Sacs. 1103   Engineering Chemistry (2+1)

Marks:50
Time: 2 hours

I   **Answer the following.**   (10x1=10)
1   The chemical formula of bleaching powder is _____
2   Gobar gas mainly consists of _____
3   Give example each for cation exchange and anion exchange resins
4   How can you remove dissolved oxygen?
5   Why small amount of ethylene dibromide or ethyl bromide along with tetraethyl lead is used in internal combustion engines?
6   Why Mg rod is used in underground iron pipelines?
7   Iron gets rapidly corroded by dil. HNO_3 but aluminium is not attacked even by conc.HNO_3 why?
8   How viscosity index of oil is related to its temperature?
9   Give an example of a solid lubricant?
10 Give the general chemical structure of fatty acids? Differentiate between saturated and unsaturated fatty acids.

II   **Write Short notes on ANY FIVE of the following**   (5x2=10)
1   Match the following

i	Permanent hardness of water	a	Hydrated sodium aluminosilicate
ii	Temporary hardness of water	b	Semi permeable membrane
iii	Softening of water	c	Nitrates of Ca and Mg
iv	Reverse osmosis	d	Bicarbonates of Ca and Mg

2   How the absorbance of a solution is related to its concentration? What is the significance of molar absorption coefficient?
3   Give a schematic representation of Fischer Tropsch process
4   Calculate the weight and volume of air required for the combustion of 1 kg of carbon. Air contains 23% of oxygen by mass and 21% of oxygen by volume.
5   Explain the initiation reaction in free radical polymerization by taking an example.
6   Explain the fermentation method for the production of alcohols.
7   Give two examples each for
a   natural
b   artificial food colourants

III   **Answer ANY FIVE of the following**   (5x4=20)
1   A polymer resin contains certain amount of $CaCO_3$ as filler. The TGA data for 0.75 g of the sample shows that, 15% by weight loss was observed below 300 °C due to the loss of volatiles and decomposition of polymer. The final weight of the sample as residue after 650 °C analysis was 65% due to liberation of CO_2. Calculate the amount of $CaCO_3$ present in the polymer sample in grams. [At.wt. of calcium = 40 gmol^{-1}].
2   Explain reverse osmosis process with a diagram.
3   Differentiate between chemical oxygen demand and biological oxygen demand

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4 Explain flue gas analysis by Orsat apparatus

5 a Differentiate between crystalline and amorphous polymers by a schematic representation of the behaviour of polymer chains.
   b How can you determine the crystallinity?

6 a An oil sample under test has a Saybolt Universal Viscosity same as that of standard Gulf oil (low viscosity standard) and Pennsylvanian oil (high viscosity index standard) at 210°F. Their Saybolt Universal viscosities at 100°F are 61, 758 and 420 s respectively. Calculate the viscosity index of the sample oil.
   b What is cloud and pour points of lubricating oil?

7 Describe with suitable examples the advantages of enzyme catalysts over the conventional ones.

IV   **Answer ANY ONE of the following**   **(1x10=10)**

1 a What are complexometric titrations?
   b Give the principle of EDTA titrations for the determination of Ca and Mg in water
   c Is it necessary to maintain the pH of the solution nearly constant by adding a suitable buffer during EDTA titrations? If yes Why?

2 a Explain any method for the processing of
      i Plastic   ii Rubber
   b Explain the chemical reaction for the synthesis of Nylon6.6
   c Differentiate between short fibre and long fibre? Name the fibre using for making bullet proofs

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