MAR IVANIOS COLLEGE (AUTONOMOUS)
THIRUVANANTHAPURAM

Reg. No. :…… **Name :……**

Fourth Semester B.Sc. Degree Examination, June 2016
First Degree Programme under CBCSS
Complementary Course: Chemistry – IV (for Physics)
AUCH431.2d: Physical and Inorganic Chemistry II

Time: **3** Hours Max. Marks: **80**

SECTION – A

*Answer **ALL** questions in a word or one or two sentences.*

1. A single step reaction involves the simultaneous collision of three reacting species. What is its molecularity ?
2. Tetraethyl lead is used for the knocking of petrol. Is it a catalyst ? If the answer is yes, state whether this is a positive or negative catalyst.
3. How is absorbance related to transmittance ?
4. What is congruent melting point ?
5. Calculate the number of degrees of freedom in an aqueous solution of glucose.
6. When 0.83 g of succinic acid was shaken with 100 ml each of water and ether the water layer was found to contain 0.70 g of the acid. Find the partition coefficient.
7. State the mathematical form of Beer – Lambert law.
8. Give one example for a bidentate ligand.
9. Name any one coordination compound that you encounter in biological systems.
10. What is flocculation value of an electrolyte ?

(10 × 1 = 10 Marks)

SECTION – B

*Answer any **EIGHT** questions, not exceeding a paragraph.*

11. Find out the order of the following reaction.
    $2NO + O_2 \rightarrow 2NO_2$; rate = k $[NO]_2[O_2]$

12. The life time of two reactions are 5.6×10^{-1} s and 3.4×10^{-2} s respectively. Which reaction is faster ?
13. Assume that a monochromatic radiation incidents on a solution of 0.05 M of an absorbing substance. The intensity of the radiation is reduced to one – fourth of the initial value after passing through 10 cm length of the solution. Find the molar extinction coefficient of the substance.
14. What is the significance of Grotthus – Draper law in the evolution of photochemistry ?
15. The supercooled water freezes spontaneously and its temperature rises to 0 degree C. What is the source of heat for this process of phase transition ?
16. What is Pattinson's process ?
17. What is an azeotropic mixture ? Give an example.
18. State Nernst Distribution law.
19. Draw the structure of Nickel carbonyl. Is it paramagnetic ?
20. Explain the purple color of $[Ti(H_2O)_6]^{3+}$ using crystal field theory.
21. Explain the chemistry behind the formation of deltas near estuaries.
22. What are protective colloids ? Give an example.

(8 × 2 = 16 Marks)

SECTION – C

*Short essay type : Answer any **SIX** questions.*

23. During the experimental studies of the following reaction it was found that the instantaneous rate increases four times when the concentration of the NO_2 is doubled but remains unaffected when the concentration of CO is doubled. Write the rate law and find the order of the reaction.

$$NO_2 + CO \rightarrow NO + CO_2$$

24. Write the essence of adsorption theory for catalysis.
25. Draw the phase diagram for the sulphur system.
26. Explain the difference between miscibility temperature and critical solution temperature using phenol – water system as an example.
27. Explain the basic principle of solvent extraction.
28. Draw schematically the splitting of d orbitals in an octahedral crystal field.
29. Explain the formation, structure and shape of Hexaamminecobalt (III) ion on the basis of valence bond theory.

30. Explain electrodialysis with a diagram.
31. What is an ultramicroscope ? What is its application ?

(6 × 4 = 24 Marks)

SECTION – D

*Long essay type : Answer any **TWO** questions.*

32. i). If the rate constant for a reaction is 1.6 x 10-5 and 6.36 x 10-3 s-1 at 600 K and 700 K respectively, calculate the energy of activation for the reaction.
    ii). The slope of the line in the graph of log10k versus 1/T for another reaction is -5841 K. Calculate the energy of activation for this reaction. (R = 8.314 JK-1mol-1)
33. Discuss the kinetics of the photochemical combination of Hydrogen and Bromine.
34. Draw and explain the phase diagram for ferric chloride – water system.
35. Discuss the kinetic, electrical and optical properties of colloids.

(2 × 15 = 30 Marks)

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