

**UNIVERSITI KUALA LUMPUR
MALAYSIAN INSTITUTE OF INDUSTRIAL TECHNOLOGY**

**FINAL EXAMINATION
JANUARY 2016 SEMESTER**

COURSE CODE	: JGD 10202
COURSE TITLE	: ESSENTIALS OF INDUSTRIAL CHEMISTRY
PROGRAMME LEVEL	: DIPLOMA
DATE	: 30 MAY 2016
TIME	: 9.00 AM – 12.00 PM
DURATION	: 3 HOURS

INSTRUCTIONS TO CANDIDATES

1. Please read the instructions given in the question paper **CAREFULLY**.
2. This question paper is printed on both sides of the paper.
3. This question paper consists of **TWO (2)** sections.
4. Answer **ALL** questions in Section A. Choose **FOUR (4)** questions in section B.
5. Please write your answers on the answer booklet provided.
6. Please answer all questions in English only.

THERE ARE 6 PAGES OF QUESTIONS EXCLUDING THIS PAGE.

SECTION A (Total: 60 marks)

INSTRUCTION: Answer ALL questions.

Please use the answer booklet provided.

Question 1

(a) The Solvay process is the major industrial process for the production of soda ash. The end products of the process are sodium carbonate and calcium chloride.

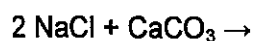
i. Lists **THREE (3)** application of soda ash.

(6 marks)

ii. State **THREE (3)** environmental issues related to Solvay process.

(6 marks)

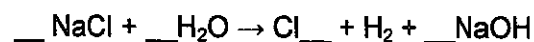
iii. Complete the overall process.



(2 marks)

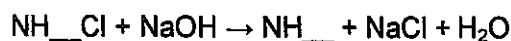
(b) Complete and balance the following equations.

i. Chlorine gas production in an industry



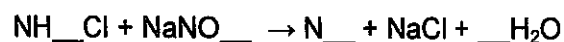
(2 marks)

ii. Ammonia gas preparation in laboratory



(2 marks)

iii. Nitrogen gas preparation in laboratory



(2 marks)

Question 2

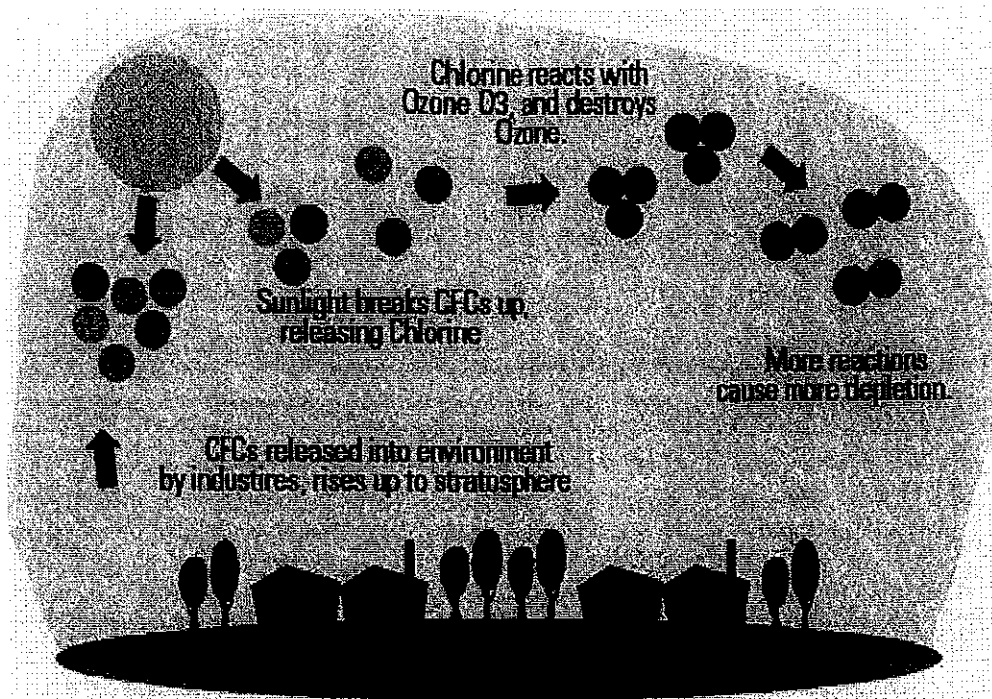


Figure 1: Summary reaction of ozone depletion in stratosphere

- (a) Less ozone in the stratosphere will allow more harmful ultraviolet (UV) radiation to reach the earth's surface.
- i. According to the summary reaction of ozone depletion in Figure 1, analyze **TWO (2)** effects of ozone depletion to wildlife or materials. (2 marks)
 - ii. Use chemical equations, shows how ozone is depleted in the stratosphere. (6 marks)
- (b) State **SIX (6)** prevention or cleanup solutions for slowing the rate of global warming. (12 marks)

Question 3

- (a) Define chromatography by short descriptions. (2 marks)
- (b) Lists FIVE (5) basic components of a Gas Chromatography. (5 marks)
- (c) Analyze and explain FOUR (4) factors that affect the Retention Time of a Gas Chromatography for hydrocarbon analysis. (8 marks)
- (d) You have carry out a Gas Chromatography analysis of an unlabeled bottle. The chromatogram produced is shown in Figure 2. Predict.

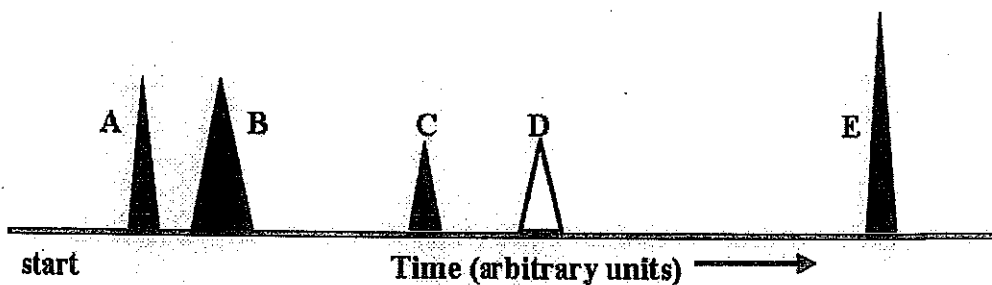


Figure 2: Chromatogram Result

- The peak represents the compound that travels through the Gas Chromatography instrument in the least amount of time.
- Arrange the five peaks with respect to their relative molecular weights, from heaviest to lightest.

_____ > _____ > _____ > _____ > _____

(5 marks)

SECTION B (Total: 40 marks)**INSTRUCTION: Answer FOUR (4) questions ONLY.****Please use the answer booklet provided.****Question 1**

- (a) According to the Bronsted Lowry definition, an acid is a compound that _____ a proton and a base is a compound that _____ a proton. An acid-base reaction involves transfer of a proton from the _____ to the _____.
- (4 marks)
- (b) State **ONE (1)** general property common to both acidic and basic solutions.
- (2 marks)
- (c) State **TWO (2)** tests that could be safely performed to determine whether an unknown solution is acidic or basic. Analyze the results if the solution is acidic.
- (4 marks)

Question 2

- (a) Demonstrate an equation representing the ionization of water at 25°C.
- (4 marks)
- (b) The ionization of water is an endothermic process. Define endothermic process.
- (2 marks)
- (c) Predict whether each of the following solutions is acidic, basic, or neutral at 25°C.
- i. $[\text{H}_3\text{O}^+] > [\text{OH}^-]$
 - ii. $[\text{H}_3\text{O}^+] = 1.0 \times 10^{-7} \text{ M}$
 - iii. $\text{pOH} = 7.0$
 - iv. $\text{pH} = 10.0$
- (4 marks)

Question 3

- (a) An aqueous solution at room temperature is analyzed and the $[\text{H}_3\text{O}^+]$ is found to be 2.0×10^{-3} M. Calculate the pH. (2 marks)
- (b) Calculate the pH of 4.0×10^{-4} M KOH. (2 marks)
- (c) If the pH of a solution is decreased from 9 to 8, determine whether the concentration of $[\text{OH}^-]$ of the solution is increase or decrease. (2 marks)
- (d) State **ONE (1)** indicator that would be used when titrating a weak acid with a strong base. (2 marks)
- (e) Identify the product produces between reactions of a strong acid with a strong base. (2 marks)

Question 4

- (a) Define a saturated and unsaturated compound. (2 marks)
- (b) Predict whether each of the following structure is a saturated or unsaturated compound. (4 marks)
- i. $\text{C} = \text{C} - \text{C} = \text{C}$
 - ii. $\text{C} - \text{C} - \text{C} - \text{C}$
 - iii. $\text{C} - \text{C} = \text{C} - \text{C}$
 - iv. $\text{C} - \text{C} \equiv \text{C} - \text{C}$
- (c) Draw a structure formula and state the condensed formula for propane (4 marks)

Question 5

- (a) State **ONE (1)** type of plastic that is used to form most of soda bottles. (2 marks)
- (b) Analyze **TWO (2)** plastic types and recycle codes which are safe to be reused multiple times. (4 marks)
- (c) Referring to your routine activity, lists **FOUR (4)** difference types of items that you use every day which are synthetic polymers. (4 marks)

END OF EXAMINATION PAPER

