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**UNIVERSITI TUN HUSSEIN ONN MALAYSIA**

**FINAL EXAMINATION  
SEMESTER I  
SESSION 2019/2020**

COURSE NAME : CHEMISTRY FOR  
BIODIVERSITY AND  
CONSERVATION

COURSE CODE : BWJ 10303

PROGRAMME CODE : BWW

EXAMINATION DATE : DECEMBER 2019 / JANUARY 2020

DURATION : 3 HOURS

INSTRUCTION : ANSWER ALL QUESTIONS

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THIS QUESTION PAPER CONSISTS OF **FIVE (5)** PAGES

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- Q1** (a) (i) Define chemistry. (2 marks)
- (ii) Discuss the importance of chemistry in our daily lives. (8 marks)
- (b) Explain **FIVE (5)** factors affecting the rate of enzymatic reaction in chemical catalysis process. (10 marks)

- Q2** (a) (i) The peroxydisulfate ion  $S_2O_8^{2-}$  is a potent oxidizing agent that reacts rapidly with iodide ion in water:

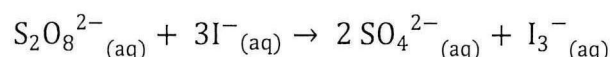
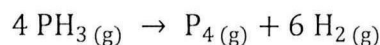


Table **Q2(a)(i)** below lists kinetics data for this reaction at 25 °C. Determine the rate law and the rate constant of this reaction.

**Table Q2(a)(i)**

Experiment	$[S_2O_8^{2-}]$	$[I^-]$	Initial Rate
1	0.27	0.38	2.05
2	0.40	0.38	3.06
3	0.40	0.22	1.76

- (6 marks)
- (ii) The thermal decomposition of phosphine ( $PH_3$ ) into phosphorus and molecular hydrogen is a first-order reaction:



The half-life of the reaction is 35.0s at 680°C. Calculate the 1<sup>st</sup> order rate constant for the reaction.

(2 marks)

- (b) Consider the reaction:



If 3 moles of  $H_2$  reacts with 3 moles of  $Cl_2$  to form  $HCl$  against a pressure of 1 atm at 25°C, what is the  $\Delta E$  for this reaction? Assume the reaction goes to completion. (Given that  $R = 8.314 \text{ J/K}\cdot\text{mol}$ )

(4 marks)

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- (c) The decomposition of a certain insecticide in water follows first-order kinetics with a rate constant of  $1.45 \text{ yr}^{-1}$  at  $12^\circ\text{C}$ . A quantity of this insecticide is washed into a lake on 4th of January, leading to a concentration of  $5.0 \times 10^{-7} \text{ g/cm}^3$ . Assume that the average temperature is  $12^\circ\text{C}$ .
- (i) Calculate the concentration of the insecticide on 4<sup>th</sup> of January of the following year. (4 marks)
- (ii) Estimate how long it will take for the concentration of the insecticide to decrease to  $3.0 \times 10^{-7} \text{ g/cm}^3$ . (4 marks)

**Q3** (a) Draw the structure of each of the following compounds.

- (i) 4-aminobutanoic acid  
(ii) Cyclopenta-1,3-diene  
(iii) Ethene  
(iv) 2-methylbuta-1,3-diene  
(v) 2,5-dimethylhexa-1,5-diene

(10 marks)

(b) 3-bromopentanoic acid reacted with an organic compound A with the aid of an acid catalyst B producing ethyl 3-bromopentanoate and water.

4-

- (i) Identify acid catalyst B. (2 marks)
- (ii) Illustrate the organic reaction occurs and give the systematic nomenclature of A. (8 marks)

**Q4** (a) Describe **FIVE (5)** importance of water to many biological activities.

(10 marks)

- (b) (i)  $\text{SO}_2$  and  $\text{NO}_2$  gases play an important role in the formation of acid precipitation in the environment. Determine if these gases are primary or secondary pollutant and state the chemical reactions of these gases with water. (6 marks)
- (ii) Acid precipitation may cause adverse effect to the environment. Identify the effect of acid precipitation towards the environment. (4 marks)

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- Q5** (a) Photosynthesis is often considered the most important chemical reaction for life on earth.
- (i) Write down the chemical equation for photosynthesis process. (2 marks)
  - (ii) Discuss **FOUR (4)** reasons why photosynthesis is necessary for our survival. (8 marks)
- (b) Explain the cleaning action of soap and detergent towards grease. (10 marks)

**- END OF QUESTIONS -**

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CONSERVATION

List of formula:

$$r = k [A]^x [B]^y$$

$$\ln [A]_t = -kt + \ln [A]_0$$

$$1/[A]_t = 1/[A]_0 + kt$$

$$\text{rate} = k[A]^2$$

$$\text{rate} = k[A]$$

$$t_{1/2} = 0.693/k$$

$$t_{1/2} = 1/k[A]_0$$

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