

Haldia Government College
 PG Semester 2 Examination 2020
 Semester: **2** Stream: **M.Sc.**
 Subject: **Inorganic Chemistry**
 Paper: **CEM -203**
 Full Marks: **20**
 Time: **1 hr.**

E-mail id for answer script submission: **hgchemistry2020@gmail.com**

Answer any one question

1. (a) What is 'Ruthenium Red'? 2
 (b) Discuss about 'Magnus green salt'. 2
 (c) The aqua Ni(II) ion is paramagnetic but aqua Pd(II) is diamagnetic-give reason. 2
 (d) What is tungsten bronze? 2
 (e) Why does the stretching frequency of CO in Au(CO)Cl is higher than free CO? 2
 (f) Arrange the followings w.r.t increasing IR frequency-CO, [Mo(CO)₆], [Mo(CO)₃(PPh₃)₃], [Mo(CO)₃(NH₃)₃]. 2
 (g) Identify the bridging modes of NO in these two complexes. [Co(diars)₂(NCS)(NO)]⁺, [Cr(CN)₅(NO)]³⁻. 2
 (h) What do you mean by agostic interaction? Give example. 2
 (i) What is hot carbene ligand? Discuss it with example. 2
 (j) Validate the 18 electron's rule of these compounds. 2
 (i) [(C_p)₂Ta=CH₂(CH₃)]
 (ii) [Os(η⁶-C₆H₆)(C₆H₅)₂PMe₃]

2. (a) What is 'Wolffarm's red salt'? 2
 (b) How Wilkinson's catalyst has been prepared? Give application of it. 2+1
 (c) Discuss about creutz taube complex. 2
 (d) What is 'purple of cassius'? What is its use? 2+1
 (e) Discuss about different bridging modes of carbonyl and their donor and IR behaviour. 4
 (f) Why does [Fe₂(CO)₄(η⁵-C₅H₅)₂] has one type of IR band. 2
 (g) Why σ-bonded transition metal complexes are unstable? Discuss it with example. 4

3. State the spectral transition selection rules. Prove that the representation of a direct product, Γ_{AB} will contain the totally symmetric representation on if irreducible Γ_A = the irreducible Γ_B. What is projection operator and draw the M.O. picture of H₂O molecule using projection operator technique. 4+8+8

4. The ground state of NO₂ is A₁. At which excited states may it be excited by electric dipole transitions and what polarization light is it necessary to use? Determine the symmetry and normal modes and their IR and Raman activity of PCl₅. Define projection operator. 8+8+4

5. State the selection rules for a molecule to be IR and Raman active. Which of the fundamental modes will be IR as well as Raman active for H₂O molecule? Find out the normal modes of vibration for ClF₃ molecule and also predict the mode to be IR and Raman active. 4+6+10

6. Write short note (150 words) on (i) metallocarborane (ii) BNCT 10+10