FE - SEM-I, (CBSGS)

Dec 2015

Applied Chemistry-I

Q.P. Code : **5023**

(2 Hours) [Total Marks :60

N.B. : (1) Question **No.1** is **compulsory**
(2) Answer any **three** questions from remaining **five** questions.
(3) Figure to the right indicate marks
(4) All questions carry equal marks
(5) Atomic weght: Ca = 40, H=1 C=12, O=16, Mg=24, Na=23, Cl= 35.5, S=32, Al=27.

1. Attempt any five from the following 15
   (a) Why is hot lime-soda process preferred over cold lime-soda method?
   (b) What are the drawbacks of Natural Rubber.
   (c) List the applications of carbon nanotubes.
   (d) Define flash point and fire point. Give its significance.
   (e) What is Triple point? Explain it with reference to one component water system.
   (f) Distinguish between thermoplastic and thermosetting resins.
   (g) A 5ml sample of waste water was refluxed with 30ml of potassium dichromate solution and after refluxing the excess unreacted dichromate required 23ml of 0.1M FAS solution. A blank of distilled water on refluxing with 30ml of dichromate solution required 36ml of 0.1M FAS solution. Calculate the COD value of the waste water.

2. (a) Calculate the quantity of pure lime (70% pure) and soda (85% pure) required for softening of 100,000 Litres of water containing the following impurities in ppm. 6
   $Ca(HCO_3)_2$ = 30.2, $Mg(HCO_3)_2$ =20.8, $CaCl_2$ = 28.1, $MgCl_2$ = 8.78, $CaSO_4$ = 35, $MgSO_4$ = 6.7, NaCl = 17.9.
   (b) What is the phase Rule? Draw a neat labelled diagram for water system. Using phase rule, find the number of degrees of freedom (F) for the following systems; 5
      (i) Ice(s) $\rightleftharpoons$ water (l) $\rightleftharpoons$ water vapour (g)
      (ii) Water $\rightleftharpoons$ water vapour
   (c) Explain the preparation, properties and uses of silica bricks 4

3. (a) Define: Lubricant, Lubrication. Discuss the boundary-film Lubrication mechanism. 6
   (b) What is meant by fabrication of plastic? Explain in details the injection moulding method 5
   (c) Discuss the Limitations of phase rule. 4

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4. (a) Write the preparation, properties and uses of any two of the following : 6
   (i) Kevlar (ii) PMMA (iii) Buna-S
   (b) What is activated sludge? Explain the method with a flow-sheet diagram. 5
   (c) Find the acid-value of a vegetable oil whose 5ml required 2ml of N/100 KOH during titration. (Density of oil = 0.92 g/ml) 4

5. (a) Write notes on (Any two) 6
   (i) Decay of concrete
   (ii) Setting and hardening of cement
   (iii) RCC
   (b) Explain the functions of the following constituents in the compounding of plastics. Give proper examples. (Any two) 5
   (i) Fillers (ii) Plasticizers (iii) Lubricants
   (c) The hardness of 75,000 litres of a water sample was completely removed by a permutit. The exhausted permutit then required 1500L of NaCl containing 117 mg of NaCl per litre for regeneration. Calculate the hardness of water sample. 4

6. (a) Explain with a neat diagram, the zeolite process of water softening including the following points. 6
   (i) Principle
   (ii) Softening and regeneration reactions
   (iii) Process
   (iv) advantages
   (b) What is vulcanization? Explain giving proper reaction. Discuss the improvement in the drawbacks of natural rubber after vulcanization 5
   (c) Under what conditions are solid lubricants used? Explain Graphite as a solid lubricant. 4