\ ml} \times 2.75\ M \times \frac{97.99\ g\ H_3PO_4}{1\ mole} = 9.46\ g\ H_3PO_4$$

7. What is the concentration (M) of a Na_2SO_4 solution prepared by dissolving 5.35 g of Na_2SO_4 in sufficient water to give 330 mL of solution?

a) 1.14 x 102
b) 0.016
c) 61.7
d) **0.114**

$M = \frac{n}{V}$ $\quad M = \frac{0.0377}{0.33} = 0.114$ $\quad \left\{ n = \frac{m}{MM} = \frac{5.35}{142.042} = 0.0377 \right.$

Explanation: Convert grams of Na2SO4 to moles of Na2SO4, ml of water to liters of water and then find the molarity of the solution by using the molarity formula.

$$5.35\ g\ Na_2SO_4 \times \frac{1\ mole\ Na_2SO_4}{142.035\ g\ Na_2SO_4} \times \frac{1}{0.330\ L} = 0.114\ M\ Na_2SO_4$$

8. How many grams of LiOH are there in 750.0 mL of a 0.0158 M LiOH solution?

a) 2.11 x 10-5
b) 11.3
c) **0.284**
d) 3.50

$M = \frac{n}{V}$ $\quad n = 0.75 \times 0.0158$ $\quad n = 0.01185\ mol$ $\quad \left\{ n = \frac{m}{MM} \right.$ $\quad m = 23.949 \times 0.01185 = 0.2838 \simeq 0.2849$

Explanation: Calculate the number of moles of LiOH present in this solution using the molarity formula and the convert the number of moles to grams of LiOH.

$$7.50 \times 10^{-1}\ L \times 0.0158\ M \times \frac{23.948\ g}{1\ mole\ LiOH} = 0.284\ g\ LiOH$$

10. A 50.0 mL sample of 0.436 M NH_4NO_3 is diluted with water to a total volume of 250.0 mL. What is the ammonium nitrate concentration in the resulting solution?

a) 21.8 M
b) 0.459 M
c) 2.18×10^{-2} M
d) 8.72×10^{-2} M

12. A 3.682 g sample of potassium chlorate $KClO_3$ is dissolved in enough water to give 375 mL of solution. What is the chlorate ion concentration in this solution?

a) 3.00×10^{-2} M
b) 4.41×10^{-2} M
c) 0.118 M
d) 8.01×10^{-2} M

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$$\frac{m}{MM} = M \times V$$

$$\frac{3.682}{122.551} = M \times 0.375$$

$$\frac{0.030}{0.375} = \frac{0.375M}{0.375}$$

$$M = 0.0801M$$

$$= 8.01 \times 10^{-2} M$$