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CINEC CAMPUS (PVT) LTD.
Faculty of Marine Engineering
Department of Marine Engineering
EDUCATION & TRAINING COURSE: Engineering Cadet Training Program – Foundation
COURSE CODE: ED- 0340 – BATCH 026

FINAL EXAMINATION - QUESTION PAPER
INDUSTRIAL CHEMISTRY

- Answer **ANY 5** questions out of 7
- Formulae and all intermediate steps taken in reaching your answer should be clearly shown
- Total Marks : 100

Date: 02/07/2023

Pass mark 50%

Time allocated: 03 Hours

Avogadro Constant (N_A) – $6.022 \times 10^{23} \text{ mol}^{-1}$

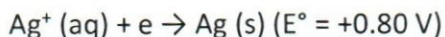
H – 1.0, He – 4.0, Li – 6.9, Be – 9.0, B – 10.8, C – 12.0, N – 14.0, O – 16.0, F – 18.9, Ne – 20.2, Na – 23.0, Mg – 24.3, Al – 27.0, Si – 28.1, P – 31.0, S – 32.1, Cl – 35.5, Ar – 40.0, K – 39.1, Ca – 40.1, Ag – 108.0, Cu – 63.5, Fe – 56.0, Co – 58.9, Zn – 65.4, Ag = 107.9, Sn = 117.8, Ba - 137.3

1)

- a) Calculate the number of moles in 25 grams of magnesium chloride (MgCl_2) (03 marks)
Sucrose ($\text{C}_{12}\text{H}_{22}\text{O}_{11}$) is a common table sugar. How many moles of sucrose are present in a 250 g sample of sucrose? (05 Marks)
- b) A 12.0 g sample of a hydrate ($\text{A} \cdot x\text{H}_2\text{O}$) with an unknown formula was heated to remove all the water, resulting in a final mass of 8.75 g. The molar mass of the anhydrous compound (A) was determined to be 150 g/mol.
Find the chemical formula and the name of the hydrate. (06 marks)
- c) A gaseous compound was found to contain 32% carbon and 68% chlorine by mass. The molar mass of the compound was determined to be approximately 99 g/mol. Determine the empirical formula of the compound (06 marks)

2)

- a) Consider the following galvanic cell involving the half-cell reactions:



Using the given standard reduction potentials, answer the following questions:

- i. Identify the anode and cathode half-reactions. (6 marks)
- ii. Write the balanced overall cell reaction. (4 marks)
- iii. Determine which metal is undergoing oxidation. (1.5 marks)
- iv. Which metal acts as the cathode? (1.5 marks)
- v. Represent the cell using standard notation. (4 marks)
- vi. Calculate the cell potential (E°_{cell}) of the electrochemical cell. (3 marks)

3)

- a) Name and Draw the types of polymers which are categorized according to the structure (04 marks)
- b) Explain the difference between branch and liner polymers based on the properties (04 marks)
- c) PVC is a useful polymer. ($\text{CH}_2=\text{CHCl}$)
 - i. Write its monomer structure
 - ii. Polymer structure
 - iii. Give two Uses and applications (04 marks)
- d) Explain the following.
 - i. Thermoplastic polymers
 - ii. Thermosetting polymers (04 marks)
- e) What is meant by vulcanization of rubber (04 marks)

4)

- a) Write four functions of lubricants.
- b) What are the three types of lubricants?
- c) Write a short note about thin film lubrication.
- d) How does Petroleum form?
- e) What is the composition of crude oil?

(5 x 4= 20 marks)

5)

- a) Express the equations for pH and pOH. (04 marks)
- b) Acetic acid (CH_3COOH) is a weak acid commonly found in vinegar. It gives vinegar its characteristic sour taste and pungent smell. Calculate the pH of a 0.1 M acetic acid solution at 25 °C. The K_a value for acetic acid at 25 °C is 1.8×10^{-5} (04 marks)

c) Calculate the pH of each of these solutions which are at 25 °C:

- (a) 0.5M HNO₃,
- (b) 0.02M NaOH,

(04 marks)

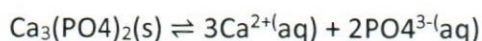
d) Write down the solubility product expression (K_{sp}) of the following

- i) PbCl(s)
- ii) CaF₂ (s)

(04 marks)

e) Determine the solubility of Ca₃(PO₄)₂. Given that the solubility product constant (K_{sp}) for Ca₃(PO₄)₂ is 2.0×10^{-32} .

The balanced equation for the dissolution of Ca₃(PO₄)₂ is:



(04 marks)

6)

- a) What are the ways of extraction of metals (04 marks)
- b) What are the Raw materials of extraction of Iron? (04 marks)
- c) Explain the meaning of corrosion with examples. (04 marks)
- d) Explain why rusting occurs so rapidly in salt water? (04 marks)
- e) Write three corrosion control methods and explain one method. (04 marks)

7)

a) Write down the correct chemical formula

- i) Methane
- ii) Carbon monoxide
- iii) Sodium Chloride
- iv) Ozone

(1×4= 04 marks)

b) Name the three particles of the atom; and their respective charges. (6 marks)

c) Give one example for the following

- i) Compound with a covalent bond
- ii) Compound with an ionic bond
- iii) Homogeneous Mixture
- iv) Heterogeneous mixture
- v) Alloy

(2×5= 10 marks)



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Faculty of Marine Engineering
Department of Marine EngineeringEDUCATION & TRAINING COURSE: ENGINEER OFFICER CADET FOUNDATION TRAINING COURSE
COURSE CODE:FINAL EXAMINATION QUESTION PAPER
Introduction to the Shipping

- This question paper consists of Five questions.
- Answer All Questions

Date: 2022.05.23

Pass mark 50%

Time allocated: 03 Hrs

1. Name following parts of the ship using a suitable diagram. (20 marks)
Accommodation, draft, air draft, length overall, beam, stbd side, port side, anchor, forecastle, astern, navigation light, main mast, keel, double bottom tank, bow thruster, navigation bridge, steering flat, propeller, rudder.
2. (a) List down five types of emergency drills which should be performed while sailing onboard ship. (10 marks)
(b) Briefly explain three of them. (06 marks)
(c) What is the purpose of having muster station on board ship? (04 marks)
3. (a) What is meant by LSA and FFA (04 Marks)
(b) List 3 types of emergency equipment available on board ship to face various types of emergency situation. (06 marks)
(c) Write short notes on the above equipment. (10 marks)
4. (a) Give 10 kinds of safety gears widely used on board. (10marks)
(b) Explain 5 of the above safety gears. (10marks)
5. (a) Make a list of different types of ships widely used in shipping industry. (10 marks)
(b) Briefly describe 5 of them. (10 marks)