

**Worksheet - Coordination Compounds Nomenclature Worksheet**

1. What is the coordination number of the metal in each of the following complexes?

- a)  $[\text{HgCl}_4]^{-2}$       b)  $[\text{ZrF}_8]^{-4}$       c)  $[\text{Cr}(\text{H}_2\text{O})_4\text{Cl}_2]^+$       d)  $[\text{Mo}(\text{CO})_5\text{Br}]^-$   
 e)  $[\text{Au}(\text{CN})_2]^-$       f)  $[\text{Ni}(\text{CN})_5]^{-3}$       g)  $[\text{Co}(\text{en})_2(\text{H}_2\text{O})\text{Br}]^{+2}$       h)  $[\text{Cu}(\text{H}_2\text{O})_2(\text{C}_2\text{O}_4)_2]^{-2}$

2. What is the oxidation state of the metal in each of the following complexes?

- a)  $[\text{HgCl}_4]^{-2}$       b)  $[\text{ZrF}_8]^{-4}$       c)  $[\text{Cr}(\text{H}_2\text{O})_4\text{Cl}_2]^+$       d)  $[\text{Mo}(\text{CO})_5\text{Br}]^-$   
 e)  $[\text{Au}(\text{CN})_2]^-$       f)  $[\text{Ni}(\text{CN})_5]^{-3}$       g)  $[\text{Co}(\text{en})_2(\text{H}_2\text{O})\text{Br}]^{+2}$       h)  $[\text{Cu}(\text{H}_2\text{O})_2(\text{C}_2\text{O}_4)_2]^{-2}$

3. What is the oxidation state and coordination number of the transition metal in each of the following coordination compounds?

- a)  $\text{K}_3[\text{Cr}(\text{C}_2\text{O}_4)_2\text{Cl}_2]$       b)  $[\text{Ag}(\text{NH}_3)_2]\text{NO}_3$       c)  $[\text{Cu}(\text{en})_2]\text{SO}_4$   
 d)  $\text{Na}_2[\text{Mn}(\text{EDTA})]$       e)  $\text{Cs}[\text{FeCl}_4]$       f)  $(\text{NH}_4)_3[\text{RhCl}_6]$   
 g)  $[\text{Co}(\text{en})_2(\text{H}_2\text{O})\text{Br}]\text{Br}_2$       h)  $\text{Mg}[\text{Cu}(\text{H}_2\text{O})_2(\text{C}_2\text{O}_4)_2]$

4. What is the name for each of the following coordination compounds?

- a)  $\text{K}_3[\text{Cr}(\text{C}_2\text{O}_4)_2\text{Cl}_2]$       l)  $[\text{ZrF}_8]^{-4}$   
 b)  $[\text{Ag}(\text{NH}_3)_2]\text{NO}_3$       m)  $[\text{Ni}(\text{CN})_5]^{-3}$   
 c)  $[\text{Cu}(\text{en})_2]\text{SO}_4$       n)  $[\text{Cr}(\text{H}_2\text{O})_4\text{Cl}_2]^+$   
 d)  $\text{Cs}[\text{FeCl}_4]$       o)  $[\text{Co}(\text{en})_2(\text{H}_2\text{O})\text{Br}]^{+2}$   
 e)  $(\text{NH}_4)_3[\text{RhCl}_6]$       p)  $[\text{Mo}(\text{CO})_5\text{Br}]^-$   
 f)  $[\text{Co}(\text{en})_2(\text{H}_2\text{O})\text{Br}]\text{Br}_2$       q)  $[\text{Cu}(\text{H}_2\text{O})_2(\text{C}_2\text{O}_4)_2]^{-2}$   
 g)  $\text{Mg}[\text{Cu}(\text{H}_2\text{O})_2(\text{C}_2\text{O}_4)_2]$       r)  $[\text{Cr}(\text{NH}_3)_3(\text{H}_2\text{O})_3]\text{Cl}_3$   
 h)  $\text{Zn}[\text{PtCl}_6]$       s)  $[\text{Co}(\text{H}_2\text{NCH}_2\text{CH}_2\text{NH}_2)_3]_2(\text{SO}_4)_3$   
 i)  $\text{Na}_2[\text{Mn}(\text{EDTA})]$   
 j)  $[\text{HgCl}_4]^{-2}$   
 k)  $[\text{Au}(\text{CN})_2]^-$

5. What is the name for each of the following coordination compounds?

- (a)  $[\text{Co}(\text{NH}_3)_4(\text{H}_2\text{O})\text{Cl}]\text{Cl}_2$       (b)  $\text{K}_2[\text{Zn}(\text{OH})_4]$       (c)  $\text{K}_3[\text{Al}(\text{C}_2\text{O}_4)_3]$   
 (d)  $[\text{CoCl}_2(\text{en})_2]^+$       (e)  $[\text{Ni}(\text{CO})_4]$       (f)  $[\text{CoCl}_2(\text{en})_2]\text{Cl}$   
 (g)  $[\text{Pt}(\text{NH}_3)_2\text{Cl}(\text{NO}_2)]$       (h)  $\text{K}_3[\text{Cr}(\text{C}_2\text{O}_4)_3]$       (i)  $\text{Hg}[\text{Co}(\text{SCN})_4]$   
 (j)  $[\text{Co}(\text{NH}_3)_5(\text{CO}_3)]\text{Cl}$       (k)  $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$       (l)  $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{Cl}_2$   
 (m)  $\text{K}_3[\text{Fe}(\text{C}_2\text{O}_4)_3]$       (n)  $\text{K}_2[\text{PdCl}_4]$       (o)  $[\text{Pt}(\text{NH}_3)_2\text{Cl}(\text{NH}_2\text{CH}_3)]\text{Cl}$   
 (p)  $\text{K}[\text{Cr}(\text{H}_2\text{O})_2(\text{C}_2\text{O}_4)_2] \cdot 3\text{H}_2\text{O}$       (q)  $[\text{CrCl}_3(\text{py})_3]$       (r)  $\text{K}_4[\text{Mn}(\text{CN})_6]$   
 (s)  $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{Cl}_2$       (t)  $\text{Cs}[\text{FeCl}_4]$       (u)  $\text{K}[\text{Cr}(\text{H}_2\text{O})_2(\text{C}_2\text{O}_4)_2]$   
 (v)  $[\text{Co}(\text{NH}_3)_5(\text{NO}_2)](\text{NO}_3)_2$       (w)  $[\text{Pt}(\text{NH}_3)(\text{H}_2\text{O})\text{Cl}_2]$       (x)  $[\text{Co}(\text{en})_3]\text{Cl}_3$   
 (y)  $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$       (z)  $[\text{NiCl}_4]^{2-}$

6. What is the name for each of the following coordination compounds?

- |  |  |  |
|--|--|--|
| (i) $[\text{Co}(\text{H}_2\text{O})(\text{CN})(\text{en})_2]^{2+}$ | (ii) $[\text{PtCl}_4]^{2-}$                                      | (iii) $[\text{Cr}(\text{NH}_3)_3\text{Cl}_3]$                                |
| (iv) $[\text{CoBr}_2(\text{en})_2]^+$                              | (v) $\text{K}_3[\text{Fe}(\text{CN})_6]$                         | (vi) $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$                                |
| (vii) $[\text{Ni}(\text{NH}_3)_6]\text{Cl}_2$                      | (viii) $[\text{Co}(\text{en})_3]^{3+}$                           | (ix) $[\text{Ni}(\text{CO})_4]$  |
| (x) $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$                        | (xi) $[\text{Co}(\text{NH}_3)_4\text{Cl}(\text{NO}_2)]\text{Cl}$ | (xii) $[\text{Pt}(\text{NH}_3)_2\text{Cl}(\text{NH}_2\text{CH}_3)]\text{Cl}$ |

7. Write the formula for each of the following coordination compounds.

- Tetraammineplatinum(II) chloride
- Sodium hexacyanoferrate(III)
- Tris(ethylenediamine)platinum(IV) sulfate
- Diamminesilver(I) nitrate
- Triamminetrithiocyanatorhodium(III)
- Potassium diaquadioxalatocobaltate(III)
- Ammonium pentachlorohydroxoferrate(III)
- Diamminetriaquahydroxochromium(III) nitrate
- Diamminetriaquahydroxochromium(III) nitrate
- Tetraammineaquachloridocobalt(III) chloride
- Potassium tetrahydroxidozincate(II)
- Potassium trioxalatoaluminate(III)
- Dichloridobis(ethane-1,2-diamine)cobalt(III)
- Tetracarbonylnickel(0)
- Diamminechloridonitrito-N-platinum(II)
- Potassium trioxalatochromate(III)
- Dichloridobis(ethane-1,2-diamine)cobalt(III) chloride
- Pentaamminecarbonatocobalt(III) chloride
- Mercury (I) tetrathiocyanatocobaltate(III)
- Tetraamminediaquacobalt(III) chloride
- Potassium tetracyanonickelate(II)
- Tris(ethane-1,2-diamine) chromium(III) chloride
- Amminebromidochloridonitrito-N-platinate(II)
- Dichloridobis(ethane-1,2-diamine)platinum(IV) nitrate
- Iron(III) hexacyanidoferrate(II)

8. Write the formula for each of the following coordination compounds.

- Tetrahydroxidozincate(II)
- Potassium tetrachloridopalladate(II)
- Diamminedichloridoplatinum(II)
- Potassium tetracyanonickelate(II)
- Pentaamminenitrito-O-cobalt(III)
- Hexaamminecobalt(III) sulphate
- Potassium tri(oxalato)chromate(III)
- Hexaammineplatinum(IV)
- Tetrabromidocuprate(II)
- Pentaamminenitrito-N-cobalt(III)

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## Answer key of nomenclature of coordination compounds

Q1. (a) 4 (b) 8 (c) 6 (d) 6 (e) 2 (f) 5 (g) 6 (h) 6

Q2. (a) +2 (b) +4 (c) +3 (d) 0 (e) +1 (f) +2 (g) +3 (h) +2

Q3. (a) C.N. = 6, O.S. = +3 (b) C.N. = 2, O.S. = +1 (c) C.N. = 4, O.S. = +2 (d) C.N. = 6, O.S. = +2 (e) C.N. = 4, O.S. = +3 (f) C.N. = 6, O.S. = +3 (g) C.N. = 6, O.S. = +3 (h) C.N. = 6, O.S. = +2

Q4. (a) Potassiumdichloridodioxalatochromate(III)

(b) Diamminesilver(I)nitrate

(c) Bis(ethane-1,2-diamine)copper(II)sulphate

(d) Caesiumtetrachloridoferrate(III)

(e) Ammoniumhexachloridorhodate(III)

(f) Aquabromidobis(ethane-1,2-diamine)cobalt(III)bromide

(g) Magnesiumdiaquadioxalatocuperate(II)

(h) Zinc(II)hexachloridoplatinate(IV) (O.S. of Zn = +2)

(i) Sodium(ethylenediaminetetraacetato)manganate(II)

(j) Tetrachloridomercurate(II)ion

(k) Dicyanidoaurate(I)ion

(l) Octafluoridozirconate(IV)ion

(m) Pentacyanidonickelate(IV)ion

(n) Tetraaquadichloridochromium(II)ion

(o) Aquabromidobis(ethane-1,2-diamine)cobalt(III)ion

(p) Bromidopentacarbonylmolybdate(0)ion

(q) Diaquadioxalatocuperate(II)ion

(r) Triamminetriaquachromium(III)chloride

(s) Tris(ethane-1,2-diamine)cobalt(III)sulphate

Q5. (a) Tetraammineaquachloridocobalt(III)chloride

(b) Potassiumtetrahydrozincate(II)

(c) Potassiumtrioxalatoaluminate(III)

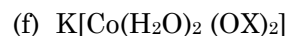
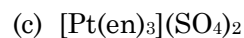
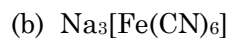
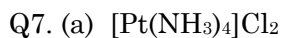
(d) Dichloridobis(ethane-1,2-diamine)cobalt(III)ion

(e) Tetracarbonylnickel(0)

- (f) Bis(ethane-1,2-diamine)dichloridocobalt(III)chloride
  - (g) Diamminechloridonitrito-N-platinum(II)
  - (h) Potassiumtrioxalatochromate(III)
  - (i) Mercury(I)tetrathiocynato(III)
  - (j) Pentaamminecarbnatocobalt(III)chloride
  - (k) Hexaamminecobalt(III)chloride
  - (l) Pentaamminechloridocobalt(III)chloride
  - (m) Potassiumtrioxalatoferrate(III)
  - (n) Potassiumtetrachloridopaladate(II)
  - (o) Diamminechlorido(methylamine)platinum(II)chloride
  - (p) Potassiumdiaquadioxalatochromate(III)trihydrated
  - (q) Trichloridotri(pyridine)chromium(III)
  - (r) Potassiumhexacyanidomangante(II)
  - (s) Pentaamminechloridocobalt(III)chloride
  - (t) Caesiumtetrachloridoferrate(III)
  - (u) Potassiumdiaquadioxalatochromate(III)
  - (v) Pentaamminenitrito-N-cobalt(III)nitrate
  - (w) Ammineaquadichloridoplatinum(II)
  - (x) Tris(ethane-1,2-diamine)cobalt(III)chloride
  - (y) Hexaaquatitanium(III)ion
  - (z) Tetrachloridonickelate(II)ion
- Q6. (i) Aquacyanidobis(ethane-1,2-diamine)cobalt(III)ion
- (ii) Tetrachloridoplatinate(II)ion
  - (iii) Triamminetrichloridochromium(III)
  - (iv) Dibromidobis(ethane-1,2-diamine)cobalt(III)ion
  - (v) Potassiumhexacyanidoferrate(III)
  - (vi) Hexaaquamangnese(III)ion
  - (vii) Hexaamminenickel(II)chloride
  - (viii) Tris(ethane-1,2-diamine)cobalt(III)ion
  - (ix) Tetracarbonylnickel(0)
  - (x) Hexaamminecobalt(III)chloride

(xi) Tetraamminechloridonitrito-N-cobalt(III)chloride

(xii) Diamminechlorido(methylamine)platinum(II)chloride



(i) same as (h)

