1st Sessional Exam, 6th Sem (M), C-601 20th June, 2022 Marks: 40, Time: 90 min (12:20 – 1:50 pm)

- 1. Answer the following:
 - a. What is the difference between a qualitative and a quantitative analysis?
 - b. Name the anions detected with the help of dilute & concentrated H_2SO_4 ?
 - c. What is the composition of dark brown ring which is formed at the junction of two layers in the ring test for nitrates? Why is it essential to boil off H_2S gas before precipitation of radicals of group–III?

2. Answer the following:

[2x3=6]

[3x2=6]

- a. Explain the following
 - i. Common ion effect
 - ii. Solubility product
- b. What are-interfering anions? Discuss, with chemical equations, the removal of any one interfering anion from the mixture.
- 3. Attempt any five of the following: [5x4=20]
 - a. What are the special features in the bonding of carbonyl ligand to transition metals?
 - b. Explain the role of cobalt carbonyl compounds in the hydroformylation reactions.
 - c. Explain the role of Wilkinson catalyst and the catalytic cycle involved.
 - d. Explain the bonding in metal-alkene complexes.
 - e. Explain the bonding in ferrocene.

- f. Give the structure, preparation and bonding in zeise's salt.
- g. Why is Ni(CO)₄ a monomer, but its analogous cobalt compound a dimer?
- 4. Draw the structure of any two [2]
 - a. $[W(\eta^6 C_6 H_6)(CO)_2]_2$
 - b. [Fe(CO)₅]
 - c. Mo(CO)₃(η^6 -C₇H₈)
- 5. State EAN rule and give the 18 electrons count for and M-M bonds wherever applicable . [4]
 - a. $[PtCl_3(C_2H_4)]^{-1}$



- c. $Fe_2(CO)_9$
- 6. Select and explain the correct order regarding v_{CO} value of carbonyl complexes [2]

(a)
$$\operatorname{Ni}(\operatorname{CO})_{4} < [\operatorname{Fe}(\operatorname{CO})_{4}]^{2^{-}} > [\operatorname{Co}(\operatorname{CO})_{4}]^{-}$$

(b) $[\operatorname{Cr}(\operatorname{CO})_{6}] > \operatorname{CO} > [\operatorname{V}(\operatorname{CO})_{6}]^{-} > [\operatorname{Ti}(\operatorname{CO})_{6}]^{2^{-}}$
(c) $\operatorname{CO} > [\operatorname{Cr}(\operatorname{CO})_{6}] > [\operatorname{V}(\operatorname{CO})_{6}]^{-} > [\operatorname{Ti}(\operatorname{CO})_{6}]^{2^{-}}$
(d) $\operatorname{Ni}(\operatorname{CO})_{4} > \operatorname{Ni}(\operatorname{CO})_{3}[\operatorname{P}(\operatorname{OMe})_{3}] > \operatorname{Ni}(\operatorname{CO})_{2}[\operatorname{P}(\operatorname{OMe})_{3}]_{2}$

1st Sessional Exam, 4th Sem (M), C-401 20th June, 2022 Marks: 40, Time: 90 min (10:40 am – 12:10 pm)

[2x5=10]

- 1. Answer the following (any four):
 - a. Zn, Cd and Hg are considered as transition elements. Comment.
 - b. Why d-block elements are called transition elements?
 - c. What effects in the body are caused by iron deficiency?
 - d. Why does Eu exhibit +2 oxidation state instead of +3?
 - e. Describe preparation, structure and use of V₂O₅.
 - f. Write about carboxypeptidase.
 - g. Whether the following reaction is explosive or not $2MnO_4^{2-} + 4 Br + 8H + \rightarrow 3Br_2 + 4H_2O + 2MnO_2$ $E_{MnO_4^{2-}/MnO_2}^0 = + 2.72 \text{ V and } E_{Br_2/Br^-}^0 = + 1.07 \text{ V}$
- 2. Explain the following with suitable example (any ten): [3x10=30]
 - a. Colour and catalytic properties of transition elements
 - b. Why La^{3+} , Lu^{3+} , Ce^{4+} and Yb^{2+} are diamagnetic in nature
 - c. Oxidation state of transition elements
 - d. What is lanthanide contraction
 - e. In transition series, starting from La (Z=57), the next element is Hf (Z=72).
 - f. What are lanthanides? Why are they called so?
 - g. Discuss the variation oxidation states of lanthanides.
 - h. What are actinides? Write the electronic configuration of elements with atomic number 94, 99 and 103.
 - i. What is Latimer or Ebsworth diagrams? Give the application of Latimer Diagram.
 - j. What are essential, non-essential and trace elements with example.
 - k. Write short note on Na^+/K^+ pump.
 - 1. Describe the separation of lanthanides by ion exchange method.
 - m. Lanthanoids have poor tendency to form complexes.

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[2x5=10]

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1st Sessional Exam, 4th Sem (GE), GE-401 Marks: 40, Time: 90 min, Date: 22.06.22

[2x3=6]

[3]

- 1. Answer the following (any three):
 - a. Zn, Cd and Hg are considered as transition elements. Comment.
 - b. Why d-block elements are called transition elements?
 - c. What are the drawbacks of VBT?
 - d. Define Lanthanoids and actinoids.
 - e. What isomerism shown by $[(\rm NH_3)_5\rm Co-S\rm CN]^{2+}$ and $[(\rm NH_3)_5\rm Co-\rm N\rm CS]^{2+}$
- 2. Explain the following with suitable example (any three): [3x3=9]
 - a. What is lanthanide contraction
 - b. Discuss the variation oxidation states of lanthanides.
 - c. What is Latimer or Ebsworth diagrams? Give application of anyone.
 - d. Describe the separation of lanthanides by ion exchange method.
 - e. Give the postulates of VBT.
 - f. Give the structure of $Co(CN)_6$]³⁻ ion and mention whether it is inner or outer orbital complex.
- 3. What is meant by co-efficient of viscosity of a liquid? Describe one method of determination of viscosity of a liquid. [3]
- 4. Define surface tension of liquid. What is the formula to determine surface tension by drop number method? [1+1=2]
- 5. Define the order and molecularity of a chemical reaction. Give example. [3]
- 6. Find out the expression of rate constant of a first order reaction. [3]
- 7. Describe one method of determination of order of a reaction. [2]
- 8. What are the postulates of Kinetic theory of gases?
- 9. Define and give the mathematical formula of
 - a) compressibility factor b) Boyle Temperature c) Mean free path in a collision [3]
- 10. What is the difference between ideal gas and real gas? State the ideal gas equation and van der Walls equation for real gases. [2+2=4]

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