

M.Sc. 2nd Semester Examination 2014

CHEMISTRY

PAPER –CEM-204

Full Marks : 40

Time : 2 hours

Answer any four questions

The figures in the right hand margin indicate marks

All symbols are of usual significant

1. (a) Differentiate between renewable and non-renewable fuels with examples.
- (b) Discuss the origin of coal.
- (c) Write the significance of various parameters in the proximate analysis. 2 + 4 + 4
2. (a) Why net calorific value is less than gross calorific value ?

(Turn Over)

(2)

(b) What is the significance of octane number ?

(c) Write the products and its temperature range obtained from atmospheric distillation of crude oil.

(d) What is the difference between domestic LPG and auto LPG ? 2 + 2 + 4 + 2

3. (a) State and explain Fick's law of diffusion.

(b) Show that $D_{AB} = D_{BA}$.

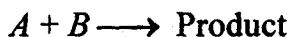
(c) In an oxygen-nitrogen gas mixture at 1 atm. 25°C, the concentration of O₂ at two planes 0.2 cm apart are 10 % and 20 % (by vol) respectively. Calculate the flux of O₂ when (i) N₂ is non-diffusing and (ii) there is equimolar counter diffusion. Diffusivity of O₂ in N₂ is 0.215 cm²/s. 2 + 2 + 6

4. (a) With proper definition of the term ORE explain the statement "sometimes ORE is MINERAL and MINERAL is ORE".

(b) Discuss the principle of Froth Flotation process used in mineral processing. 5 + 5

5. (a) Explain how differential analysis of kinetic data set is carried out.

(b) For an elementary reaction



The reaction rate at 500 K is 10 times that at 400 K. Calculate the activation energy for this reaction.

(c) For the liquid phase zero-order reaction $A \rightarrow B$, the conversion of A in a CSTR is found to be 0.3 at a space velocity of 0.1 min^{-1} . What will be the conversion for a PFR with a space velocity of 0.2 min^{-1} . Assume that all the other operating conditions are the same for CSTR and PFR. 2 + 4 + 4

6. (a) Define refractory material.

(b) Write the classification of refractory material:

(4)

(c) Define crystalline and non-crystalline ceramics.

(d) Write the useful properties of ceramics.

(e) Write the raw materials used for the manufacture of acidic and neutral refractory.

2 + 2 + 2 + 2 + 2
