Uva Wellassa University of Sri Lanka
Faculty of Science and Technology
Department of Science and Technology
100 level 2nd Semester Examination – Jan./Feb. 2016
SCT 132-1, Chemistry II

Uva Wellassa University

Instructions to candidates
Duration: One (01) hour
Number of questions: Two (02)
Answer all questions
Total mark allocation: 200 marks

1. a. Calculate the lattice energy of NaCl from following data

Atomization energy of Sodium = 107 KJ mol^{-1}

First ionization energy of Sodium = 496 KJ mol^{-1}

Bond dissociations energy of Cl_2 = 242 KJ mol^{-1}

Electron affinity of Chlorine = -364 KJ mol^{-1}

Formation energy of NaCl = -411 KJ mol^{-1}

(40 Marks)

b. Calculate the free energy for the following reaction by using given data

$$CCl_4(l) + H_2O(l) \rightarrow COCl_2(g) + 2HCl(g)$$

Heat of formation of CCl_4 = -135.4 KJ mol^{-1}

Heat of formation of H_2O = -285.8 KJ mol^{-1}

Heat of formation of $COCl_2$ = -218.8 KJ mol^{-1}

Heat of formation of HCl = -92.3 KJ mol^{-1}

(60 Marks)

12

2. In aqueous medium $HgCl_2$ reacts with $K_2C_2O_4$ yielding KCl, CO_2 and Hg_2Cl_2

a. Write the balanced equation for the above reaction.

b. Following data are obtained for three different sets of experiments.

Experiment No	Initial Concentration / mol L^{-1}		Initial Rate of Reaction / mol L^{-1} min^{-1}
	$HgCl_2$	$K_2C_2O_4$	
1	0.105	0.15	1.775×10^{-5}
2	0.105	0.30	7.100×10^{-5}
3	0.052	0.30	3.500×10^{-5}

i. Write the equation for the rate (R) of total reaction using initial concentration of $HgCl_2$ and initial concentration of $K_2C_2O_4$. Define all the constants.

ii. Calculate the order of the reaction with respect to $HgCl_2$.

iii. Calculate the order of the reaction with respect to $K_2C_2O_4$.

iv. Calculate total order of the reaction.

v. Calculate the rate constant of the reaction.

vi. If concentration of $HgCl_2$ is twice that of $K_2C_2O_4$, calculate the time it takes for the concentration of $HgCl_2$ to change from 0.105 mol L^{-1} to 0.075 mol L^{-1}.

(100 Marks)