

Government General Degree College, Dantan-II

5th Semester B. Sc (H) Internal Examination-2021

Subject: Chemistry

Paper: CC-11T

F.M: 20

Time: 1h

Answer the following questions (*any ten*)

10×2

1. What is Jahn- Teller distortion?
2. Draw Orgel diagram for d^8 system?
3. Explain the origin of colour of potassium permanganate solution.
4. Why carbon monoxide is the strongest ligand?
5. $[NiCl_4]^{2-}$ is paramagnetic but $[Ni(CN)_4]^{2-}$ is diamagnetic. – Explain.
6. Cu^+ ion is unstable in aqueous medium. – Explain.
7. What is lanthanide contraction?
8. NO^+ is a bad donor but good acceptor while CN^- is a good donor but bad acceptor ligand. – Explain.
9. Compare the common oxidation states of Ni, Pd and Pt metals.
10. Eu^{2+} and Tb^{4+} are stable in addition to their common oxidation states. - Explain.
11. $[FeF_6]^{3-}$ is colourless but $[Fe(SCN)_6]^{3-}$ is blood red though both are d^5 complexes. – Explain.
12. The electronic spectra of $[Ti(H_2O)_6]^{3+}$ shows a broad band having peak at 20100 cm^{-1} and a shoulder at 17400 cm^{-1} . Assign the ligand field transition for both the peak.
13. For the complex $[Mn(H_2O)_6]^{3+}$ the mean pairing energy P is found to be 28800 cm^{-1} . The magnitude of $10 Dq$ or Δ is 21000 cm^{-1} . Calculate the crystal field stabilization energy for the complex corresponding to high spin and low spin state.
14. Predict the geometry of the following compounds on the basis of their spin only magnetic moment values:
 $[Mn(CN)_6]^{3-} : 2.828\text{ BM}$ and $[MnBr_4]^{2-} : 5.916\text{ BM}$
15. $HgCl_2$ is colourless but HgI_2 is intensely coloured. – Explain.
16. Calculate the difference in CFSE (in units of Δ_o) between octahedral and tetrahedral coordination for high spin configurations of d^7 system.
17. Explain the carbonyl stretching frequency $[\bar{\nu}_{CO},\text{ cm}^{-1}]$ in the following compounds:
 $[Cr(CO)_6]: 2000$; $[Mo(CO)_6]: 1984$; $[W(CO)_6]: 1960$
18. Explain briefly the principle of separation of lanthanides by ion exchange method.
19. Atomic radii of Nb and Ta are almost identical. – Explain.
20. Lanthanide exhibit +3 oxidation state in general while actinides can show variable oxidation state. – Explain.