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Number

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Part III — CHEMISTRY

(English Version)

Time Allowed : 3 Hours]

[Maximum Marks : 150

Note : Draw diagrams and write equations wherever necessary.

PART - I

Note : i) Answer all the questions.

ii) Choose and write the correct answer. $30 \times 1 = 30$

- Which compound is formed when excess of KCN is added to an aqueous solution of copper sulphate ?
 - $\text{Cu}(\text{CN})_2$
 - $\text{K}_2[\text{Cu}(\text{CN})_6]$
 - $\text{K}[\text{Cu}(\text{CN})_2]$
 - $\text{Cu}_2(\text{CN})_2 + (\text{CN})_2$
- Alloys of Lanthanides are called as
 - Mish metals
 - Metalloids
 - Plate metal
 - actinides.
- Lanthanide contraction is due to
 - perfect shielding of 4f electrons
 - imperfect shielding of 4f electrons
 - perfect shielding of 3d electrons
 - imperfect shielding of 3d electrons.
- An example of a chelating ligand is
 - nitro
 - chloro
 - bromo
 - en.

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37. Write the uses of Radio carbon dating.
38. What is molecular crystal ? Give an example.
39. Calculate the maximum % efficiency possible from a thermal engine operating between 110°C and 25°C .
40. Define reaction quotient.
41. What is pseudo first order reaction ? Give example.
42. Write the Arrhenius equation and explain the terms.
43. Write any three general characteristics of catalytic reaction.
44. What is common ion effect ? Give example.
45. Distinguish racemic mixture from mesoform.
46. How can Terylene be prepared ?
47. How is tertiary butyl alcohol converted to isobutylene ?
48. How can acetophenone be prepared by Friedel-Crafts reaction ?
49. What is aspirin ? How is it prepared ?
50. An organic compound A of molecular formula $\text{C}_2\text{H}_5\text{ON}$ treated with bromine and KOH gives B of molecular formula CH_5N . Identify A and B. Write the equation involved.
51. Write any three characteristics of dyes.

PART - III

Note : Answer any seven questions choosing at least two questions from each Section. $7 \times 5 = 35$

SECTION - A

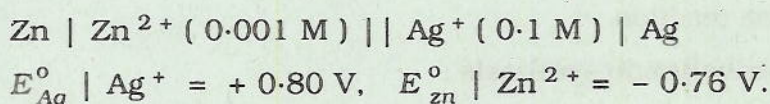
52. Derive de-Broglie's equation.
53. Explain the extraction of zinc from its ore.
54. Write any five differences between lanthanides and actinides.

55. For the complex $K_4 [Fe (CN)_6]$ mention the following :

- IUPAC name
- Central metal ion
- Ligand
- Co-ordination number
- Charge on the complex ion.

SECTION - B

- Write the characteristics of free energy G .
- Derive the expressions for K_c and K_p for decomposition of PCl_5 .
- Write the characteristics of order of reaction.
- Calculate the e.m.f. of the cell :



SECTION - C

- Distinguish aliphatic and aromatic ethers.
- How is acetone converted to —
 - mesityl oxide
 - mesitylene ?
- Write the mechanism of esterification reaction.
- Explain briefly on characteristics of rocket propellants.

PART - IV

Note : i) Question No. 70 is compulsory and answer any *three* from the remaining questions.

ii) Answer *four* questions in all. 4 × 10 = 40

- How do electronegativity values help to find out the nature of bonding between atoms ?
 - How are noble gases separated by Dewar's method ?

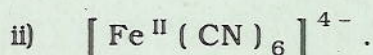
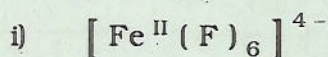
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65. a) Write the application of VB theory on the following complexes :



b) Differentiate between chemical reaction and nuclear reaction.

66. a) Write the properties of ionic crystals.

b) How can colloidal solutions be purified by dialysis ?

67. a) Derive Henderson equation.

b) Write IUPAC representation of a cell.

68. a) Explain geometrical isomerism with example.

b) How to do the following conversions ?

i) Lactic acid to lactide

ii) Salicylic acid to methyl salicylate.

69. a) Write the following reactions :

i) Carbylamine reaction

ii) Gabriel's phthalimide synthesis .

b) How are carbohydrates classified ? Give example for each.

70. a) An organic compound A ($\text{C}_2\text{H}_6\text{O}$) liberates hydrogen with sodium metal.

A when heated with alumina at 620 K gives an alkene B which when passed through Bayer's reagent gives C ($\text{C}_2\text{H}_6\text{O}_2$). C reacts with PI_3 and gives back B. Identify A, B and C. Write the reactions.

b) The chief ore of chromium A on roasting with molten sodium carbonate gives compound B. Compound B on acidification with conc. H_2SO_4 gives compound C. Compound C on treatment with KCl gives compound D. Identify A, B, C and D. Explain the reactions.

OR

c) An organic compound A (C_7H_8) on oxidation by air in the presence of V_2O_5 at 773 K gives B ($\text{C}_7\text{H}_6\text{O}$), which reduces Tollen's reagent. B when heated with acetic anhydride and sodium acetate gives C ($\text{C}_9\text{H}_8\text{O}_2$). Identify A, B and C. Write the reactions.

d) Calculate the pH of 0.1 M acetic acid solution. Dissociation constant of acetic acid is 1.8×10^{-5} M.