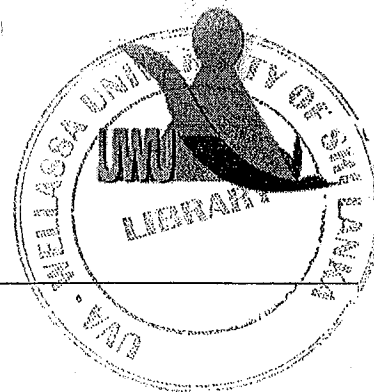


Uva Wellassa University, Sri Lanka  
End Semester Examination – August 2010  
SCT 132-1 Chemistry II

Time: One (01) hour

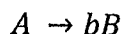


Total four (04) questions  
Answer all questions

Universal gas constant,  $R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}$

01. i. Compare the physical properties of Be, Mg, Ca and Sr. (05 marks)
- ii. Briefly explain two of following properties of s – block elements. (08 marks)
- Alkali earth metals have higher melting points than the alkali metals.
  - Generally the group 1 elements form colourless compounds.
  - Chemical reactivity of the metals increase from Li to Cs?
- iii. Briefly describe how you industrially prepare caustic soda. Support your answer with relevant equations. (04 marks)
- iv. The hardness of water may be 'temporary' or 'permanent'. What causes each of these conditions, and how the hardness of water can be minimized by a chemical treatment? (04 marks)
- v. The first element in each of the main groups in the periodic table shows anomalous properties when compared with the other members of the same group. Briefly discuss the statement with reference to Li, Be and B. (04 marks)
02. i. a. What is the compound known as "Inorganic benzene"?  
b. Draw the structure of the molecule.  
c. Explain the reason, why the compound is called as "Inorganic benzene". (10 marks)
- ii. a. Draw the structures of graphite and diamond. Which form is stable under ambient atmospheric conditions?  
b. Briefly explain why graphite is soft but diamond is hard. (08 marks)
- iii.
- |                                   | $\text{F}_2$ | $\text{Cl}_2$ | $\text{Br}_2$ |
|-----------------------------------|--------------|---------------|---------------|
| Bond energy/ $\text{KJ Mol}^{-1}$ | 159          | 243           | 193           |
- a. Briefly explain why bond energy of  $\text{F}_2$  is less than the bond energy of  $\text{Cl}_2$ .  
b. Why bond energy of  $\text{Br}_2$  is less than the bond energy of  $\text{Cl}_2$ .  
c. Which one of the above gasses is difficult to prepare under normal conditions? (07 marks)

03. A reaction has the following general form:



At 27°C concentration [A] Vs. time data were collected. The initial concentration of A in the reaction mixture was  $2.8 \times 10^{-3} \text{ mol dm}^{-3}$ . The graph of  $1/[A]$  Vs time was a straight line with the slope  $+3.6 \times 10^{-2} \text{ dm}^3 \text{ mol}^{-1} \text{ s}^{-1}$ .

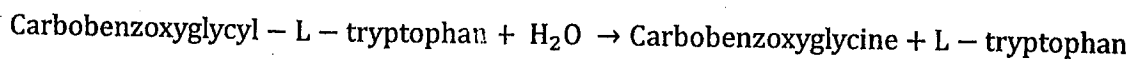
- i. Determine the rate law of the reaction. (05 marks)
- ii. Determine the integrated form of the rate law. (05 marks)
- iii. Determine the rate constant of the reaction at 25°C. (05 marks)
- iv. Calculate the half life of the reaction. (05 marks)
- v. State the Arrhenius equation and identify the terms therein. (05 marks)
- vi. At 37°C the rate constant was found to be  $1.08 \text{ dm}^3 \text{ mol}^{-1} \text{ s}^{-1}$ . Calculate the activation energy of the reaction. (05 marks)

04. i. Identify the terms in Michaelis – Menten equation.

$$v = \frac{k_p[E]_0}{1 + K_M \frac{1}{[S]_0}}$$

(05 marks)

ii. The hydrolysis of carbobenzoxyglycyl-L-tryptophan catalysed by pancreatic carboxypeptidase occurs according to the reaction:



Following data is given on the rate of formation of L – tryptophan at 25°C, and pH=7.5:

[S]/ mmol dm <sup>-3</sup>	0.0	2.5	5.0	10.0	15.0
Rate/ mmol dm <sup>-3</sup> s <sup>-1</sup>	0.085	0.024	0.036	0.053	0.060

Explain how do you determine the Michaelis – Menten constant and the maximum velocity.

(15 marks)