The enolic form of acetone contains?

Transition elements and Co-ordination chemistry

1. $[Ni(CN)_4]^{2\ominus}$ and $[NiCl_4]^{2\ominus}$ complex ions are
1) both diamagnetic
2) both paramagnetic
3) diamagnetic and paramagnetic respectively
4) antiferromagnetic and paramagnetic respectively

2. For magnesium complex of $EDTA^{2\ominus}$ the number of N – donor and O – donor centres are respectively
1) two and four 2) two and two
3) two and six 4) two and eight

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3. Two complexes $[Cr(H_2O)_6]Cl_3$ (A) and $[Cr(NH_3)_6]Cl_3$ (B) are violet and yellow coloured respectively. The incorrect statement regarding them is
1) Δ_0 value of (A) is less than that of (B)
2) Δ_0 value of (A) and (B) are calculated from the energies of violet and yellow light respectively
3) Both absorb energies corresponding to their complementary colours
4) Both are paramagnetic with three unpaired electrons

4. The complex that has highest crystal field splitting energy (Δ) is
1) $K_3[Co(CN)_6]$
2) $[Co(NH_3)_5(H_2O)]Cl_3$
3) $K_2[CoCl_4]$
4) $[Co(NH_3)_5Cl]Cl_2$

5. Hybridisation of Co in $[Co(NH_3)_6]^{3+}$ and Ni in $[Ni(NH_3)_6]^{2+}$ respectively
1) d^2sp^3, sp^3d^2 2) sp^3d^2, d^2sp^3
3) d^2sp^3, d^2sp^3 4) sp^3d^2, sp^3d^2

6. In the complex ion $[Fe(H_2O)_5NO]^{2+}$
1) Fe is in the +1 O.S and NO coordinates as NO^+ (Nitrosonium ion)
2) Fe is in the +1 O.S and NO coordinates as neutral NO (Nitrosyl radical)
3) Fe is in the +3 O.S and NO coordinates as NO^-
4) Fe is in the +2 O.S and NO coordinates as NO^+

7. Cinnabar is the ore of
1) Zn 2) Cd 3) Hg 4) Ag

8. The transition element that has lowest enthalpy of atomization is
1) Zn 2) Cu 3) V 4) Fe

9. One mole of the complex compound $CoCl_3.5\ NH_3$ gives 3 moles of ions on dissolution in water. One mole of the same complex reacts with two moles of $AgNO_3$ solution to yield two moles of AgCl. The structure of the complex is
1) $[Co(NH_3)_4Cl]Cl_2.\ NH_3$
2) $[Co(NH_3)_4Cl_2]Cl.NH_3$
3) $[Co(NH_3)_5Cl]Cl_2$
4) $[Co(NH_3)_3Cl_3].2NH_3$

10. Of the following outer electronic configuration of atoms, the highest oxidation state is achieved by which one of them?
1) $(n-1)d^8ns^2$ 2) $(n-1)d^5ns^1$
3) $(n-1)d^3ns^2$ 4) $(n-1)d^5ns^2$

11. The ligand system present in vitamin B_{12} is
1) porphyrin 2) corrin
3) phthalocyanine 4) crown ether

12. Na_2S give purple colour with sodium nitroprusside, purple colour has formulae
1) $Na_2[Fe(CN)_6S]$
2) $Na_2[Fe(CN)_5NOS]$
3) $Na_4[Fe(CN)_5NOS]$
4) $KFe[Fe(CN)_5COS]$

JEE MAIN
Chemistry

13. The oxidation number of the central metal ion in Wilkinson's catalyst is
1) +1 2) +4 3) +2 4) +6

14. If the transition elements exist in more than one oxidation states, their relative stabilities can be known from
1) Elecronegativity values
2) Standard electrode potential
3) Heat of formation
4) Ionic radii

15. The correct order of d–orbital splitting in a square planar geometry is
1) $d_{xz} \sim d_{yz} < d_{z^2} < d_{xy} < d_{x^2-y^2}$
2) $d_{xz} \sim d_{yz} < d_{xy} < d_{z^2} < d_{x^2-y^2}$
3) $d_{xz} \sim d_{yz} < d_{z^2} < d_{xy} < d_{x^2-y^2}$
4) $d_{z^2} < d_{xy} < d_{xz} \sim d_{yz} < d_{x^2-y^2}$

16. For which pair of complexes, the order of values of Δ_0 is correct?
1) $[Rh(NH_3)_6]^{3+} > [Co(NH_3)_6]^{3+}$
2) $[Fe(CN)_6]^{4-} > [Fe(CN)_6]^{3-}$
3) $[Cr(CH_2)_6]^{2+} > [Cr(OH)_2]^{3+}$
4) $[CrF_6]^{3-} > [Cr(CN)_6]^{3-}$

17. The highest value of the calculated spin only magnetic moment (in BM) among all the transition metal complex is
1) 5.92 2) 3.87 3) 6.93 4) 4.90

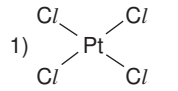
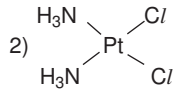
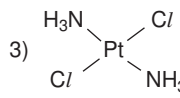
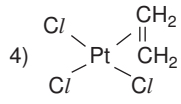
18. Match the catalysts (Column I) with product (Column II).

Column I Catalysts	Column II Product
A) V_2O_5	i) Polyethylene
B) $TiCl_3/Al(Me)_3$	ii) Ethanol
C) $PdCl_2$	iii) H_2SO_4
D) Iron oxide	iv) NH_3

1) A–ii, B–iii, C–i, D–iv
2) A–iii, B–iv, C–i, D–ii
3) A–iv, B–iii, C–ii, D–i
4) A–iii, B–i, C–ii, D–iv

19. The number of water molecule(s) not coordinated to copper ion directly in $CuSO_4.5H_2O$ is
1) 3 2) 4 3) 5 4) 1

20. Which of the following is considered to be anti cancer species?

1) 
2) 
3) 
4) 

ANSWERS
1-3; 2-1; 3-2; 4-1; 5-1; 6-1; 7-3; 8-2; 9-3; 10-4; 11-2; 12-3; 13-1; 14-2; 15-3; 16-1; 17-1; 18-4; 19-4; 20-2.

Chemical Bonding

1. Which pair is not correctly matched?

Molecule/ion	Bond order
1) NO	2.5
2) HF	1
3) NO^+	3
4) CO	2.5

2. The hybridisation of nitrogen in NO_2^+, NO_3^- and NH_4^+ respectively is
1) sp, sp^3 and sp^2 2) sp, sp^2 and sp^3
3) sp^2, sp and sp^3 4) sp^2, sp^3 and sp

3. According to VSEPR theory which of the following is not correct?
1) Electron pair tend to minimize repulsions
2) Repulsions are of the order BP – BP > LP – BP > LP – LP
3) The ideal geometry for five electron pairs is TBP
4) Double bonds occupy more space than single bonds

4. In which of the following processes the bond order has increased and paramagnetic character has changed to diamagnetic?
1) $N_2 \rightarrow N_2^+$ 2) $NO \rightarrow NO^+$
3) $O_2 \rightarrow O_2^{2-}$ 4) $O_2 \rightarrow O_2^+$

5. In the molecules H_2O, NH_3 and CH_4
1) The bond angles are same
2) The bond distances are same
3) The hybridisations are same
4) The shapes are same

6. The molecules ion having ideal shape according to VSEPR theory is
1) SF_4 2) SO_4^{2-}
3) S_2Cl_2 4) SO_2Cl_2

7. The highest occupied MO in N_2 and O_2^+ respectively are (take X – axis as inter nuclear axis)
1) $\sigma 2P_x$, $\pi^* 2P_y$ 2) $\pi 2P_y$, $\pi 2P_z$
3) $\sigma^* 2P_x$, $\sigma 2P_x$ 4) $\pi^* 2P_y$, $\pi^* 2P_z$

8. Match List - I (compounds) with List - II (structures) and select the correct answer using the codes given below.

List – I	List – II
A) XeO_4	i) square planar
B) BrF_4^-	ii) tetrahedral
C) $SeCl_4$	iii) distorted tetrahedral

1) A–ii, B–iii, C–i 2) A–iii, B–i, C–ii
3) A–ii, B–i, C–iii 4) A–i, B–ii, C–iii

9. Among ClO_3^-, XeO_3 and SO_3 species with pyramidal shape is/are
1) ClO_3^- and XeO_3 2) XeO_3 and SO_3
3) ClO_3^- and SO_3 4) SO_3

10. The molecular shapes of SF_4, CF_4 and XeF_4 are
1) the same with 2, 0 and 1 lone pairs of electrons on the central atom respectively
2) the same with 1, 1 and 1 lone pair of electrons on the central atom respectively
3) different with 0, 1 and 2 lone pairs of electrons on the central atom respectively
4) different with 1, 0 and 2 lone pairs of electrons on the central atom respectively

11. The hydrogen bond is strongest in
1) O – H ... S 2) S – H ... O
3) F – H ... O 4) F – H ... F

12. Which of the following molecules have dipole moment?
A) BeF_2 B) BF_3 C) NF_3 D) H_2S
1) A and C 2) C and D
3) B and C 4) Only C

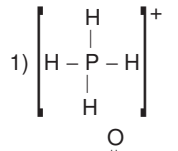
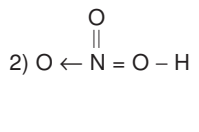
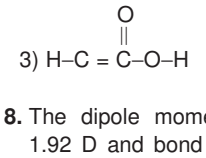
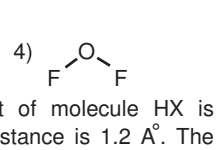
13. Point out the non-existing molecule out of the following?
1) CBr_4 2) XeF_4 3) SF_6 4) NF_5

14. The enolic form of acetone contains
1) 9σ, 1π and 2 lone pairs
2) 8σ, 2π and 2 lone pairs
3) 10σ, 1π and 1 lone pair
4) 9σ, 2π and 1 lone pair

15. The lesser solubility of silver halides in comparsion to alkali metal halides is due to
1) low lattice energies of silver halides as compared to alkali metals
2) lesser ionic character of silver halides because of greater polarisation of Ag^+ ion
3) tendency of Ag^+ ion to form complexes
4) small size of Ag^+ ion

16. The dipole moment of NF_3 is much less than NH_3 because
1) the size of N atom is much less than that of H atom
2) number of lone pairs in NF_3 is more than in NH_3
3) F atom is more electronegative than N atom where as H atom is less electronegative than N atom
4) statement is wrong, NF_3 has larger dipole moment than NH_3

17. Which of the following does not correctly represent the bonding capacity of the atoms involved?

1) 
2) 
3) 
4) 

18. The dipole moment of molecule HX is 1.92 D and bond distance is 1.2 A°. The percentage ionic character of HX is ..... (electronic charge = 4.8×10^{-10} esu)
1) 50% 2) 33.3% 3) 66.7% 4) 75%

19. The correct order of the O - O bond length in O_2, H_2O_2 and O_3 is
1) $H_2O_2 > O_3 > O_2$ 2) $O_2 > O_3 > H_2O_2$
3) $O_2 > H_2O_2 > O_3$ 4) $O_3 > H_2O_2 > O_2$

20. The bonds present in N_2O_5 are
1) only ionic 2) only covalent
3) covalent and ionic
4) covalent and coordinate

ANSWERS
1-4; 2-2; 3-2; 4-2; 5-3; 6-2; 7-1; 8-3; 9-1; 10-4; 11-4; 12-2; 13-4; 14-1; 15-2; 16-3; 17-3; 18-2; 19-1; 20-4.