

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

B.A./B.Sc. SIXTH SEMESTER EXAMINATION, MAY 2014

THIRD YEAR

INDUSTRIAL CHEMISTRY (Honours)

Date : 05/05/2014

Time : 11 am – 1 pm

Paper : VII

Full Marks : 50

Group – A

[Use a separate Answer book for each Unit]

Unit - I

1. Choose the correct alternative (**any four**) : [4×1]
 - a) Which is the most efficient absorbant for SO_3 out of the following :
i) 20% oleum ii) 65% oleum iii) 78% H_2SO_4 iv) 98.5% H_2SO_4
 - b) Which of the following process is used for the manufacture of sodium carbonate by ammonia soda process?
i) Ostwald's ii) Bosch iii) Haber's iv) Solvay
 - c) Which of the following has sodium bicarbonate as its main constituent?
i) Baking Soda ii) Baking Powder iii) Washing Soda iv) None of these
 - d) $\text{Ca}(\text{OCl})\text{Cl}$ is the chemical formula of—
i) Hypo ii) Bleaching Power iii) Plaster of Paris iv) Aqua Regia v) Blue Vitriol
 - e) Commercial production of Calcium Carbide needs lime stone and any of the following chemicals as raw material—
i) Coke ii) Sand iii) Soda ash iv) Fuel oil
 - f) The temperature of Calcium Carbide furnace is—
i) 200 – 300°C ii) 700 – 850°C iii) 2000 – 2200°C iv) 4000 – 4500°C
 - g) Heating of _____ to 120°C, produces plaster of Paris
i) blue vitriol ii) gypsum iii) Calcium Silicate iv) Calcium Sulphate (anhydrous)
2. Write down the reactions involved in the manufacture of **any three** of the following chemicals. Give one example of their uses for each compound : [3×2]
 - a) Tripple Superphosphate
 - b) Silicon Carbide
 - c) Chloramine T
 - d) Bleaching Powder
 - e) Graphite
 - f) Carbon black
3. Answer **any three** of the following : [3×10]
 - a) In the manufacturing process of Sulphuric Acid by contact process. Answer the following criteria about the process. [5×2]
 - i) What are usual raw materials?
 - ii) What is the ratio of $\text{O}:\text{SO}_2$ used in the reactor any why?
 - iii) Why 98% H_2SO_4 is used for the absorption of SO_3 ? and why water is not used in the absorption of SO_3 ?
 - iv) What catalyst is used in the oxidation of SO_2 to SO_3 . Write a brief note on this catalyst.
 - v) Write briefly about the physico chemical principle of the manufacturing process.
 - b) i) Describe the manufacturing process for the production of Soda Ash by Solvay process and what is the modification done in the modified Solvay process. Give two uses of Soda Ash. [6]

- ii) Write all the chemical reactions involved in the manufacturing process. Give a flowsheet of the process. [4]
- c) i) Describe with neat sketch and chemical reactions involved in the manufacturing process of Caustic Soda and chlorine by membrane cell process. What is advantage over the process. [8]
 ii) Give physico chemical principle of the process. [2]
- d) i) Write down the reactions takes place and the catalysts used in the manufacture of HNO_3 by Ostwald process. [5]
 ii) What is NPK? How combination fertilizers are prepared? [5]
- e) i) Describe in brief the wet-process of manufacturing Phosphoric acid. Write the chemical reactions involved in the process. [6]
 ii) How Uranium is recovered from phosphate rock? [2]
 iii) Give the chemical reactions for the manufacture of Superphosphate. [2]
- f) i) What are the raw materials for the manufacture of urea? [1]
 ii) Write down the main reactions that takes place during manufacture of urea? [4]
 iii) What is the function of prilling tower in manufacture of urea? [2½]
 iv) What are the major uses of Ammonium nitrate? [2½]

Unit - IV

(Answer any two questions)

4. Choose the correct alternative (any five) : [5×1]
- | | | | |
|-------------------------------------|-----------------|-------------------|-------------------|
| a) Cobalt Naphthenate is a | | | |
| i) Type of varnish | ii) Paint drier | iii) drying oil | iv) Lacquer |
| b) Chromium Trioxide is a | | | |
| i) Pigment | ii) Varnish | iii) drying oil | iv) None of these |
| c) Tung (China Wood) oil is | | | |
| i) Non-drying | ii) Drying | iii) Curing Agent | iv) Thinner |
| d) Phenolic Resin is used in making | | | |
| i) Lacquer | ii) Solvent | iii) Pigment | iv) None of these |
| e) Precipitated chalk is | | | |
| i) Pigment | ii) Extender | iii) Filler | iv) None of these |
5. State the method of synthesis and use of (any two) : [2×2½]
 BHC, DDT, Anhydrous ferric chloride
6. a) What is Pigment Volume Concentration (PVC)? Mention its importance in paint formulation. [2]
 b) A Seagreen paint is prepared for Refrigerator Pannel having following composition :
 (in litre)
- | | |
|---|--------|
| Prucian Blue Pigment | 5.00 |
| Tata Yellow Oxide of iron | 3.00 |
| Titanium dioxide (TiO_2) (Rutile) | 5.00 |
| Soap stone Powder | 7.00 |
| Butylated U.F Resin in Xylol (50% solid) | 200.00 |
| Mixture of Petroleum Spirit, Tuluol & Diacetone alcohol | 100.00 |
- Calculate the PVC with your comment on the quality of paint. [3]
7. Write short notes on (any two) : [2×2½]
 Natural Insecticide, White & Black Pigment, Green & Yellow Pigment

