

# TEST SERIES CSIR-NET/JRF JUNE 2019

BOOKLET SERIES **B**

## INORGANIC CHEMISTRY

Paper Code **01**

Test Type: **TEST SERIES**

### CHEMICAL SCIENCES

Duration: 2:00 Hours

Date: 29-05-2019

Maximum Marks: 180

Read the following instructions carefully:

\* Single Paper Test is divided into **THREE** Parts.

**Part - A:** This part shall carry **10** questions. Each question shall be of **2** marks.

**Part - B:** This part shall carry **20** questions. Each question shall be of **2** marks.

**Part - C:** This part shall contain **30** questions. Each question shall be of **4** marks.

\* Darken the appropriate bubbles with HB pencil/Ball Pen to write your answer.

\* There will be negative marking @25% for each wrong answer.

\* The candidates shall be allowed to carry the Question Paper Booklet after completion of the exam.

\* For rough work, blank sheet is attached at the end of test booklet.



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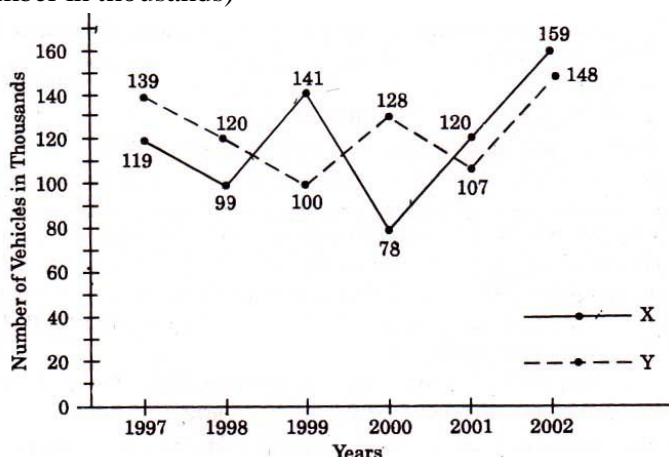
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## PART – A

1. 45 men can complete a work in 16 days. Six days after they started working, 30 more men joined them. How many days will they take to complete the remaining work?  
(a) 6 days                      (b) 10 days                      (c) 8 days                      (d) 4 days
2. A train can travel 50 % faster than a car. Both start from point A at the same time and reach point B 75 kms away from A at the same time. On the way, however, the train lost about 12.5 minutes while stopping at the stations. The speed of the car is:  
(a) 100 kmph                      (b) 110 kmph                      (c) 120 kmph                      (d) 130 kmph
3. Study the following line-graph and answer the question based on it.  
The line graph given below shows the number of Vehicles Manufactured by two Companies (X, Y) over the Years.

(Number in thousands)



- In which of the following years, the difference between the productions of Companies X and Y was the maximum among the given years ?  
(a) 1997                      (b) 1998                      (c) 1999                      (d) 2000
4. 6 students A, B, C, D, E, F are to be called for an interview based on their percentage of marks secured in the examination. One who secures the highest marks is called first and next in the decreasing order of their secured marks they are called.  
B secured 75 % marks and got a call after C.  
F got the call before E.  
D was not the last person to get the call as he got 72 % marks.  
If C got more marks than B, but less than A.  
Then who was the second last student to appear in the interview and what could be his possible mark in the examination ?  
(a) F, 73                      (b) C, 74                      (c) F, 71                      (d) C, 70
  5. If 1 cubic cm of iron weighs 21 gms, what will be the weight (in kg) of a iron pipe of length 1 metre with a bore of 3 cm and in which thickness of the metal is 1 cm.  
(a) 26.4                      (b) 20                      (c) 30                      (d) 30.6
  6. In the series, given below follows a certain pattern. Based on the pattern followed you have to find out what should come in place of questions mark (?) ?

5	11	24	51	?
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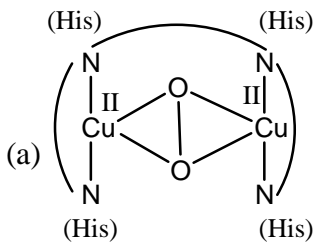
- (a) 105                      (b) 104                      (c) 108                      (d) 106

7. Gitika walks 30 m North. Then she turns right and walks 30 m, after that she turns right and walks 55m. Then she turns left and walks 20 m. Then she again turns left and walks 25m. How many metres away is she from her original position?  
 (a) 45 m (b) 50 m (c) 66 m (d) None of these
8. Two dice are tossed. What is the probability that the total score is a prime number.  
 (a)  $5/12$  (b)  $1/3$  (c)  $2/9$  (d)  $11/36$
9. Ram spends 75 % of his income in 2018. In the next year his income increased by 20 % and his expenditure also increases by 10 %. Find the percentage increase in his savings ?  
 (a) 50 (b) 45 (c) 40 (d) 60
10. In a 100 m race A runs at a speed of 8 km/hr. Even after giving B a start of 4 m. A still beats B by 15 seconds. What is the speed of B in km/hr ?  
 (a) 6 (b) 5.76 (c) 6.75 (d) 6.25

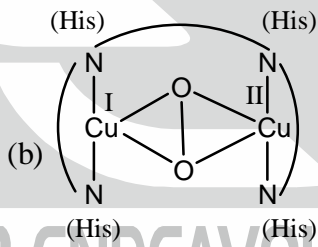
## PART – B

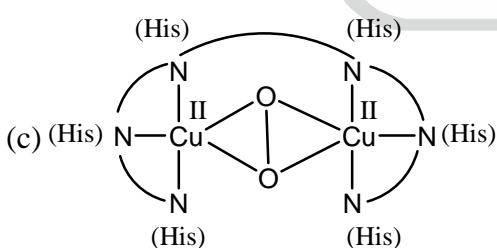
11. In compound  $\text{Cs}_2\text{Au}^{\text{I}}\text{Au}^{\text{III}}\text{Cl}_6$ , intravalence charge transfer occurs between:  
 (a)  $[\text{AuCl}_5]^{2-}$  and  $[\text{AuCl}]$  (b)  $[\text{AuCl}_4]^-$  and  $[\text{AuCl}_2]^-$   
 (c)  $[\text{AuCl}_3]$  and  $[\text{AuCl}_3]^{2-}$  (d)  $[\text{AuCl}_2]^+$  and  $[\text{AuCl}_4]^{3-}$
12. Hg(II) and Au(I) generally forms linear complex because  
 (a) They are bigger in size  
 (b) Participation of  $d_{z^2}$  orbital in bonding  
 (c) No d-orbital participation in bond formation  
 (d) Complex with these metal ions show high bending force constant
13.  $\text{Cu}^{2+}$  ion forms faint pink complex  $[\text{Cu}(\text{phen})_3]^{2+}$ . When this complex is reduced, the colour of the complex disappears. The colour of the complex is due to  
 (a) LMCT (b) MLCT (c) d-d transition (d) Intraligand  $\pi - \pi^*$  transitions
14. The hybridisation, shape and magnetic moment of  $\text{K}_2[\text{Cu}(\text{CN})_4]$  are :  
 (a)  $sp^3$ , tetrahedral, 1.73 B.M. (b)  $sp^2d$ , square planar, 1.73 B.M.  
 (c)  $sp^3$ , tetrahedral, 2.44 B.M. (d)  $dsp^2$ , square planar, 2.44 B.M.
15. For the complex  $\text{MeTiCl}_3$ , predict the order of reactivity towards the following set of ligands:  $\text{NMe}_3$ , CO and  $\text{PMe}_3$ .  
 (a)  $\text{NMe}_3 > \text{PMe}_3 > \text{CO}$  (b)  $\text{CO} > \text{PMe}_3 > \text{NMe}_3$   
 (c)  $\text{PMe}_3 > \text{CO} > \text{NMe}_3$  (d)  $\text{NMe}_3 > \text{CO} > \text{PMe}_3$
16. Among the following which reaction sequence is *not* correct.  
 (a)  $\text{RCHO} \xrightarrow{\text{Rh}(\text{PPh}_3)_3\text{Cl}} \text{RH}$  (b)  $\text{R}-\text{CO}-\text{R} \xrightarrow{\text{Rh}(\text{PPh}_3)_3\text{Cl}} \text{R}-\text{R}$   
 (c)  $\text{RCOCl} \xrightarrow{\text{Rh}(\text{PPh}_3)_3\text{Cl}} \text{R}-\text{Cl}$  (d)  $\text{R}-\text{CH}=\text{CH}_2 \xrightarrow{\text{Rh}(\text{PPh}_3)_3\text{Cl}} \text{R}-\text{CH}_2-\text{CH}_2-\text{R}$
17. The correct pairs of metal fragments in order of increasing tendency for an attached alkene to undergo nucleophilic attack.  
 (a)  $\text{PdCl}_2(\text{H}_2\text{O}) > \text{PtCl}_2(\text{H}_2\text{O})$   
 (b)  $\text{Pd}(\text{PPh}_3)_2 > [\text{Pd}(\text{PPh}_3)_2\text{Cl}]^+$



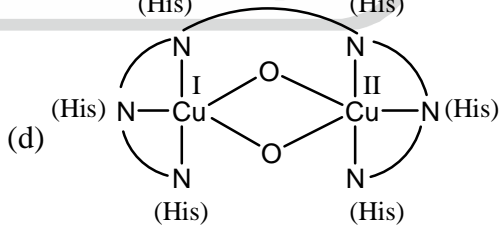
- (c)  $[\text{CpMo}(\text{NO})\text{P}(\text{OMe})_3]^+ < [\text{CpMo}(\text{NO})\text{PMe}_3]^+$
- (d)  $\text{PdCl}_2(\text{H}_2\text{O}) = \text{PtCl}_2(\text{H}_2\text{O})$
18.  $[\text{CpRh}(\text{CO})]_2(\mu - \text{CH}_2)$  structure will be isolobal structure of  
 (a) Cyclopropane (b) Cyclobutane (c) Cyclopentane (d) Adamantane
19. Consider the following statement(s)  
 (A)  $\text{CH}_3\text{NCS}$  is angular while  $\text{H}_3\text{SiNCS}$  is linear  
 (B)  $\text{TlI}_3$  is linear and  $\text{TeF}_5^-$  is square pyramidal in shape  
 (C) The hydrolysis product of  $\text{NCl}_3$  and  $\text{BCl}_3$  are of same type  
 The correct statement(s) is/are  
 (a) A and B (b) A and C  
 (c) B and C (d) A, B and C
20. Which of the following statement is incorrect?  
 (a) Ionisation energy of  $\text{N}_2$  molecule is higher than that of N atom  
 (b)  $\text{N}_2^+$  molecule has higher bond length as compared to  $\text{N}_2$   
 (c) Ionisation energy of O atom is higher than that of  $\text{O}_2$  molecule  
 (d) HOMO of  $\text{C}_2$  molecule is a gerade orbital
21. Which of the following option is incorrect for the mentioned property?  
 (a)  $\text{CrO}_4^{2-} > \text{MoO}_4^{2-} > \text{WO}_4^{2-}$  [Order of oxidising power]  
 (b)  $\text{Sc} < \text{Y} < \text{La}$  [Order of ionisation energy]  
 (c)  $\text{Si} > \text{C} > \text{Ge} > \text{Sn} > \text{Pb}$  [Order of electron affinity]  
 (d)  $\text{Cs} > \text{Rb} > \text{Na} > \text{Li}$  [Order of basicity of their hydroxides]
22. The active site structure for Oxy-hemocyanin is
- 

(a)



(b)
- 

(c)

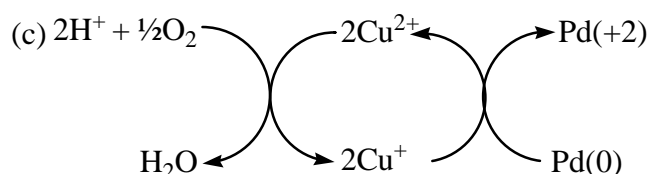
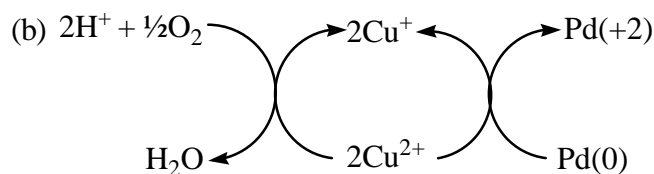
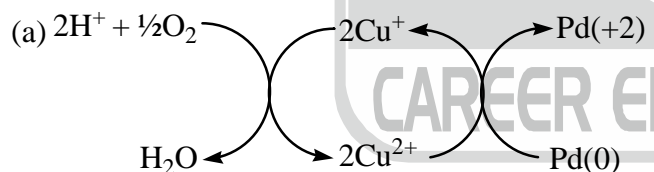


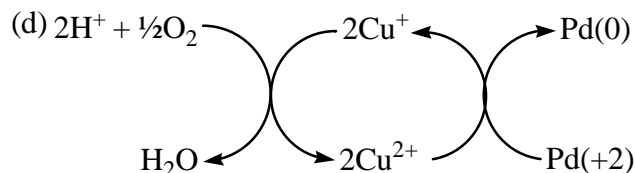
(d)
23. In the following statements, the true statement is :  
 (a) Cytochrome C is a non-heme protein  
 (b) Deoxyhemerythrin act as a electron carrier in biological systems  
 (c) Metallothioneins prefer to bind soft metal ions such as  $\text{Cd}(\text{II})$ ,  $\text{Hg}(\text{II})$  and  $\text{Zn}(\text{II})$   
 (d) Oxyhemoglobin is paramagnetic in nature
24. Aluminium carbide ( $\text{Al}_4\text{C}_3$ ) reacts with  $\text{D}_2\text{O}$  to give  
 (a)  $\text{Al}(\text{OD})_3 + \text{CD}_3$  (b)  $\text{Al}(\text{OD})_2 + \text{C}_2\text{D}_2$  (c)  $\text{Al}(\text{OD})_3 + \text{CD}_4$  (d)  $\text{Al}(\text{OD})_3 + \text{C}_3\text{D}_2$

25. The ground state term symbol of a molecule with electronic configuration  
 $\sigma_g^2(1s)\sigma_u^2(1s)\sigma_g^2(2s)\sigma_u^2(2s)\pi_u^2(2p_x)\pi_u^2(2p_y)$   
 (a)  $^1\Sigma_g^-$  (b)  $^1\Sigma_g^+$  (c)  $^3\Sigma_g^-$  (d)  $^3\Sigma_g^+$
26. Treatment of antimony pentachloride ( $\text{SbCl}_5$ ) with an excess of HF gives.  
 (a)  $\text{Sb}_4\text{F}_4$  and HCl (b)  $\text{H}^+[\text{Sb}_2\text{F}_{11}]^-$  and HCl  
 (c)  $[\text{SbF}_4(\mu - \text{F})]_4$  and HCl (d)  $\text{SbF}_5$  and HCl
27. Least paramagnetic property is shown by  
 (a)  $\text{Eu}^{3+}$  (b)  $\text{Gd}^{3+}$  (c)  $\text{U}^{3+}$  (d)  $\text{No}^{2+}$
28. Total number of ESR lines in tetraaza naphthalene radical and pyrazine radical respectively are  
 (a) 36, 18 (b) 45, 25 (c) 81, 81 (d) 75, 25
29. The half life of  $^{214}\text{Bi}$  is 20 minutes. The fraction of a sample of  $^{214}\text{Bi}$  which will remain after 2 hours, is  
 (a)  $\frac{1}{16}$  (b)  $\frac{1}{32}$  (c)  $\frac{1}{64}$  (d)  $\frac{1}{128}$
30. If Mössbauer spectrum of  $\text{Ni}(\text{CO})_4$  is recorded in the presence of a magnetic field. The original spectrum with two lines changes into the one with  
 (a) 6 lines (b) 10 lines (c) 15 lines (d) 12 lines

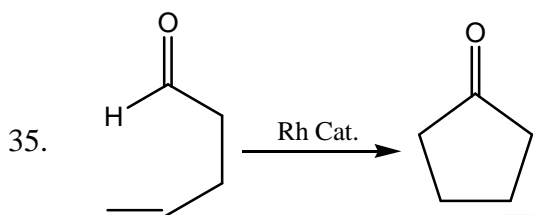
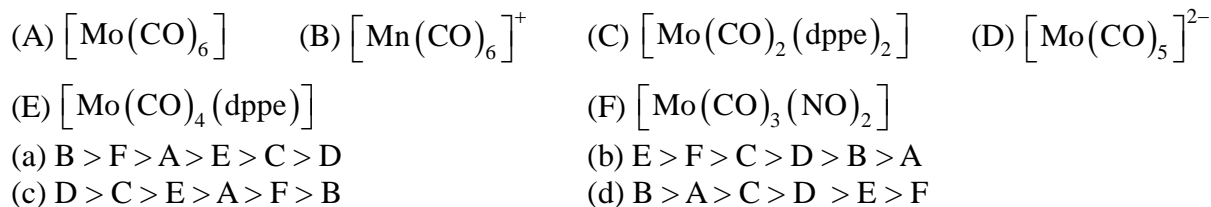
### PART – C

31. The chiral complexes among the following are:  
 (A)  $[\text{Cr}(\text{EDTA})]^-$  (B)  $[\text{Ru}(\text{bipy})_3]^{3+}$  (C)  $[\text{PtCl}(\text{dien})]^+$   
 (a) A, B and C (b) A and B only (c) A and C only (d) B and C only
32. A true statement about base hydrolysis of  $[\text{Co}(\text{NH}_3)_5\text{Cl}]^{2+}$   
 (a) It is a first order reaction  
 (b) The rate determining step involves the dissociation of chloride in  $[\text{Co}(\text{NH}_3)_4(\text{NH}_2)\text{Cl}]^+$   
 (c) Rate is independent of the concentration of the base  
 (d) Rate determining step involves the abstraction of a proton from  $[\text{Co}(\text{NH}_3)_5\text{Cl}]^{2+}$
33. Among the following which is correct regarding olefin oxidation by  $\text{Pd}(+2)$  in Wacker process.





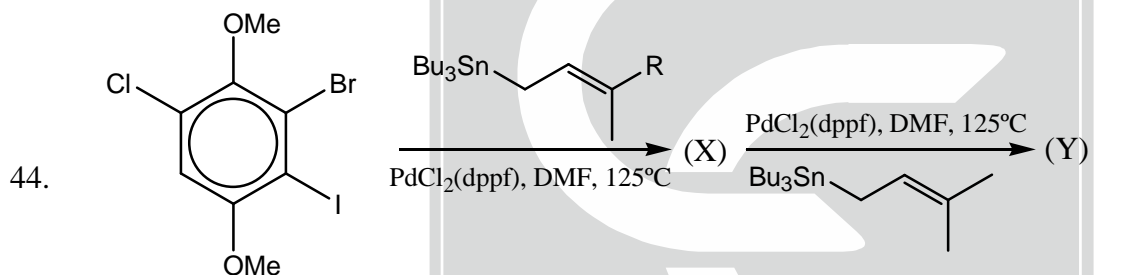
34. Arrange the order of decreasing reactivity for the attack of trimethylamine oxide (nucleophile) on their CO groups.



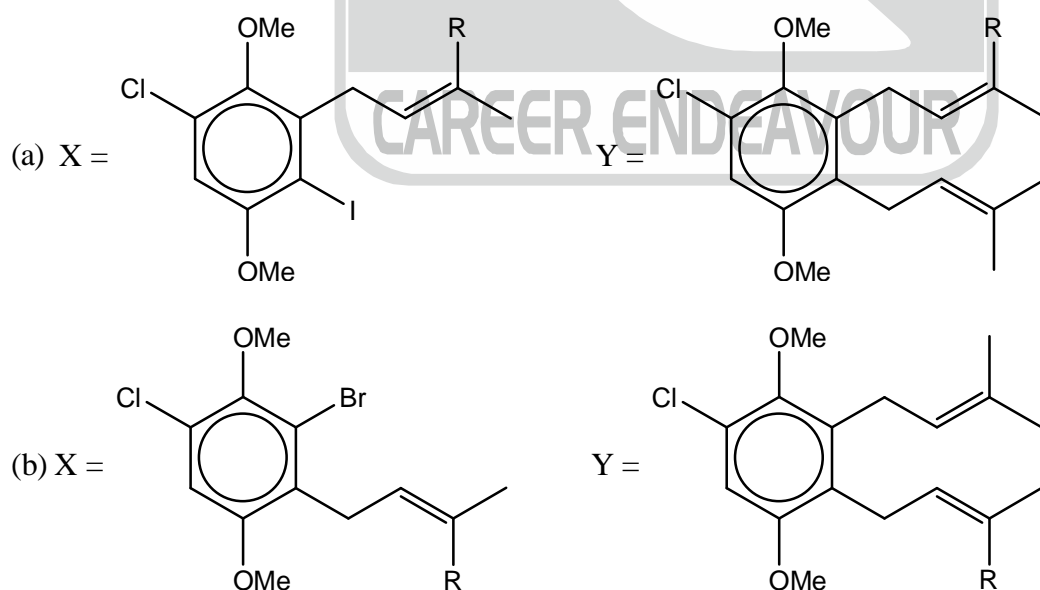
The suitable steps involved in above conversion reaction is

- (a) Oxidative addition of C–H to Rh, C=C bond insertion into Rh hydride, followed by reductive elimination.  
 (b) Oxidative addition of C–C to Rh, followed by reductive elimination.  
 (c) Oxidative addition of C–H to Rh followed by C = C bond insertion into Rh–H, followed by ligand addition.  
 (d) Reductive elimination followed by oxidative addition.
36. Which of the following pair doesn't consist of similar d-orbitals in their hybridization?
- (a)  $\text{BiPh}_5$ ,  $[\text{TlCl}_5]^{-2}$  (b)  $[\text{W}(\text{CN})_8]^{4-}$ ,  $[\text{Cr}(\text{O})_2]^{3-}$   
 (c)  $\text{TcO}_4^-$ ,  $\text{CrO}_4^{2-}$  (d)  $[\text{HgCl}_5]^{3-}$ ,  $[\text{InCl}_5]^{2-}$
37. Which of the following pair have species with similar structures?
- (A)  $\text{SF}_3^-$ ,  $\text{XeF}_3^+$  (B)  $\text{ClF}_2^-$ ,  $\text{BeCl}_2$  (C)  $\text{I}_3^+$ ,  $\text{XeOF}^+$  (D)  $\text{XeO}_3$ ,  $\text{SOF}_2$
- (a) A and B (b) A, B and D (c) C and D (d) All of these
38. Which of the following statement is incorrect regarding different scales of electronegativity?
- (a) Mulliken defined electronegativity as the arithmetic mean of the first ionization energy and the electron affinity of an atom.  
 (b) Mulliken's electronegativity scale is relative whereas Allred-Rochow scale is absolute.  
 (c) Allred and Rochow defined electronegativity as the electrostatic force of attraction existing between the nucleus and the valence electrons in an atom.  
 (d) Mulliken's electronegativity is 2.8 times greater than Pauling's electronegativity
39. Match the metalloprotein in Column-A with its biological function in Column-B
- | Column-A                   | Column-B                                       |
|----------------------------|--|
| (A) Hemosiderin            | (I) Electron transport                         |
| (B) Cytochrome-C           | (II) Hydrolysis of C-terminal peptide residue  |
| (C) Leucine aminopeptidase | (III) Hydrolysis of N-terminal peptide residue |
| (D) Catalase               | (IV) Iron storage                              |
|                            | (V) Oxygen transport                           |
|                            | (VI) Disproportionation of water               |
|                            | (VII) Disproportionation of peroxide           |
- (a) A-IV, B-I, C-III, D-VII  
 (b) A-V; B-I; C-II, D-VI  
 (c) A-IV, B-V, C-II, D-VI  
 (d) A-V, B-VI, C-III, D-VII

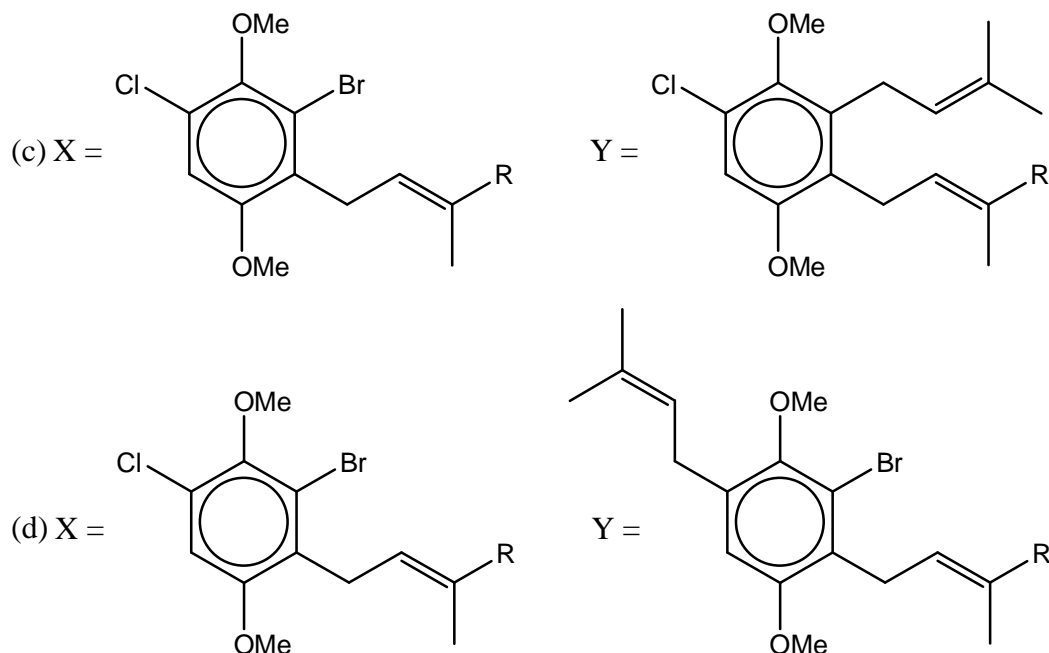
40. Consider the following statements for deoxy-hemocyanin and deoxy-myoglobin  
 (A) They are involved in  $O_2$  transport in biological systems  
 (B) They contain two metal ions in their active site  
 (C) Active site metal centres are bridged by hydroxo group  
 (D) They prefer to bind only one  $O_2$  per active site.  
 The correct statements is/are  
 (a) A, B and D (b) A, C and D (c) A and C (d) D only
41.  $BF_3$  reacts with  $\ddot{N}H_3$  to give X, whereas  $BCl_3$  reacts with liquid  $\ddot{N}H_3$  to give Y. X and Y are  
 (a)  $X = BF_3 \cdot NH_3$ ;  $Y = BCl_3 \cdot NH_3$  (b)  $X = (BN)_x$ ;  $Y = B_3N_3Cl_3$   
 (c)  $X = BF_3 \cdot NH_3$ ;  $Y = (BN)_x$  (d)  $X = BF_3 \cdot NH_3$ ;  $Y = B(NH_2)_3$
42. Consider the following statements in respect of lanthanoids  
 (I) Spin orbit coupling is more important than crystal field splitting  
 (II)  $Ce^{3+}$  and  $Yb^{3+}$  are colourless because of transition from 4f to 5d.  
 (III) The blood red colour of  $Sm^{2+}$  is due to f-f spectra.  
 The correct statements is/are  
 (a) (I), (II) and (III) (b) (III) only (c) (I) and (II) (d) (II) and (III)
43. No difference in the measured and calculated magnetic moment (based on spin-orbit coupling) is observed for:  
 (a)  $Pm^{3+}$  and  $Eu^{3+}$  (b)  $Lu^{3+}$ ,  $Dy^{3+}$  and  $Eu^{3+}$   
 (c)  $Pm^{3+}$ ,  $Dy^{3+}$  and  $Lu^{3+}$  (d)  $Eu^{3+}$  only



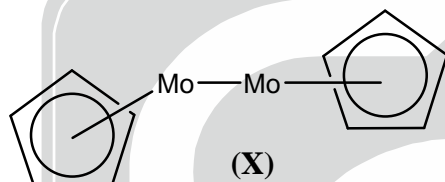
The major product in the above synthetic transformation is



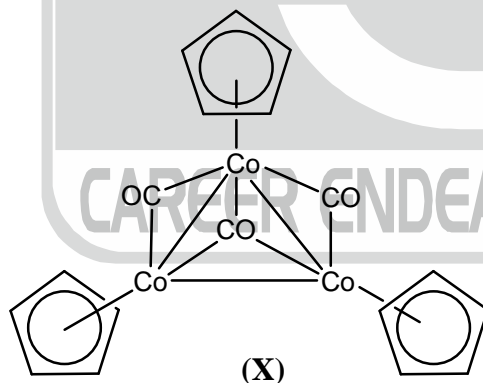




45. The four chlorine ligands are missing in the complex (X). Given that the complex obey 18 electron rule and no additional metal-metal bonds are present. The missing Cl ligands in the complex will be



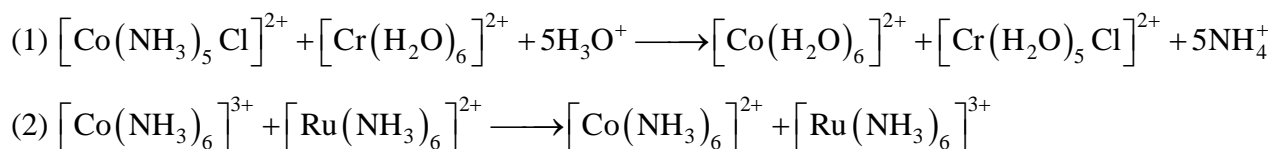
- (a) Two  $\mu^2$ -Cl and two terminal-Cl  
(b) All Cl at terminal position  
(c) Three  $\mu^2$ -Cl and one terminal-Cl  
(d) All four-Cl are  $\mu^2$ -Cl
46. Select the most appropriate set of  $\nu_{C-O}$  stretching frequency in IR for the trimetallic carbonyl complex (X)



- (a) 1973, 1827, 1794, 1744  $\text{cm}^{-1}$   
(b) 1833, 1775, 1673  $\text{cm}^{-1}$   
(c) 1935, 1975, 1653  $\text{cm}^{-1}$   
(d) 1960, 1918  $\text{cm}^{-1}$
47. Arrange the following complex in the increasing order of C-C bond length of ethylene
- (A)  $\left[ \text{Fe}(\text{PPh}_3)(\text{NH}_3)(\text{PH}_3)(\eta^2\text{-C}_2\text{H}_4) \right]^{2-}$   
(B)  $\left[ \text{Co}(\text{PPh}_3)(\text{NH}_3)(\text{PH}_3)(\eta^2\text{-C}_2\text{H}_4) \right]^{-}$   
(C)  $\left[ \text{Ni}(\text{PPh}_3)(\text{NH}_3)(\text{PH}_3)(\eta^2\text{-C}_2\text{H}_4) \right]$
- (a)  $A > B > C$  (b)  $C > B > A$  (c)  $A > C > B$  (d)  $C > A > B$



48. Consider the reactions:



Which of the following statement(s) is/are correct?

(I) Reaction-1 follows inner sphere and Reaction-2 follows outer sphere electron transfer reaction.

(II) Reaction-1 is slower than Reaction-2

(III) Reaction-2 is slower than Reaction-1

(IV) Both the reactions follow inner sphere mechanism

(a) only (I) (b) (I) and (II) (c) (I) and (III) (d) (III) and (IV)

49. Addition of an aqueous solution of Fe(II) to  $\text{K}_3[\text{Cr}(\text{CN})_6]$  produces a brick red coloured complex which turns dark green at  $100^\circ\text{C}$ . The dark green complex is

(a)  $\text{Fe}_4[\text{Cr}(\text{CN})_6]$  (b)  $\text{K Fe}[\text{Cr}(\text{CN})_6]$  (c)  $\text{KCr}[\text{Fe}(\text{CN})_6]$  (d)  $\text{Fe}[\text{Cr}(\text{CN})_6]$

50.  $[\text{Ni}(\text{NH}_3)_6]^{2+}$  exhibits three absorption bands at 10750, 17500 and  $28200\text{ cm}^{-1}$ . The values of  $\Delta_0$  and  $B'$

for  $[\text{Ni}(\text{NH}_3)_6]^{2+}$  are respectively.

(a)  $9000\text{ cm}^{-1}$  and  $900\text{ cm}^{-1}$  (b)  $10750\text{ cm}^{-1}$  and  $900\text{ cm}^{-1}$   
(c)  $10700\text{ cm}^{-1}$  and  $900\text{ cm}^{-1}$  (d)  $6800\text{ cm}^{-1}$  and  $900\text{ cm}^{-1}$

51. Which of the following pairs exhibits linkage isomerism?

(I)  $[\text{Co}(\text{NH}_3)_5(\text{NO}_2)]^{2+}$  and  $[\text{Co}(\text{NH}_3)_5(\text{ONO})]^{2+}$

(II)  $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{SO}_4$  and  $[\text{Co}(\text{NH}_3)_5(\text{SO}_4)]\text{Cl}$

(III)  $[\text{Co}(\text{NH}_3)_6][\text{Cr}(\text{CN})_6]$  and  $[\text{Cr}(\text{NH}_3)_6][\text{Co}(\text{CN})_6]$

(IV)  $\text{KFe}[\text{Cr}(\text{CN})_6]$  and  $\text{KCr}[\text{Fe}(\text{CN})_6]$

(a) Only I (b) Only I and III (c) Only I and IV (d) Only III and IV

52. The compound which dissolves in  $\text{POCl}_3$  to give a solution with highest chloride ion concentration is

(a)  $\text{SbCl}_5$  (b)  $\text{Et}_3\text{N}$  (c)  $\text{FeCl}_3$  (d)  $\text{CsCl}$

53. In liq.  $\text{NH}_3$ ,  $\text{Zn}(\text{NH}_2)_2$  and  $\text{Al}(\text{NH}_2)_3$  act as

(a) Both  $\text{Zn}(\text{NH}_2)_2$  and  $\text{Al}(\text{NH}_2)_3$  as strong base  
(b) Both  $\text{Zn}(\text{NH}_2)_2$  and  $\text{Al}(\text{NH}_2)_3$  as weak base  
(c) Both  $\text{Zn}(\text{NH}_2)_2$  and  $\text{Al}(\text{NH}_2)_3$  as amphoteric  
(d)  $\text{Zn}(\text{NH}_2)_2$  as weak base and  $\text{Al}(\text{NH}_2)_3$  as strong base.

54. The correct statement(s) about  $\text{P}(\text{SiH}_3)_3$  and  $\text{N}(\text{SiH}_3)_3$  are

(I) Both  $\text{P}(\text{SiH}_3)_3$  and  $\text{N}(\text{SiH}_3)_3$  are pyramidal

(II) Both  $\text{P}(\text{SiH}_3)_3$  and  $\text{N}(\text{SiH}_3)_3$  are planar



(III)  $P(SiH_3)_3$  is pyramidal and  $N(SiH_3)_3$  is planar

(IV)  $P(SiH_3)_3$  is more basic than  $N(SiH_3)_3$

(V)  $N(SiH_3)_3$  is more basic than  $P(SiH_3)_3$

(a) I and III

(b) II and V

(c) III and V

(d) III and IV

55. Select the correct statement(s) among the following

(I)  $SF_6$  does not undergo hydrolysis

(II)  $NCl_3$  undergo hydrolysis because Cl can expand its octet by using d-orbitals whereas  $NF_3$  does not undergo hydrolysis because neither N nor F have vacant d-orbitals and can not expand their octets.

(III)  $NCl_3$  gives  $NH_3$  and  $HClO$  on hydrolysis.

(IV)  $BiCl_3$  and  $SbCl_3$  are hydrolysed to give white turbidity of  $BiOCl$  and  $SbOCl$  respectively.

(V)  $GeCl_4$  is hydrolysed to give  $Ge(OH)_4$  and  $HCl$

(a) I, II and III

(b) II, III and IV

(c) II, III, IV and V

(d) All of these

56. Arrange the following compounds in the increasing order of their melting points

$NaF, MgF_2, AlF_3, SiF_4, PF_5$  and  $SF_6$

(a)  $NaF < MgF_2 < AlF_3 < SiF_4 < PF_5 < SF_6$

(b)  $SiF_4 < PF_5 < SF_6 < NaF < MgF_2 < AlF_3$

(c)  $SF_6 < PF_5 < SiF_4 < NaF < MgF_2 < AlF_3$

(d)  $NaF < MgF_2 < AlF_3 < SF_6 < PF_5 < SiF_4$

57. Choose the incorrect statement from the following

(a) Nuclei which are  $\alpha$ -emitters are more likely to have mass number A such that  $A > 200$ .

(b) In nuclei of  $Z < 20$ , the ratio of number of neutrons to proton is nearly equal to 1

(c) The nuclear spin of  $^{25}_{12}Mg$  nucleus is half integer.

(d)  $^{208}_{82}Pb$  nucleus is an unstable nucleus.

58. Consider the following statements

(A) Three is the possible J-value for  $^3D$  term.

(B)  $^1\Delta_u \rightarrow ^1\Sigma_g^+$  is allowed electronic transition of a diatomic molecule

(C)  $^3P_2$  is the lowest energy term symbol of electronic configuration  $ns^1np^1$

(D)  $^3\Delta$  is possible term for an electronic configuration of two non-equivalent  $\pi$ -electrons  $[\pi^1, \pi^1]$

The correct statements are

(a) A and D only

(b) B and C only

(c) A, B and C only

(d) A, C and D only

59. A radical contains  $^{13}C$  with hyperfine constant 1.80 mT and three equivalent proton with hyperfine constant 0.90 mT. The total number of lines and intensity pattern for this ESR spectrum are

(a) 8, 1:2:3:4:4:3:2:1

(b) 8, 1:3:3:1:1:3:3:1

(c) 6, 1:3:4:4:3:1

(d) 9, 1:2:3:2:3:3:2:2:1

60. In  $^{57}Fe^*$  Mössbauer experiment source of 20.5 keV ( $4.95 \times 10^{12}$  MHz) towards absorber at a velocity of  $x$  mms $^{-1}$ . The shift in frequency of the source for this sample is 25.5 MHz. The value of  $x$  approximately is

(a) 2.5 mms $^{-1}$

(b) 1.55 mms $^{-1}$

(c) 3.46 mms $^{-1}$

(d) 7.5 mms $^{-1}$







**CAREER ENDEAVOUR**  
Best Institute for IIT-JAM, NET & GATE

CSIR-UGC-NET/JRF | GATE CHEMISTRY

CHEMICAL SCIENCES

Date : 29-05-2019

TEST SERIES-B

**ANSWER KEY [INORGANIC CHEMISTRY]**

**PART-A**

- |        |        |         |        |        |        |        |
|--------|--------|---------|--------|--------|--------|--------|
| 1. (a) | 2. (c) | 3. (d)  | 4. (c) | 5. (a) | 6. (d) | 7. (b) |
| 8. (a) | 9. (a) | 10. (b) |        |        |        |        |

**PART-B**

- |         |         |         |         |         |         |         |
|---------|---------|---------|---------|---------|---------|---------|
| 11. (b) | 12. (b) | 13. (c) | 14. (b) | 15. (a) | 16. (b) | 17. (a) |
| 18. (a) | 19. (a) | 20. (d) | 21. (b) | 22. (c) | 23. (c) | 24. (c) |
| 25. (b) | 26. (d) | 27. (d) | 28. (b) | 29. (c) | 30. (d) |         |

**PART-C**

- |         |         |         |         |         |         |         |
|---------|---------|---------|---------|---------|---------|---------|
| 31. (b) | 32. (b) | 33. (a) | 34. (d) | 35. (a) | 36. (d) | 37. (d) |
| 38. (b) | 39. (a) | 40. (d) | 41. (d) | 42. (c) | 43. (c) | 44. (c) |
| 45. (d) | 46. (b) | 47. (a) | 48. (c) | 49. (c) | 50. (b) | 51. (c) |
| 52. (d) | 53. (c) | 54. (d) | 55. (d) | 56. (b) | 57. (d) | 58. (a) |
| 59. (c) | 60. (b) |         |         |         |         |         |

