

## Part A: Multiple Choice (10 marks)

- (1) What is the volume of 3.20 mol of sulphur dioxide gas,  $\text{SO}_2$  at STP?  
(a) 0.0140 L (c) 0.142 L  
(b) 71.7 L (d) 243 L
- (2) What is the concentration of a 250 mL solution that contains 0.80 moles of calcium chloride,  $\text{CaCl}_2$ ?  
(a) 3.2 mol / L (c) 0.31 mol / L  
(b) 0.20 mol / L (d) 0.0032 mol / L
- (3) What volume of 0.15 mol/L HCl would contain 0.30 mol of HCl?  
(a) 0.045 L (c) 0.30 L  
(b) 0.50 L (d) 2.0 L
- (4) Which is true for a diluted solution?  
(a) The number of moles before dilution is greater than the number of moles after dilution  
(b) The number of moles before dilution is less than the number of moles after dilution  
(c) The number of moles before dilution is equal to the number of moles after dilution.  
(d) The concentration before dilution is less than the concentration after dilution
- (5) What is the percent by volume of a 500 mL solution that contains 100 mL of sodium chloride,  $\text{NaCl}$ ?  
(a) 10% (c) 20%  
(b) 30% (d) 50%
- (6) A 15 mL sample of acetic acid solution is diluted to form 100.0 mL of a 0.24 mol/L solution. What was the original concentration of the acetic acid?  
(a) 0.036 mol/L (c) 0.45 mol/L  
(b) 1.6 mol/L (d) 24 mol/L
- (7) A solution is made by dissolving 2.00 mol of  $\text{Na}_3\text{PO}_4$  in 250 mL of water. What is the concentration of  $\text{Na}^+$  in this solution?  
(a) 2.0 M (c) 6.0 M  
(b) 8.0 M (d) 24 M
- (8) Which of the following dissociation equations is written **incorrectly**?  
(a)  $\text{CaCO}_3(\text{s}) \rightarrow \text{Ca}^{2+}(\text{aq}) + \text{CO}_3^{2-}(\text{aq})$  (c)  $\text{NaCl}(\text{s}) \rightarrow \text{Na}^+(\text{aq}) + \text{Cl}^-(\text{aq})$   
(b)  $\text{CuSO}_4(\text{s}) \rightarrow \text{Cu}^{2+}(\text{aq}) + \text{SO}_4^{2-}(\text{aq})$  (d)  $(\text{NH}_4)_2\text{SO}_4(\text{s}) \rightarrow \text{NH}_4^+(\text{aq}) + \text{SO}_4^{2-}(\text{aq})$
- (9) Which gas sample will occupy the most volume at STP?  
(a) 2.0 mol of  $\text{NH}_3$  (b) 4.0 mol of  $\text{O}_2$   
(c) 3.0 mol of  $\text{H}_2$  (d) 1.0 mol of  $\text{CO}_2$

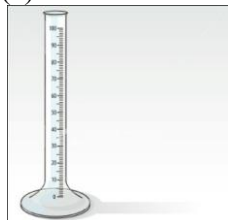
(10) Which of the following is a pipette?



(b)



(c)



(d)

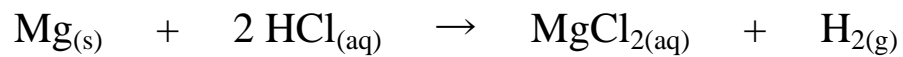


Part B: Short Answer Questions (15 marks)

(1) Find the concentration of a solution made by dissolving 4.75g of  $\text{Ca}(\text{NO}_3)_2$  in enough water to form 225 mL of solution? (3)

(2) A solution is made by adding 750 mL of water to 375 mL of a 2.7 M stock solution of sodium chloride. What is the concentration of this new solution? (3)

(3) 0.20 L of a 0.25 mol/L solution of hydrochloric acid is reacted with excess magnesium according to the reaction below. What volume of hydrogen gas is produced if the reaction occurs at STP? (4)



(4) What is the mass of 42.6 L of  $\text{XeCl}_{4(g)}$  at STP? (3)

(5) Write dissociation equations for the following ionic substances when dissolved in water (2)

a.  $\text{Fe}(\text{NO}_3)_3$

b.  $\text{Li}_2\text{SO}_4$