COORDINATION COMPOUNDS AND POLYMERS

* K₃(Al(C₂O₄)₃) is called
  (a) Potassium aluminooxalate  (b) Potassium trioxalatoaluminate (III)
  (c) Potassium alumium (III) oxalate  (d) Potassium trioxalatoaluminate (VI)
  Ans : (b) Potassium trioxalatoaluminate (III)

* Which of the following is common donor atom in ligands?
  (a) arsenic  (b) nitrogen  (c) oxygen  (d) both ‘b’ and ‘c’
  Ans: (d) both ‘b’ and ‘c’

* The formula for the complex, dichlorobis (urea) copper (II) is
  (a) [Cu{O=C(NH₂)₂}Cl₂  (b) [Cu{O=C(NH₂)₂}Cl]Cl
  (c) [CuCl₂{O=C(NH₂)₂}₂]  (d) [CuCl₂{O=C(NH₂)₂}]₂
  Ans: (c) [CuCl₂{O=C(NH₂)₂}₂]

* In which of the following compounds does iron exhibit zero oxidation state?
  (a) [Fe(H₂O)₆](NO₃)₃  (b) K₃[Fe(CN)₆]
  (c) K₄[Fe(CN)₆]  (d) [Fe(CO)₃]
  Ans: (d) [Fe(CO)₃]

* The hypothetical complex chloridoaquatriamminecobalt(III)chloride can be represented as
  (a) [CoCl(NH₃)₃(H₂O)₂]Cl₂  (b) [Co(NH₃)₃(H₂O)Cl₃]
  (c) [Co(NH₂)₃(H₂O)₂Cl]  (d) [Co(NH₃)₃(H₂O)₃]Cl₃
  Ans: (a) [CoCl(NH₃)₃(H₂O)₂]Cl₂

* The oxidation state of Cr in [Cr(NH₃)₄Cl₂]⁺ is
  (a) 0  (b) +1  (c) +2  (d) +3
  Ans: (d) +3
The IUPAC name of the coordination compound $K_3[Fe(CN)_6]$ is
(a) Tripotassiumhexacyanidoiron (II)  
(b) Potassium hexacyanidoiron (II)  
(c) Potassiumhexacyanidoferate (III)  
(d) Potassium hexacyanidoferate(II)  
Ans: (c) Potassiumhexacyanidoferate (III)

The IUPAC name for the complex $[Co(ONO)(NH_3)_5]Cl_2$ is
(a) pentaamminenitro-N-cobalt (II) chloride  
(b) pentaamminenitrito-O-cobalt (III) chloride  
(c) nitrito-N-pentaamminecobalt (III) chloride  
(d) nitrito-N-pentaamminecobalt (II) chloride  
Ans: (b) pentaamminenitrito-O-cobalt (III) chloride

[EDTA]$^{4-}$ is a:
(a) monodentate ligand  
(b) bidentate ligand  
(c) quadridentate ligand  
(d) hexadentate ligand  
Ans: (d) hexadentate ligand

In $K_4[Fe(CN)_6]$, the E.A.N. of Fe is
(a) 33  
(b) 35  
(c) 36  
(d) 26
Ans: (c) 36

Pick out the complex compound in which the central metal atom obeys EAN rule strictly
(a) $K_4[Fe(CN)_6]$  
(b) $K_3[Fe(CN)_6]$  
(c) $[Cr(H_2O)Cl_3]$  
(d) $[Cu(NH_3)_4]SO_4$
Ans: (a) $K_4[Fe(CN)_6]$

The number of geometrical isomers for $[Pt(NH_3)_2 Cl_2]$ is
(a) 2  
(b) 1  
(c) 3  
(d) 4
Ans: (a) 2
The total number of possible isomers for the complex compound $[\text{Cu}^{II}(\text{NH}_3)_4][\text{Pt}^{II}\text{Cl}_4]$

(a) 3  (b) 6  (c) 5  (d) 4

Ans: (d) 4

Which one of the following octahedral complexes will not show geometric isomerism? (A and B are monodentate ligands)

(a) $[\text{MA}_2\text{B}]$  (b) $[\text{MA}_2\text{B}_4]$  (c) $[\text{MA}_3\text{B}_3]$  (d) $[\text{MA}_4\text{B}_2]$

Ans: (a) $[\text{MA}_3\text{B}]$

Which of the following coordination compounds would exhibit optical isomerism?

(a) pentamminenitrocobalt(III) iodide
(b) diamminedichloridoplutonium(II)
(c) trans-dicyanobis(ethane1, 2-diamine) chromium (III) chloride
(d) tris(ethane1, 2-diamine) cobalt (III) bromide

Ans: (d) tris(ethane1, 2-diamine) cobalt (III) bromide

The type of isomerism present in Pentamminenitrochromium (III) chloride is

(a) Optical  (b) linkage  (c) ionization  (d) polymerisation

Ans: (b) linkage

Which of the following compounds shows optical isomerism?

(a) $[\text{Co(CN)}_6]^{3-}$  (b) $[\text{Cr(C}_2\text{O}_4)_3]^{3-}$
(c) $[\text{ZnCl}_4]^{2-}$  (d) $[\text{Cu(NH}_3)_4]^{2+}$

Ans: (b) $[\text{Cr(C}_2\text{O}_4)_3]^{3-}$

Which would exhibit co-ordination isomerism

(a) $[\text{Cr(NH}_3)_6][\text{Co(CN)}_6]$  (b) $[\text{Co(en)}_2\text{Cl}_2]$
(c) $[\text{Cr(NH}_3)_6]\text{Cl}_3$  (d) $[\text{Cr(en)}_2\text{Cl}_2]^+$

Ans: (a) $[\text{Cr(NH}_3)_6][\text{Co(CN)}_6]$
[Co(NH$_3$)$_5$NO$_2$]Cl$_2$ and [Co(NH$_3$)$_5$(ONO)]Cl$_2$ are related to each other as
(a) geometrical isomers  (b) optical isomers
(c) linkage isomers       (d) coordination isomers
Ans: (c) linkage isomers

Coordination isomerism is caused by the interchange of ligands between the
(a) cis and trans structure (b) complex cation and complex anion
(b) Inner sphere and outer sphere (d) low oxidation and higher oxidation states
(b) Complex cation and complex anion

The number of precipitable halide ions in the sample [Pt(NH$_3$)$_2$ClBr]Cl will be
(a) 2  (b) 3  (c) 4  (d) 1
Ans: (d) 1

Which of the following is considered to be an anticancer species?

(A) \[
\begin{array}{c}
\text{Cl} \\
\text{Cl} \\
\text{Pt} \\
\text{CH}_2=\text{CH}_2 \\
\end{array}
\]
(B) \[
\begin{array}{c}
\text{Cl} \\
\text{Cl} \\
\text{Pt} \\
\text{Cl} \\
\end{array}
\]
(C) \[
\begin{array}{c}
\text{H}_3\text{N} \\
\text{H}_3\text{N} \\
\text{Pt} \\
\text{Cl} \\
\end{array}
\]
(D) \[
\begin{array}{c}
\text{H}_3\text{N} \\
\text{H}_3\text{N} \\
\text{Pt} \\
\text{Cl} \\
\text{NH}_3 \\
\end{array}
\]
Ans: (C)

Which one of the following will show paramagnetism corresponding to 2 unpaired electrons? (Atomic number: Ni = 28, Fe = 26)
a) [FeF$_6$]$^{3-}$  (b) [NiCl$_4$]$^{2-}$  (c) [Fe(CN)$_6$]$^{3-}$  (d) [Ni(CN)$_4$]$^{2-}$
Ans: (b) [NiCl$_4$]$^{2-}$
[Cr(H_2O)_6]Cl_3 (at no. of Cr=24) has a magnetic moment of 3.83 B.M. The correct distribution of 3d electrons in the Chromium of the complex is

(a) 3d_{xy}^1, (3d_{x^2-y^2})^1, 3d_{yz}^1
(b) 3d_{xy}^1, 3d_{yz}^1, 3d_{xz}^1
(c) 3d_{xy}^1, 3d_{yz}^1, 3d_z^2
(d) (3d_{x^2-y^2})^1, 3d_z^2, 3d_{xz}^1
Ans: (b) 3d_{xy}^1, 3d_{yz}^1, 3d_{xz}^1

The value of the ‘spin only’ magnetic moment for one of the following configuration is 2.83 BM. The correct one is

(a) d^5 (in strong ligand field)
(b) d^3 (in weak as well as in strong fields)
(c) d^4 (in weak ligand fields)
(d) d^4 (in strong ligand fields)
Ans: (d) d^4 (in strong ligand fields)

The “spin-only” magnetic moment (in units of Bohr magneton, µ_B) of Ni^{2+} in aqueous solution would be (At No. Ni = 28)

(a) 6
(b) 1.73
(c) 2.84
(d) 4.90
Ans: (c) 2.84

Which complex of Co^{2+} will have the weakest crystal field splitting -

(a) [CoCl_6]^{4-}
(b) [Co(CN)_6]^3-
(c) [Co(NH_3)_6]^{2+}
(d) [Co(en)]^{2+}
Ans: (a) [CoCl_6]^{4-}

The crystal field stabilization energy (CFSE) is the highest for

(a) [CoF_4]^{2-}
(b) [Co(NCS)_4]^2-
(c) [Co(NH_3)_6]^{3+}
(d) [CoCl_4]^2-
Ans: (c) [Co(NH_3)_6]^{3+}

Which one of the following complexes is an outer orbital complex?

(a) [Co(NH_3)_6]^{3+}
(b) [Fe(CN)_6]^{4-}
(c) [Fe(CN)_6]^{4-}
(d) [Ni(NH_3)_6]^{2-}
Ans: (d) [Ni(NH_3)_6]^{2-}
The number of isomers possible for octahedral complex \([\text{CoCl}_2\ (\text{en})(\text{NH}_3)_2]^+\) is,
(a) Two  \hspace{1cm} (b) Three
(C) No isomer  \hspace{1cm} (d) Four isomers
Ans: (d) Four isomers

Which of the following sequence is correct regarding field strength of ligands as per spectrochemical series
(a) \(\text{SCN}^\text{-} < \text{F}^- < \text{CN}^\text{-} < \text{CO}\)  \hspace{1cm} (b) \(\text{F}^- < \text{SCN}^\text{-} < \text{CN}^\text{-} < \text{CO}\)
(c) \(\text{CN}^\text{-} < \text{F}^- < \text{CO} < \text{SCN}^\text{-}\)  \hspace{1cm} (d) \(\text{SCN}^\text{-} < \text{CO} < \text{F}^- < \text{CN}^\text{-}\)
Ans: (a) \(\text{SCN}^\text{-} < \text{F}^- < \text{CN}^\text{-} < \text{CO}\)

Which of the following will be able to show geometrical isomerism?
(a) \(\text{MA}_3\text{B}\) – square planar  \hspace{1cm} (b) \(\text{MA}_2\text{B}_2\) – Tetrahedral
(c) \(\text{MABCD}\) – square planar  \hspace{1cm} (d) \(\text{MABCD}\) – Tetrahedral
Ans: (c) \(\text{MABCD}\) – square planar

POLYMERS

An example of biopolymer is
(a) teflon  \hspace{1cm} (b) neoprene  \hspace{1cm} (c) nylon-66  \hspace{1cm} (d) DNA
Ans: (d) DNA

In elastomer, intermolecular forces are
(a) Strong  \hspace{1cm} (b) weak  \hspace{1cm} (c) zero  \hspace{1cm} (d) None of these
Ans: (b) weak

Natural rubber is a polymer of
(a) Butadiene  \hspace{1cm} (b) isoprene  \hspace{1cm} (c) 2-methylbutadiene  \hspace{1cm} (d) hexa-1, 3-diene
Ans: (b) isoprene

\(\text{--[NH(CH}_2)_n\text{NHCO(CH}_2)_m\text{CO]}_n\text{--}\) is a
(a) addition polymer  \hspace{1cm} (b) thermosetting polymer
(c) homopolymer  \hspace{1cm} (d) copolymer
Ans: (d) copolymer
* Which of the following is an example of thermosetting polymer?
  (a) Polythene   (b) PVC   (c) Neoprene   (d) Bakelite
  Ans: (d) Bakelite

* A condensation polymer among the following is
  (a) Dacron   (b) PVC   (c) polystyrene   (d) teflon
  Ans: (a) Dacron

* One the basis of mode of formation, polymers can be classified
  (a) As addition polymers only   (b) as condensation polymers only
  (c) As copolymers   (d) as addition and condensation polymers
  Ans: (d) as addition and condensation polymers

* Ebonite is
  (a) Natural rubber   (b) synthetic rubber
  (c) Highly vulcanized rubber   (d) polypropene
  Ans: (c) highly vulcanized rubber

* Which is not a macromolecule?
  (a) DNA   (b) Starch   (c) Palmitate   (d) Insulin
  Ans: (c) Palmitate

* Which of the following is not an example of addition polymer?
  (a) Polystyrene   (b) Nylon 6,6   (c) PVC   (d) Polypropylene
  Ans: (b) Nylon 6,6

* Low density polythene is prepared by
  (a) Free radical polymerization
  (b) Cationic polymerization
  (c) Anionic polymerization
  (d) All of the above are correct
  Ans: (a) Free radical polymerization
* PVC is:
  (a) Thermoplastic polymer  (b) compound polymer
  (c) Thermosetting polymer  (d) simple polymer

  Ans: (a) thermoplastic polymer

* The synthetic polymer which resembles natural rubber is
  (a) Neoprene  (b) chloroprene  (c) glyptal  (d) nylon

  Ans: (a) neoprene

* For natural polymers PDI is generally
  (a) 0  (b) 1  (c) 100  (d) 1000

  Ans: (b) 1

* Nylon 6,6 is polyamide obtained by the reaction of
  (a) COOH (CH₂)₄ COOH + NH₂C₆H₄NH₂-(p)
  (b) COOH (CH₂)₄ COOH + NH₂(CH₂)₆NH₂
  (c) COOH (CH₂)₆ COOH + NH₂(CH₂)₄NH₂
  (d) COOH C₆H₄ COOH-(p) + NH₂(CH₂)₆NH₂

  Ans: (b) COOH (CH₂)₄ COOH + NH₂ (CH₂)₆ NH₂

* CF₂=CF₂ is a unit of
  (a) teflon  (b) Buna - S  (c) bakelite  (d) polythene

  Ans: (a) teflon

* Which of the following is not correctly matched?
  (a) Terylene

  \[ \text{OCH}_2\text{-CH}_2\text{-C} \equiv \text{C} - \text{OCH}_2\text{-CH}_2\text{-C} \text{\_}_n \]

  (b) Neoprene

  \[ \text{CH}_2\text{-C} \equiv \text{CH-CH}_2\text{-Cl} \]

  (c) Nylon-66

  \[ [-\text{NH-} (\text{CH}_2)_6 \text{-NH-CO-} (\text{CH}_2)_4 \text{COO-} \text{]}_n \]

  (d) PMMA

  \[ \text{CH}_3 \text{\_}_n \]

  \[ \text{CH}_2\text{-C} \equiv \text{C} \text{\_}_n \text{COOCH}_3 \]
Ans: (a) Terylene \[\left(-\text{OCH}_2\text{-CH}_2\text{-C}(-\text{O})\right)_n\]

* P.V.C. is a polymer of
(a) ethene  (b) 1-chloropropene  (c) propene  (d) 1-chloroethene
Ans: (d) 1-chloroethene

* Caprolactum polymerises to give
(a) terylene  (b) teflon  (c) glyptal  (d) nylon-6
Ans: (d) nylon-6

* The process of involving heating of rubber with sulphur is called
(a) galvanisation  (b) vulcanization  (c) bessemerisaion  (d) sulphonation
Ans: (b) vulcanization

* Which of the following polymers do not involve cross linkages?
(a) Melmac  (b) Bakelite  (c) Polythene  (d) Vulcanised rubber
Ans: (c) Polythene

* Isoprene is valuable substance for making
(a) Propene  (b) liquid fuel  (c) synthetic rubber  (d) petrol
Ans: (c) synthetic rubber

* The polymer used in making synthetic hair wigs is made up of
(a) CH\(_2\)=CHCl  (b) CH\(_2\)=CHCOOCH\(_3\)
(b) C\(_6\)H\(_5\)CH=CH\(_2\)  (d) CH\(_2\)=CH-CH=CH\(_2\)
Ans: (a) CH\(_2\)=CHCl
Which of the following is polyamide?
(a) Nylon 6,6  (b) Terylene  (c) Polythene  (d) BuNa-S
Ans: (a) Nylon 6,6

Orlon has monomeric unit
(a) Acrolein  (b) Glycol  (c) Vinyl cyanide  (d) Isoprene
Ans: (c) Vinyl cyanide

Terylene is NOT a
(a) Polyester fibre  (b) Step growth polymer  (c) Copolymer  (d) Chain growth polymer
Ans: (d) Chain growth polymer

Glycogen is
(a) A polymer of β-D-Glucose units  (b) A structural polysaccharide  (c) Structurally very much similar to amylopectin  (d) Structurally similar to amylopectin but extensively branched
Ans: (d) Structurally similar to amylopectin but extensively branched

In BuNa-S, the symbol Bu stands for
(a) 1-butene  (b) n-butene  (c) 2-butene  (d) Butadiene
Ans: (d) Butadiene