

28-10-2013-DTP-P-7-MU-16

Con. 5769-13.

GX - 10040

(2 Hours)

[Total Marks : 60

- N. B. :**
- (1) Question No. 1 is **compulsory**.
 - (2) Answer any **three** questions from the remaining **five**.
 - (3) **All** questions carry **equal** marks.
 - (4) **Atomic weight** :- Mg = 24, Ca = 40, Si = 28, N = 14, O = 16, C = 12

1. Solve any **five**:-

15

- (a) What happens when temporary hard water is boiled? Give equations to explain.
- (b) Give the preparation and uses of Silica refractory.
- (c) Define Gibbs Phase Rule. State the number of Phases, Components and Degrees of freedom for the following equation-
$$\text{CaCO}_{3(s)} \rightleftharpoons \text{CaO}_{(s)} + \text{CO}_{2(g)}$$
- (d) What is the function of plasticiser in the compounding of plastic? Give two examples.
- (e) Two samples of water A and B were analysed for their salt content:
 - (i) Sample A was found to contain 168 mg MgCO_3 per litre.
 - (ii) Sample B was found to contain 820 mg $\text{Ca}(\text{NO}_3)_2$ per litre and 2 mg SiO_2 per litre. Calculate the total hardness of each sample and state which sample is more hard.
- (f) Discuss the conditions under which semisolid lubricants are used.
- (g) Distinguish between thermoplastic and thermosetting resins.

2. (a) 50 ml of standard hard water containing 1 mg of pure CaCO_3 per ml consumed 20 ml of EDTA. 50 ml of the water sample consumed 30 ml of same EDTA solution using Erichrome Black T indicator. After boiling and filtering, 50 ml of the water sample required 10 ml of the same EDTA for titration. Calculate the total and permanent hardness of water sample. 6
- (b) Draw a neat phase diagram of the one component water system and explain with reference to (i) curves (ii) Triple point. 5
- (c) What are carbon nano tubes? What are their types? Discuss their Electrical and Mechanical properties. 4

3. (a) Discuss the mechanism of thick-film lubrication.

6

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- (b) Define moulding and discuss the Injection moulding method of fabrication of plastic. 5
- (c) Discuss the limitations of phase rule. 4
4. (a) Give the preparation, properties and uses of: (i) PMMA (ii) Buna-S. 6
- (b) Give well balanced equations of the reactions that take place in the Lime soda process. 5
- (c) Find the saponification value of an oil sample weighing 1.5 g, refluxed with 25 ml of 0.5 N KOH, required 15 ml of 0.5 N HCl for the residual titration. The blank titration reading was 25 ml of 0.5 N HCl. 4
5. (a) Discuss the setting and hardening of portland cement as well as the function of gypsum with balanced equations. 6
- (b) What is glass transition temperature? What are the factors that affect it and what is the significance of it. 5
- (c) An exhausted zeolite softener was regenerated by passing 150 litres of NaCl solution having a strength of 150 g/L of NaCl. If the hardness of the water is 600 ppm. Calculate the total volume of water that is softened by the softener. 4
6. (a) Write short notes on any two:- 6
- (i) Reverse osmosis
- (ii) Electrodialysis
- (iii) Ultrafiltration
- (b) Define conducting polymers. Explain Intrinsic and Doped conducting polymer with appropriate examples. 5
- (c) Define and discuss the significance of the following properties of lubricant (any two):- 4
- (i) Acid value of oil
- (ii) Cloud and Pour point
- (i) Flash and Fire point
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(REVISED COURSE)

QP Code : **NP-17714**

(2 Hours)

[Total Marks : 60

- N.B. :
- (1) Question No. 1 is compulsory.
 - (2) Answer any **three** questions from the remaining **five**.
 - (3) All questions carry equal marks.
 - (4) Atomic weights Ca = 40, Mg = 24, Fe = 56, Cl = 35.5, Na = 23, S = 32, H = 1, C = 12, O = 16

1. Solve any **five** :-

15

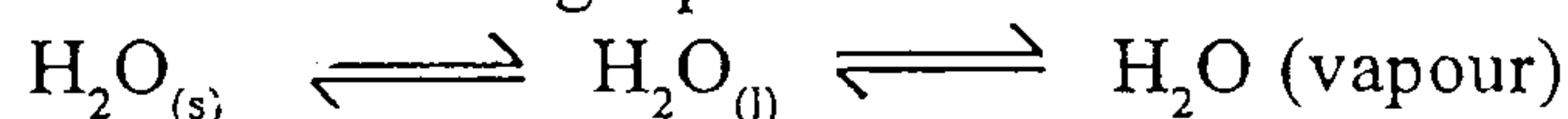
- (a) Give the principle of estimation of hardness of water using EDTA method (only equations).
- (b) Natural rubber needs to be vulcanised. Give reasons for the same.
- (c) What are the functions of a lubricant?
- (d) Give the preparation, properties and uses of dolomite bricks.
- (e) What is a condensed system? State the condensed phase rule equation.
- (f) Classify the following salts into temporary and permanent hardness causing salts and also calculate their calcium carbonate equivalents.
 - (i) $\text{Ca}(\text{HCO}_3)_2$ - 16.2 mg/L
 - (ii) MgSO_4 - 1.2 mg/L
 - (iii) FeCl_2 - 12.7 mg/L
 - (iv) NaCl - 94 mg/L
- (g) Name the various ingredients used in the compounding of plastics and give two examples of each.

2. (a) Calculate the quantity of pure lime and soda required for softening 50,000 litres of water containing the following salts per litre -
- $\text{Ca}(\text{HCO}_3)_2$ - 8.1 mg; $\text{Mg}(\text{HCO}_3)_2$ - 7.3 mg;
 CaSO_4 - 13.6 mg; MgSO_4 - 12.0 mg;
 NaCl - 4.7 mg; MgCl_2 - 23.75 mg.

6

- (b) Define (i) Phase (ii) Component (iii) Degrees of freedom. State the number of phases, components and the number of degrees of freedom for the following equilibrium.

5



- (c) What are carbon nanotubes? Discuss the CVD method of preparation of CNT.

4

3. (a) Discuss the mechanism of boundary film lubrication.

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- (b) What are thermoplastic polymers? Name any two thermoplastic polymer. Give the preparation, properties and uses of any one thermoplastic polymer.

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- (c) Draw the phase diagram of one component water system. Explain triple point. 4
4. (a) Write short notes on any two :- 6
- (i) Glass transition temperature
 - (ii) Conducting polymers.
 - (iii) Polymers used in medicine and surgery.
- (b) With a neat diagram explain the principle of Ion- Exchange method of softening of water and also give the softening and regeneration reactions. 5
- (c) 3g of vegetable oil was mixed with 50ml of 0.5N KOH solution and heated for 1 hour. The mixture required 19ml of 0.5N HCl. The blank titration reading was 49ml. Find the saponification value of the oil sample. 4
5. (a) Name the raw materials necessary for the manufacture of portland cement. Draw a neat labelled diagram of the rotary kiln and write the chemical reactions alongwith the temperature. Also mention the functions of Alumina and gypsum in cement. 6
- (b) What is moulding? Explain with the help of a neat diagram Extrusion moulding of an insulated cable. 5
- (c) The hardness of 50,000 litres of a sample of water was removed by passing it through a zeolite softener. The softener required 200 litres of NaCl solution containing 125g/L of NaCl for regeneration. Calculate the hardness of the sample of water. 4
6. (a) (i) Define and explain the significance of BOD and COD. 6
- (ii) Discuss reverse osmosis.
- (b) Give the preparation and uses of 5
- (i) Kevlar
 - (ii) Polyurethane
- (c) Write note on any two :- 4
- (i) Acid value of oil.
 - (ii) Flash and fire point.
 - (iii) Semi solid lubricant.
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- N.B. (1) Question No. 1 is compulsory.
 (2) Answer any **three** questions from the remaining.
 (3) All questions carry equal marks.

Atomic weight :—

Ca = 40	Mg = 24
H = 1	Cl = 35.5
C = 12	Na = 23
O = 16	

1. Solve any **five** :—

15

- Differentiate between BOD and COD.
- What are natural rubbers ? What are their drawbacks ?
- Define grease. Under which situation it is used as a lubricant.
- Define phase, component and degree of freedom.
- Write composition of portland cement.
- What are plasticizer and give its functions ?
- What is the total hardness of sample of water which has the following impurities in mg/l.

$\text{Ca}(\text{HCO}_3)_2$ = 162	CaCl_2 = 22.2
Mg Cl_2 = 95	NaCl = 20

- 0.5g of CaCO_3 was dissolved in dilute HCl and diluted to 500 ml, 50 ml of this solution required 45 ml of EDTA solution for titration. 50ml of hard water sample required 15 ml of EDTA solution for titration. 50 ml of same water sample on boiling, filtering requires 10 ml of EDTA solution. Calculate the temporary permanent and total hardness in ppm. 6
 - Draw and explain the phase diagram of ice-water-water vapour system. 5
 - Explain CVD method for preparation of carbonnanotubes. 4
- What are solid lubricants explain with two examples. 6
 - Explain fabrication of plastic with example of injection molding. 5
 - Give limitations of phase rule. 4
- Write preparation, properties and uses of following polymers :— 6
 - Buna S
 - Kevlar
 - Explain demineralization of water by ion exchange method. 5
 - 2.5 g of vegetable oil was mixed with 50 ml of KOH solution and heated for 1 hour. The mixture required 26.4 ml of 0.4 N HCl. The blank titration reading was 49.0 ml. Find the saponification value of oil. 4
- Write preparation properties and uses of — 6
 - Dolomite bricks
 - Silicon carbide
 - Explain effect of heat on polymers and factors affecting it. 5
 - A zeolite softener was completely exhausted and was regenerated by passing 150 lit of NaCl solution, containing 50 g/litre of sodium chloride. How many litres of water sample of hardness 450 ppm can be softened by this zeolite container. 4
- With the help of chemical equations explain the principle of lime soda process. 6
 - Write short notes on :— 5
 - Conducting polymers
 - Polymers in medicine and surgery.
 - Explain the following properties and discuss its significance 4

Viscosity and Viscosity index.