CHEMISTRY

BOOKS - CENGAGE CHEMISTRY (HINGLISH)

REDOX REACTIONS

Solved Examples

1. Calculate the oxidation number of all the atoms in the following compounds and ions:

a. $PbSO_4$, b. CrO_4^{2-}, c. Sb_2O_5, d. $NH_4\_(2)SO_4$

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2. Determine the oxidation number of following underline elements:

a. $HC\underline{N}$

b. $H\underline{N}C$

c. $H\underline{N}O_3$

d. $K\underline{O}_2$

e. $\underline{Fe_3}O_4$

f. $K\underline{I_3}$

g. $\underline{N_3}H$

h. $\underline{Fe}(CO)_5$

i. $\underline{Fe_{0.94}}O$

j. $\underline{N}H_2NH_2$

k. $\underline{Fe}SO_4(NH_4)_2SO_46H_2O$

l. $\underline{N}OCI$

m. $NO\underline{Cl}O_4$

n. $Na_2\left[\underline{Fe}(CN)_5NO\right]$

o. $\left[\underline{Fe}(NO)(H_2O)_5\right]SO_4$

p. $Na_{\underline{2S_4}O_6}$

q. $(CH_3)_2\underline{SO}$

r. $Na\underline{S_2}O_3$

s. $CaO\underline{Cl_2}.$

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3. Using stock notation, represent the following compounds:

a. $HAuBr_4$, b. Tl_2O , c. FeO , d. Fe_2O_3, e. $CuBr$, f. CuO

g. MnO, h. MnO_2

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4. Which of the following species do not show disproportionation reaction and why?

$BrO^{\ominus}$ (hypobromirte ion), $BrO_2^{\ominus}$ (bromite ion), $BrO_3^{\ominus}$ (bromate ion),and $BrO_4^{\ominus}$ (perbromate ion)

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5. Classify the following redox reactions:

a. $N_2(g) + O_2(g) \rightarrow 2NO(g)$

b. $2Pb(NO)_3(s) \rightarrow 2PbO(s) + 2NO_2(g) + \frac{1}{2}O_2(g)$

c. $NaH(s)H_2O(l) \rightarrow NaOH(aq) + H_2(g)$

d. $2NO_2(g) + 2\overset{\ominus}{O}H(aq) \rightarrow NO_2^{\ominus}(aq) + NO_3^{\ominus}(aq) + H_2O(l)$

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6. Why following two reaction proced differently?

$Pb_3O_4 + 8HCl \rightarrow 3PbCl_2 + Cl_2 + 4H_2O$

and

$Pb_3O_4 + 4HNO_3 \rightarrow 2Pb(NO_3)_2 + PbO_2 + 2H_2O$

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7. Use the arbitrary method to balance the following equations:

a. $KIO_3 + KI + H_2SO_4 \rightarrow KI_3 + K_2SO_4 + H_2O$

b. $Pb(N_3)_2 + Co(MnO_4)_3 \rightarrow CoO + MnO_2 + Pb_3O_4 + NO$

c.

$K_4[Fe(CN)_6] + KOH + Ce(NO_3)_4 \rightarrow Fe(OH)_3 + Ce(OH)_3 + K_2CO_3$

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8. Balance the following reactions by oxidation number method

$KMnO_4 + H_2SO_4 + HCl \rightarrow K_2SO_4 + MnSO_4 + H_2O + Cl_2$

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9. Balance the following reaction by oxidation number method:

$CrO_4^{2-} + I^{\ominus} \rightarrow Cr^{3+} + IO_3^{\ominus}$ (in alkaline or basic medium)

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10. Complete and balance the following in acidic medium:

$Ag^{\oplus} + AsH_3 \rightarrow H_3AsO_3$

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11. Balance the following reaction in acidic medium.

$CuS + NO_3^{\ominus} \rightarrow cu^{2+} + S_8 = NO$

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12. Balance the following by ion electron method is basic medium.

$NO_3^{\ominus} + Zn \rightarrow Zn^{2+} + NH_4^{\oplus}$.

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13. Balance the following by ion electron method (acidic medium).

$Mn^{2+} + S_2O_8^{2-} \rightarrow MnO_4^{\ominus} + HSO_4^{\ominus}$

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14. Balance the following by ion electron method in acidic medium.

$CIO_3^{\ominus} + I_2 \rightarrow IO_3 + CI^{\ominus}$

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15. Which of the following are examples of disproportionation reactions?

a. $Ag(NH_3)_2^{\oplus} + 2H^{\oplus} \rightarrow Ag^{\oplus} + 2\overset{\oplus}{N}H_4$

b. $Cl_2 + 2\overset{\ominus}{O}H \rightarrow ClO^{\ominus} + Cl^{\ominus} + H_2O$

c. $CaCO_3 \rightarrow CaO + CO_2$

c. $CaCO_3 \rightarrow CaO + CO_2$

d. $2HgO \rightarrow 2Hg + O_2$

e. $Cu_2 + 2H^{\oplus} \rightarrow Cu + Cu^{2+} + H_2O$

f. $CuS + O_2 \rightarrow Cu + SO_2$

g. $2HCuCl_2 + \text{dilute with} H_2O \rightarrow Cu + Cu^{2+} + 4Cl^{\ominus} + 2H^{\oplus}$

h. $2H_2O_2 \rightarrow 2H_2O + O_2$

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16. Balance the following by ion electron method (basic medium):

$Cr(OH)_3 + IO_3^{\ominus} \rightarrow I^{\ominus} + CrO_4^{2-}$

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17. H_2SO_4 acts as an oxidising agent, a dehydrating agent, and an acid. Among each of the following reactions, which behaviour is shown by H_2SO_4?

a. $C_6H_{12}O_6 + H_2SO_4(conc) \rightarrow 6C + 6H_2O$

b. $5H_2SO_4(conc) + 4Zn \rightarrow H_2S + 4Zn^{2+} + 4SO_4^{2-} + 4H_2O$

c. $H_2SO_4(dil) + Zn \rightarrow Zn^{2+} + H_2 + SO_4^{2-}$

d. $H_2SO_4(dil)ZnCO_3 \rightarrow Zn^{2+} + CO_2 + CO_2 + SO_4^{2-} + H_2O$

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18. Balance the following reaction by ion electrons method (acidic medium).

$As_2S_3 - NO_3^{\ominus} \rightarrow S + NO_2 + AsO_4^{3-}$

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19. For the reaction

$3Br_2 + 6OH^{\ominus} \prec Br^{\ominus} + BrO_3^{\ominus} + 3H_2O$

Equivalent weight of Br_2 (molecular weitht M) is

A. $\frac{M}{2}$

B. $\frac{M}{10}$

C. $\left(\frac{M}{2}+\frac{M}{10}\right)$

D. $\left(\frac{M}{6}\right)$

Answer: C

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20. $P_4 + 3\overset{\ominus}{O}H + 3H_2O \rightarrow 3H_2O \rightarrow 3H_2PO_2^{\ominus} + PH_3$

Equivalent weight of P_4 is

A. $\frac{M}{4}$

B. $\frac{M}{12}$

C. $\left(\frac{M}{4}+\frac{M}{12}\right)$

D. $\left(\frac{M}{2}+\frac{M}{6}\right)$

Answer: C

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21. $3KClO_3 + 3H_2SO_4 \rightarrow 3KHSO_4 + HClO_4 + 2ClO_2 + H_2O$

Equivalent weight of $KClO_3$ is

A. $\frac{M}{4}$

B. $\frac{M}{2}$

C. $\left(M + \frac{M}{2}\right)$

D. $\left(\frac{M}{4} + \frac{M}{2}\right)$

Answer: C

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22. $Cu_2S + MnO_4^{\ominus} \rightarrow Cu^{2+} + Mn^{2+} + SO_2$

The equivalent weight of Cu_2 is

A. $\frac{M}{2}$

B. $\frac{M}{6}$

C. $\frac{M}{8}$

D. $\frac{M}{4}$

Answer: C

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23.

$As_2S_3 + 7NaClO_3 + 12NaOH \rightarrow 2Na_3AsO_4 + 7NaClO + 3Na_2SO_4 +$

The equivalent weight of As_2S_3 is

A. $\frac{M}{24}$

B. M

C. $\frac{M}{2}$

D. $\frac{M}{28}$

Answer: D

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24. The equivalent weight of HNO_3 (molecular weight $= 63$) in the following reaction is

$3Cu + 8HNO_3 \rightarrow 3Cu(NO_3)_2 + 2NO + 4H_2O$

A. $\frac{4 \times 63}{3}$

B. $\frac{63}{5}$

C. $\frac{63}{3}$

D. $\frac{63}{8}$

Answer: D

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25. The equivalent weight of H_2SO_4 in the following reaction is

$$Na_2Cr_2O_7 + 3SO_2 + H_2SO_4 \rightarrow 3Na_2SO_4 + Cr_2(SO_4)_3 + H_2O$$

A. 98

B. $\frac{98}{6}$

C. $\frac{98}{2}$

D. $\frac{98}{8}$

Answer: B

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26. The equivalent weight of potash alum

$\left(K_2SO_4.\ Al_2(SO_4)_3.24H_2O\right)$ is

A. M

B. $\frac{M}{2}$

C. $\frac{M}{6}$

D. $\frac{M}{8}$

Answer: B

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27. Calculate the number of moles of Cu and HNO_3 to give NO and NO_2 in the $(2:1)$ molar ratio.

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28. Balance the following equations:

a. $BaCrO_4 + KI + HCl \rightarrow BaCl_2 + I_2 + KCl + CrCl_3 + H_2O$

b. $SO_2 + Na_2CrO_4 + H_2SO_4 \rightarrow Na_2SO_4 + Cr_2(SO_4)_3 + H_2O$

c. $C_2H_5OH + I_2 + \overset{\ominus}{O}H \rightarrow CHI_3 + HCO_2^{\ominus} + H_2O + I^{\ominus}$ (Basic)

d. $As_2S_3 + HNO_3 \rightarrow H_3AsO_4 + H_2SO_4 + NO$

e. $\ldots\ldots + HC_2O_4^{\ominus} \rightarrow CO_3^{2-} + Cl^{\ominus}$ (Acidic)

f. $HgS + HCl + HNO_3 \rightarrow H_2NO_3 \rightarrow H_2HgCl_4 + NO + S + H_2O$

g. $Mn_2O_7 \rightarrow MnO_2 + O_2$

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29. Balance the following equations:

i. $As_2S_3 + NaClO_3 + NaOH \rightarrow Na_3AsO_4 + NaClO + Na_2SO_4$

ii. If M is the molecular mass of As_2S_3, the equivalent weight of As_2S_3 is

a. $M/24$, b. M ,c. $M/2$,d. $M//28$`.

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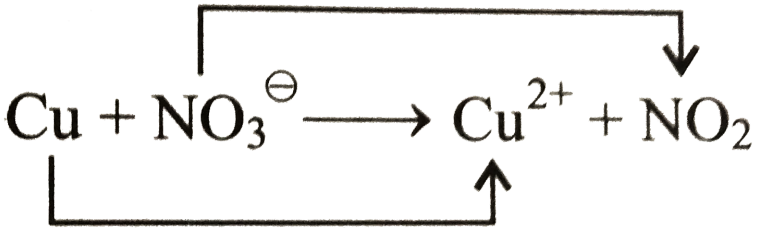
30. Write a balanced equaiton when copper reacts with nitric acid, a brown gas is fromed and the solution turns blue.



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31. Balance the following redox equaiton by both methods.

$\left[Cr(OH)_4\right]^{\ominus} + H_2O_2 \rightarrow CrO_4^{2-} + H_2O$(basic medium)

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32. Balance the following reactions:

a.

$U(SO_4)_2 + KMnO_4 + H_2O \rightarrow H_2SO_4 + K_2SO_4 + MNSO_4 + UO_2SO_4$

b. $Bi_2O_3 + NaOH + NaOCl \rightarrow NaBiO_3 + NaCl + H_2O$

c. $Ca(Ocl)_2 + KI + HCI \rightarrow I_2 + CaCl_2 + H_2O + KCI$

d. $MnO + PbO_2 + HNO_3 \rightarrow HMnO_4 + Pb(NO_3)_2 + H_2O$

(e) $CeI_3 + KOH + Cl_{20 \rightarrow K_2CrO_3 + KIO_4 + Kcl + H_2O}$

(g) $Na_2HasO_3 + NaI + HCl \rightarrow NaCl + KBr + H_3AsO_4$

(g) $Na_2TeO_3 + Nal \rightarrow NaCl + Te + H_2O + I_2$

(h)

$K_3\left[Fe(CN)_6\right] + Cr_2O_3 + KOH \rightarrow K_4\left[Fe(CN)_6\right] + K_2CrO_4 + H_2O$

(i) $NH_3 + O_2 \rightarrow NO + H_2O$

(j) $HNO_3 + HI \rightarrow NO + I_2 + H_2O$

(k) $MnSO_4 + (NH_4)_2S_2O_8 + H_2O \rightarrow MnO_2 + H_2SO_4 + (NH_4)_4$

(l) $CuO + NH_3 \rightarrow N_2 + H_2O + Cu$

m. $NaHSO_4 + Al + NaOH \rightarrow Na_2S + Al_2O_3 + H_2O$

n. $CoCl_2 + Na_2O_2 + NaOH + H_2O \rightarrow Co(OH)_3 + NaCl$

o.

$\left[Cu(NH_3)_4\right]Cl_2 + KCN + H_2 \rightarrow NH_3 + NH_4Cl + KCl + KCNO + K_2$

p. $Sb_2O_3 + KIO_3 + HCI + H_2O \rightarrow HSb(OH)_6 + KCI + ICI$

q. $WO_3 + SnCl_2 + HCl \rightarrow W_3O_8 + H_2SnCl_6 + H_2O$

r. $CoCl_2 + KNO_2 + CI \rightarrow K_3Co(CNO_2)_6 + NO + KCI + H_2O$

s. $V(OH)_4Cl + FeCl_2 + HCl \rightarrow VOCl_2 + FeCl_2 + FeCl_3 + H_2O$

t. $Ag + KCN + O_2 + H_2O \rightarrow K\left[Ag(CN)_2\right] + KOH$

u. $KClO_3 + H_2SO_4 \rightarrow KHSO_4 + O_2 + ClO_2 + H_2O$

v. $Cr_2O_3 + Na_2CO_3 + KNO_3 \rightarrow Na_2CrO_4 + CO_2 + KNO_2$

w. $Au + CN^{\ominus} + O_2 \rightarrow \left[Au(CN)_4\right]^{\ominus}$ (aqueous solution)

x. $Zn + ReO_4^{\ominus} \rightarrow Re^{\ominus} + Zn^{2+}$ (acidic medium)

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33. Complete and balance the following equations:

1. $ClO_2 + O_2^{2-} \rightarrow ClO_2^{\ominus} + ?$ (Basic medium)

2. $Cl_2 + IO_3^{\ominus} \rightarrow IO_4^{\ominus} + ?$ (Basic medium)

3. $Cu + NO_3^{\ominus} + ? \rightarrow Cu^{2+} + NO_2 + ?$

4. $H_2S + K_2CrO_4 + H_2SO_4 \rightarrow ?$

5. $Fe^{2+} + MnO_4^{\ominus} \rightarrow Fe^{3+} + Mn^{2+} + ?$

6. $Zn + HNO_3 \rightarrow ? + N_2O + ?$

7. $HI + HNO_3 \rightarrow ? + NO + H_2O$

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Ex 2 1

1. Identify the oxidant and the reductant in the following reactions:

a. $Zn(s) + \frac{1}{2}O_2(g) \rightarrow Zn(s)$

b. $Zn(s) + 2H^{\oplus}(aq) \rightarrow Zn^{2+}(aq) + H_2(g)$

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2. Find the oxidation number of sulphur in the following compounds: $H_2S, H_2SO_4, S_2O_4^{2-}, S_2O_8^{2-}, HSO_3^{\ominus}$.

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3. Find the oxidation number of Cl in $HCl, HClO, ClO_4^{\ominus}$, and $Ca(Ocl)Cl$.

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4. Find the oxidation number of carbon in the following compounds: $CH_3OH, CH_2O, HCOOH, C_2H_2$.

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5. Find the oxidation number of Fe in Fe_3O_4 and in $Fe(III)_4\left[Fe(II)(CN)_6\right]_3$.

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6. Identify the oxidant and reductant in the following reactions:

a.

$10^{\oplus}(aq) + 4Zn(s) + NO_3^{\ominus}(aq) \rightarrow 4Zn^{2+}(aq) + NH_4^{\oplus}(aq) + 3H_2O(l)$

b. $I_2(g) + H_2S(g) \rightarrow 2Hl(g) + S(s)$

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7. Identify the species undergoing oxidation and reduction.

a. $H_2S(g) + Cl_2(g) \rightarrow 2HCl(g) + S(s)$

b. $3Fe_3O_4(s) + 8Al(s) \rightarrow 9Fe(s) + 4Al_2O_3(s)$

c. $2Na(s) + H_2(g) + H_2(g) \rightarrow 2NaH(s)$

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8. Justify that the reaction

$2Cu_2O_s + Cu_2S(s) \rightarrow 6Cu(s) + SO_2(g)$ a redox reaction. Identify the

species oxidised / reduced. Which acts as an oxidanat and which acts as a reductant?

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9. Which of the following represents oxidation?

a. $NO_2^{\ominus} \rightarrow N_2$, b. $VO_2^{\ominus} \rightarrow VO_3^{\ominus}$

c. $ClO^{\ominus} \rightarrow Cl^{\ominus}$, d. $CrO_4^{2-} \rightarrow cr_2O_7^{2-}$

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10. Using stock notation, represent the following compounds and write their names also.

a. $Na_2Cr_2O_7$, b. Mn_2O_7, c. V_2O_5, d. K_2CrO_4

e. Cr_2O_3, f. $FeSO_4$, g. $Fe_2(SO_4)_3$, h. $CuBr_2$

i. Cu_2Br_2

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Ex 2 2

1. Indicate the species which are oxidised and reduced in the following reactions:

(a) $CN^{\ominus} + OCl^{\ominus} \rightarrow N_2 + HCO_3^{\ominus} + Cl^{\ominus}$

(b) $C_6H_5OH + O_3 \rightarrow CO_2 + H_2O + O_2$

(c) $I^{\ominus} + O_3 \rightarrow O_2 + I_2$

(d) $S_2O_3^{2-} + Cl_2 \rightarrow HSO_4^{\ominus} + Cl^{\ominus}$

(e) $C + ZnO \rightarrow Zn + CO$

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2. What is the oxidation stae of Cl in

(a) CrO_2Cl_2 , (b) $HClO_4$

(c) $Ba(ClO_3)_2$, (d) Cl_2O_7

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3. Balance the following half-reactions in acidic medium:

(a) $IO_3^{\ominus}(aq) \rightarrow I_3^{\ominus}(aq)$

(b) $NO_3^{\ominus}(aq) \rightarrow NO_2(g)$

(c) $VO^{2-}(aq) \rightarrow B^{3+}(aq)$

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4. Write balanced redox reactions for each of the following reactions:

(a) Potassium dichromate $(K_2Cr_2O_7)$ reacts with hydroiodic acid (HI) to produce potassium iodide, chromium (III) iodide, and solid iodine, $I_2(s)$.

(b) A purple solution of aqueous potassium permanganate $(KMnO_4)$ reacts with aqueous sodium sulphite (Na_2SO_3) in basic solution to yield the green magnanate ion $\left(MnO_4^{2-}\right)$ and sulphate ion $\left(SO_4^{2-}\right)$.

(c) $Sn^{2+}(aq)$ reduce $I_4^{\ominus}(aq)$ to $I^{\ominus}(aq)$ and is oxidised to Sn^{4+}.

(d) $H_2O_2(aq)$ oxidises $Mn^{2+}(aq)$ to MnO_2 in basic medium.

(e) $H_2O_2(aq)$ reduces $Cr_2O_7^{2-}(aq)$ to green coloured $Cr^{3+}(aq)$ in acidic medium.

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5. Balance the following chemical reactions (by ion electron method)

(a) $C_2H_5OH + MnO_4^{\ominus} \rightarrow CH_3COO^{\ominus} + MnO_2 + H_2O + \overset{\ominus}{O}H$

(b) $\left[Fe(CN)_6\right]^{3-} + N_2H_4 + \overset{\ominus}{O}H \rightarrow [Fe(CN_6)]^{4-} + N_2 + H_2O$

(c) $CN^{\ominus} + MnO_4^{\ominus} + H_2O \rightarrow MnO_2 + CNO^{\ominus} + \overset{\ominus}{O}H$

(d) $CuO + NH_3 \rightarrow Cu + N_2 + H_2O$

(e) $HI + HNO_3 \rightarrow I_2 + NO + H_2O$

(f) $H_2S + SO_2 \rightarrow S + H_2O$

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6. Write balanced ionoic half equation (oxidation and reduction) for each of the following reactions:

(a) $Mn^{3+}(aq) \rightarrow MnO_2(s) + Mn^{2+}(aq)$

(b) $Mn(s) + NO_3^{\ominus}(aq) \rightarrow Mn^{2+}(aq) + NO_2(g)$

(c) $H_2O_2(aq) + Fe^{2+}(aq) \rightarrow Fe^{3+}(aq) + H_2O(l)$

(d) $Te(s) + NO_3^{\ominus}(aq) \rightarrow TeO_2(s) + NO(g)$

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7. Balance the following half reactions in basis medium:

(a) $CrO_4^{2-}(aq) \rightarrow Cr(OH)_4^{\ominus}(aq)$

(b) $ClO^{\ominus}(aq) \rightarrow Cl^{\ominus}(aq)$

(c) $Bi^{3+}(aq) \rightarrow BiO_3^{\ominus}(aq)$

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8. Write balanced net ionic equations for the following reactions in basic solution:

(a) $H_2O_2(aq) + ClO_4^{\ominus}(aq) \rightarrow ClO_2^{\ominus}(aq) + O_2(g)$

(b)

a. $H_2O_2(aq) + ClO_4^{\ominus}(aq) \longrightarrow ClO_2^{\ominus}(aq) + O_2(g)$

b. $Fe(OH)_2(s) + CrO_4^{2-}(aq)$ ⟶

(c) $Cu(OH)_2(s) + N_2H_4(aq) \rightarrow Cu(s) + N_2(g)$

(d) $MnO_4^{\ominus} + IO_3^{\ominus}(aq) \rightarrow MnO_2(s) + IO_4^{\ominus}(aq)$

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9. Balanced the following equations:

(a) $H_2O_2 + H^{\oplus} + Fe^{2+} \rightarrow H_2O + Fe^{3+}$

(b) $Ibr + BrO_3^{\ominus} + H_2O \rightarrow IO_3^{\ominus} + Br^{\ominus} + H^{\oplus}$

(c) $I^{\ominus} + IO_3^{\ominus} + H^{\oplus} \rightarrow H_2O + I_2$

(d) $\underset{\text{superoxide ion}}{O_2^{\ominus}} + H_2O \rightarrow \overset{\ominus}{O}H + O_2$

(e) $HS^{\ominus} + HSO_3^{\ominus} \rightarrow S_2O_3^{2-} + H_2O$

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10. For the redox reaction:

$Cr_2O_7^{2-} + H^{\oplus} + Ni \rightarrow Cr^{3+} + Ni^2 + H_2O$

The correct coefficient of the reactants for the balanced reaction are:

A. $Cr_2O_7^{2-} = 1, Ni = 3, H^{\oplus} = 14$

B. $Cr_2O_7^{2-} = 3, Ni = 3, H^{\oplus} = 12$

C. $Cr_2O_7^{2-} = 2, Ni = 3, H^{\oplus} = 14$

D. $Cr_2O_7^{2-} = 1, Ni = 1, H^{\oplus} = 16$

Answer: A

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11. SO_2 under atomspheric condition changes to SO_x^{2-}. If oxidation number of S in SO_x^{2-} is $+6$, what is the value of x in SO_x^{2-}?

A. 2

B. 1

C. 3

D. 4

Answer: A

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12. Which of the following can act as an oxidising agent as well as a reducing agent?

1. H_2O_2, 2. H_2S, 3. SO_2, 4. HNO_2

A. 1, 2, 3

B. 2, 3, 4

C. 1, 3, 4

D. All

Answer: C

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13. Sulphur has highest oxidation state in

A. SO_2

B. H_2SO_4

C. $Na_2S_4O_6$

D. $Na_2S_2O_3$

Answer: B

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14. The number of electrons involved in the reduction of nitrate $\left(NO_3^{\ominus}\right)$ to hydrazine (N_2H_4) is

A. 8

B. 7

C. 3

D. 5

Answer: B

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15. Oxidation number of P in $Ba(H_2PO_2)_2$ is

A. $+2$

B. $+3$

C. $+1$

D. -1

Answer: C

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16. Which of the following is a disproportional reactions ?

A. $Cr_2O_7^{2-} + 2\overset{\ominus}{O}H \rightarrow 2CrO_4^{2-} + H_2O$

B. $CrO_4^{2-} + 2H^{\oplus} \rightarrow Cr_2O_2^{2-} + H_2O$

C. $CaCO_3 + 2H^{\oplus} \rightarrow Ca^2 + H_2O + CO_2$

D. $Cu_2O + 2H^{\oplus} \rightarrow Cu + Cu^{2+} + H_2O$

Answer: D

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17. In balancing the half reaction

$CN^{\ominus} \rightarrow CNO^{\ominus}$ (skeltan)

The number of electrosn that must be added is

A. 1 on the right

B. 0

C. 1 on the left

D. 2 on the right

Answer: D

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18. Which of the following changes requires a reducing agent ?

A. $H_3AsO_3 \rightarrow HAsO_4^{2-}$

B. $BrO_3^{\ominus} \rightarrow BrO^{\ominus}$

C. $CrO_4^{2-} \rightarrow Cr_2O_7^{2-}$

D. $Al(OH)_3 \rightarrow \left[Al[OH)_4\right]^{\ominus}$

Answer: B

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Exercise

1. In the following reactions:

a. $3MnO_2 + 4Al \rightarrow 3Mn + 2Al_2O_3$

b. $2MnO_4^{\ominus} + 16H^{\oplus} + 10Cl^{\ominus} \rightarrow 2Mn^{2+} + 5Cl_2 + 8H_2O$

Which species is reduced and which is oxidised?

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2. Which of the following are redox reactions?

A. $Zn + 2HCl \rightarrow ZnCl_2 + H_2$

B. $Al(OH)_3 + 3HCl \rightarrow AlCl_3 + 3H_2O$

C. $Ag^{\oplus} + I^{-} \rightarrow Agl$

D. Disproportionation of $Cu^{\oplus}$ in aqueous solution.

Answer: A::D

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3. What is the sum of oxidation numbers of various elements in $HCO_3^{\ominus}$ (bicarbonate) ion?

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4. What is the oxidation numbr of iodine in each of the following compounds: IF_7, IF_5, KI, I_2, ICI, HIO_4?

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5. What is the oxidation number of Mn is $KMnO_4$ K_2MNO_4 $MnSO_4$ MnO_2, and Mn_3O_4?

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6. What is the oxidation number of Mg and N in magnesium nitride?

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7. What is the oxidation number and valency of carbon in methanal $(HCHO)$?

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8. Write the following redox reactions using half equations:

a. $Zn(s) + PbCl_2(aq) \rightarrow Pb(s) + ZnCl_2(aq)$.

b. $2Fe^{3+}(aq) + 2I^{\ominus}(aq) \rightarrow I_2(aq) + 2Fe^{2+}(aq)$

c. $2Na(s) + Cl_2(g) \rightarrow 2NaCl(s)$

d. $Mg(s) + Cl_2(g) \rightarrow MgCl_2(s)$

e. $Zn(s) + 2H^{\oplus}(aq) \rightarrow Zn^{2+}(aq) + H_2(g)$.

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9. In the reaction given in euaqution 8, mention:

I. Which reactant is oxidised? To what?

II. Which reactant is the oxidiser?

III.Which reactant is reduced? To what?

IV. What reactant is the reducer?

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10. Write correctly balanced equaitons for the following redox reaction.

Using half reaction:

a. $H_2S + Fe^{3+} \rightarrow Fe^{2+} + S \downarrow + H^{\oplus}$

b. $I^{\ominus} + IO_3^{\ominus} + H^{\oplus} \rightarrow I_2 + H_2O$

c. $Bi(s) + NO_3^{\ominus} + H^{\oplus} \rightarrow NO_2 + Bi^{3+} + H_2O$

d. $I^{\ominus} + O_2(g) + H_2O \rightarrow I_2 + \overset{\ominus}{O}H$

e. $Cu(s) + Au^{\oplus} \rightarrow Au(s) + Cu^{2+}$

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11. In question 10, state which element is oxidised by which element and what is reduced to what in the reactions expressed by the respective equaitons.

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12. Balance the following redox reactions.

Coppoer reacts with nitric acid, a brown, gas is formed and solution turns blue.

a. $Cu + NO_3^{\ominus} \rightarrow NO_2 + Cu^{2+}$

b. $Cr(OH)_4^{\ominus} + H_2O_2 \rightarrow CrO_4^{2-} + H_2O$ (basic solutions)

c. $SnO_2 + C \rightarrow Sn + CO$

d. $Fe_2O_3 + C \rightarrow Fe + CO$

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13. Write correctly balanced half reactions and overall equations for the following skeletal equations:

a. $NO_3^{\ominus} + Bi(s) \rightarrow Bi^{3+} + NO_2$ (in acid solution)

b. $Fe(OH)_3(s) + H_2O_2 \rightarrow Fe(OH)(s) + H_2O + O_2$ (in basic medium)

c. $Cr_2O_7^{2-} + C_2H_4O \rightarrow C_2H_4O_2 + Cr^{3+}$ (in acid solutions)

d. $MnO_4^{\ominus} + H_2C_2O_4 \rightarrow Mn^{2+} + CO_2 \uparrow$ (in acid solutions)

e. $Al(s) + NO_3^{\ominus} \rightarrow \left[Al(OH)_4\right]^{\ominus} + NH_3$ (in basic solution)

f. $Cr_2O_7^{2-} + Fe^{2+} \rightarrow Fe^{2+} + Cr^{3+}$ (in acid solution)

g. $MnO_4^{\ominus} + Br^{\ominus} \rightarrow Mn^{2+} + Br_2$ (in acid solution)

h. $PbO_2 + Cl^{\ominus} \rightarrow ClO^{\ominus} + \left[Pb(OH)_3\right]^{\ominus}$ (in basic solution)

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14. Starting with correctly balanced half reactions, write the overall net ionic reaction in the following changes:

a. Chloride ion is oxidised to Cl_2 by $\underline{Mn}O_4^{\ominus}$ in acid solution.

b. Nitrous acid $(H\underline{N}O_2)$ reduce $MnO_4^{\ominus}$ in acidsolution.

c. Nitrous acid $(H\underline{N}O_2)$ oxidises $I^{\ominus}$ to I_2 in acid solution.

d. Chlorate ion $\left(\underline{Cl}O_3^{\ominus}\right)$ oxidises Mn^{2+} to $MnO_2(s)$ in acid solution.

e. Chromine ion $\left(\underline{C}rO_3^{\ominus}\right)$ is oxidation numbers of the basic solution.

Also find out the change in oxidation numbers of the underline atoms.

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15. Assign oxidation numbers to the elements in the following ionic compounds.

a. $NaBr$, b. MgO , c. AlF_3

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16. Calculate the oxidation number of the underlines elements:

a. $\underline{P}H_3$, b. $\underline{Mg}O$, c. $H\underline{N}O_3$, d. $H_3\underline{P}O_4$

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17. Calculate the oxidation number of the underlined elements in the following compounds:

a. $K\underline{Mn}O_4$, b. $\underline{Cr}O_2Cl_2$, c. $Na\underline{I}O_3$

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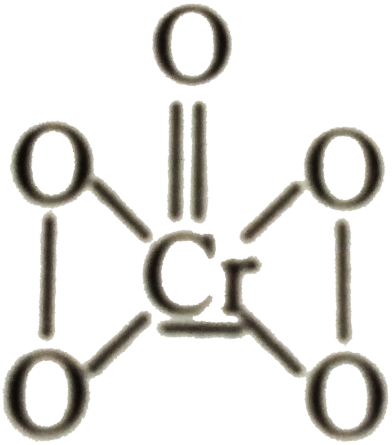
18. What is the oxidation number of the underlined elements?

a. $H_2\underline{S}$, b. $H_2\underline{S}O_4$ c. $Na\underline{S_2}O$

d. $Na_2\underline{S_4}O_6$ e. $Ca(H\underline{S}O_3)_2$ f. $H_2\underline{S_2}O_8$

e. $Ca(H\underline{S}O_3)_2$

h. 

k. $H-N \overrightarrow{\equiv} \underline{C}$

g. $H_2\underline{S}O_5$, h.

, i. $\underline{N}H_4\underline{N}O_3$, j. $H-\underline{C}\equiv N$, k. $H-N \xrightarrow{=} \underline{C}$, l. $H\underline{N}O_4$

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19. Balance the following equation stepwise:

$Cr_2O_7^{2-} + Fe^{2+} + + H^{\oplus} \rightarrow Cr^{3+} + Fe^{3+} + H_2O$

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20. Balance the following equation in a basic solution stepwise:

$$NO_3^{\ominus} + Zn \rightarrow Zn^{2+} + NH_4^{\oplus}$$

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21. Balance the following equations by the ion electron method:

a. $MnO_4^{\ominus} + Cl^{\ominus} + H^{\oplus} \rightarrow Mn^{2+} + H_2O + Cl_2$

b. $Cr_2O_7^{2-} + I^{\ominus} + H^{\oplus} \rightarrow Cr^{3+} + H_2O + I_2$

c. $H^{\oplus} + SO_4^{2-} + I^{\ominus} \rightarrow H_2S + H_2O + I_2$

d. $MnO_4^{\ominus} + Fe^{2+} \rightarrow Mn^{2+} + Fe^{3+} + H_2O$

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22. Balance the following equations by oxidation number method:

a. $Fe^{2+} + Sn^{+2} \rightarrow Sn^{4+} + fe^{2+}$

b. $MnO_4^{\ominus} + H_2S \rightarrow S + Mn^{2+}$

c. $Cr_2O_7^{2-} + 2I^{\ominus} \rightarrow 2Cr^{3+} + I_2$

d. $Zn + NO_3^{\ominus} \rightarrow Zn^{2+} + NH_4^{\oplus}$

e. $MnO_4^{\ominus} + SO_3^{2-} \rightarrow SO_4^{2-} + MnO_2$

f. $Cl_2 + IO_3^{\ominus} \rightarrow IO_4^{\ominus}$ (in basic medium)

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23. Balance the following equations by ion electron method:

a. $Cr_2O_7^{2-} + C_2H_4O + H^{\oplus} \rightarrow 2Cr^{3+} + C_2H_4O_2 + H_2O$

b. $Cu_2O + H^{\oplus} + NO_3^{\ominus} \rightarrow Cu^{2+} + NO + H_2O$

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24. Balance the following equations by ion electron (half reaction) method for each of the following equations:

a. $Cr_2O_7^{2-} + Fe^{2+} \rightarrow cr^{3+} + Fe^{3+} + H_2O$

b. $H_2O_2 + I^{\ominus} + H^{\oplus} \rightarrow H_2O +_2$

c. $AsO_3^{3-} + H^{\oplus} + IO_3^{\ominus} \rightarrow AsO_4^{3-} + I^{\ominus}$ (in acid medium)

d. $Cr_2O_7^{2-} + H^{\oplus} + Cl^{\ominus} \rightarrow 3Cr^{3+} + Cl_2 + H_2O$

e. $MnO_4^{\ominus} + Fe^{2+} \rightarrow Mn^{2+} + Fe^{3+}$ (in alkaline medium)

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25. Indicate in the following reactions which of the reactants, if any, are oxidised or reduced:

a. $2HI(aq) + Cl_2(aq) \rightarrow I_2(s) + 2HCl(aq)$

b. $2MnO_2 + 4Al \rightarrow 3Mn + 2Al_2O_3$

c. $2MnO_4^{\ominus} + 10Cl^{\ominus} + 16H^{\oplus} \rightarrow 2Mn^{2+} + 5Cl_2 + 8H_2O$

d. $2Cu^{2+} + 2Br^{\ominus} + SO_2 + H_2O \rightarrow 2CuBr + 4H^{\oplus}$

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26. One mole of N_2H_4 loses ten moles of electrons to form a new compound A. Assuming that all the nitrogen appears in the new compound, what is the oxidation state of nitrogen in A? (There is no change in the oxidation state of hydrogen.)

A. $+1$

B. -3

C. $+3$

D. $+5$

Answer: C

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27. In the reaction:

$$Cr_2O_7^{2-} + 14H^{\oplus} + 6I^{\ominus} \rightarrow 2Cr^{3+} + 3H_2O + 3I_2$$

Which element is reduced?

A. Cr

B. H

C. O

D. I

Answer: A

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28. In the following equation, MnO_2 acts as

$$MnO_4^{2-} + 2H_2O + 2E^- \rightarrow MnO_2 + 4\overset{\ominus}{O}H$$

A. Oxidising agent

B. Reducing agent

C. Both oxidising and reducing agent.

D. Neither oxidising nor reducing agent.

Answer: B

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29. Balance the following equations by ion electron method:

a. $CuO + NH_3 \rightarrow Cu + H_2O + N_2$

b. $HNO_3 + I_2 \rightarrow HIO_3 + NO_2 + H_2O$

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Exercises Linked Comprehension

1. Consider the following unbalanced redox reaction:

$H_2O + AX + BY \rightarrow HA + OY + X_2B$

The oxidation number of X is -2 and niether X nor water is involved in the redox process.

The elements(s) undergoing oxidation is / are

A. A

B. B

C. Y

D. B or Y or both

Answer: D

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2. Consider the following unbalanced redox reaction:

$H_2O + AX + BY \rightarrow HA + OY + X_2B$

The oxidation number of X is -2 and niether X nor water is involved in the redox process.

The positive oxidation states of B and Y in BY are respectively,

A. $+1, \ -1$

B. $+2, \ -2$

C. $+3, \ -3$

D. All of these

Answer: D

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3. Consider the following unbalanced redox reaction:

$H_2O + AX + BY \rightarrow HA + OY + X_2B$

The oxidation number of X is -2 and niether X nor water is involved in

the redox process.

If the above reaction is balanced with smallest whole number coefficients, the sum of the stoichiometric coefficients of all the compound is

A. 9

B. 8

C. 7

D. 6

Answer: B

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4. Oxidation reaction involves loss of electrons, and reduction reaction involves gain of electrons. The reaction in which a species disproportinates into two oxidation states (lower and higher) is called disproportionation reaction.

Which of the following statements is wrong?

A. An acidified $K_2Cr_2O_7$ paper on being exposed to SO_2 turns green.

B. Mercuric chloride and stannous chloride cannot exist as such.

C. Iron turning on addition to $CuSO_4$ solution decolourises the blue colour.

D. $[CuI_4]^{2-}$ is formed but $[CuCl_4]^{2-}$ is not.

Answer: D

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5. Oxidation reaction involves loss of electrons, and reduction reaction involves gain of electrons. The reaction in which a species disproportinates into two oxidation states (lower and higher) is called disproportionation reaction.

Which of the following statements is wrong?

A. Acidified $KMnO_4$ solutions decolourises on the addition of sodium oxalate.

B. In the reaction between Br_2 and CsI, Br_2 is an oxidising agent and CsI is a reducing agent.

C. In the reaction $2K_2SO_3 + I_2 \rightarrow 2KI + K_2S_4O_6$, the change in the oxidation number of S is 0.5.

D. C has the same oxidation number in both CH_4 and CO_2

Answer: D

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6. Oxidation reaction involves loss of electrons, and reduction reaction involves gain of electrons. The reaction in which a species disproportinates into two oxidation states (lower and higher) is called disproportionation reaction.

Which of the following statements is correct?

A. An element in the lowest oxidation state acts only as a reducing agent.

B. An element in the highest oxidation state acts only as a reducing agent.

C. The oxidation number of V is $Rb_4K(HV_{10}O_{28})is + 4.$

D. The oxidation number and valency of Hg in calomel is $+1$

Answer: A

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7. Oxidation reaction involves loss of electrons, and reduction reaction involves gain of electrons. The reaction in which a species disproportinates into two oxidation states (lower and higher) is called disproportionation reaction.

Which of the following statements is wrong?

A. The algebraic sum of the oxidation numbers of all atoms in an iron is zero.

B. The oxidation number is an arbitrary number. It can have positive, negative, zero, or fractional values.

C. When a negative ion changes to neutral species, the process is oxidation.

D. The oxidation number of phosphorous can very from $-3to+5$.

Answer: A

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8. Oxidation reaction involves loss of electrons, and reduction reaction involves gain of electrons. The reaction in which a species disproportinates into two oxidation states (lower and higher) is called disproportionation reaction.

Which of the following is not a dispropotional reaction?

A. $\overset{\ominus}{O}H + Br_2 \rightarrow Br^{\ominus} + BrO_3^{\ominus}$

B. $Cu_2O + 2H^{\oplus} \rightarrow Cu + Cu^{2+} + H_2O$

C. $(CN)^{\ominus} \rightarrow CO_3^{2-} + NO_3^{\ominus}$

D. $(CN)_2 + 2\overset{\ominus}{O}H \rightarrow CN^{\ominus} + CNO^{\ominus} + H_2O$

Answer: C

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9. The valancy of carbons is generally 4, but its oxidation state may be $-4, -2, 0, +2, -1$, etc. In the compounds containing C, H, and O, the oxidation number of C is calculated as

Oxidation number of $C = \frac{2n_O - n_H}{n_C}$

Where n_O, n_H and n_C are the numbers of oxygen, hydrogen, and carbons, atoms, respectively.

Teh oxidation of C in diamonds is

A. 0

B. $+1$

C. -1

D. $+2$

Answer: A

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10. The valancy of carbons is generally 4, but its oxidation state may be $-4, -2, 0, +2, -1$, etc. In the compounds containing C, H, and O, the oxidation number of C is calculated as

Oxidation number of $C = \frac{2n_O - n_H}{n_C}$

Where n_O, n_H and n_C are the numbers of oxygen, hydrogen, and carbons, atoms, respectively.

In which of the following compounds is the valency of C two?

A. Ketenes

B. Alkenes

C. Allenes

D. Carbenes

Answer: D

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11. The valancy of carbons is generally 4, but its oxidation state may be $-4,\ -2, 0,\ +2,\ -1$, etc. In the compounds containing C, H, and O, the oxidation number of C is calculated as

Oxidation number of $C = \frac{2n_O - n_H}{n_C}$

Where n_O, n_H and n_C are the numbers of oxygen, hydrogen, and carbons, atoms, respectively.

In which of the following compounds is the oxidation state of carbon is zero?

A. CH_4

B. CH_3OH

C. $HCOOH$

D. $C_6H_{12}O_6$

Answer: D

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12. The valancy of carbons is generally 4, but its oxidation state may be $-4, -2, 0, +2, -1$, etc. In the compounds containing C, H, and O, the oxidation number of C is calculated as

Oxidation number of $C = \frac{2n_O - n_H}{n_C}$

Where n_O, n_H and n_C are the numbers of oxygen, hydrogen, and carbons, atoms, respectively.

In which of the following compounds is the oxidation state of C highest?

A. $HCOOH$

B. $HCHO$

C. CH_3OH

D. CH_4

Answer: A

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13. The valancy of carbons is generally 4, but its oxidation state may be $-4, -2, 0, +2, -1$, etc. In the compounds containing C, H, and O, the oxidation number of C is calculated as

Oxidation number of $C = \frac{2n_O - n_H}{n_C}$

Where n_O, n_H and n_C are the numbers of oxygen, hydrogen, and carbons, atoms, respectively.

In which of the following compounds is the oxidation state of C a fraction?

A. CO

B. CO_2

C. Carbon suboxide

D. All

Answer: C

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14. Redox equations are balanced either by ion-electron method or by oxidation number method. Both methods lead to the correct from of the balanced equation. The ion electron methodd has two advantages. So some chemists prefer to use the ion-electron method for redox reactions carried out in dilute aqueous solutions, where free ions have more or less independent existance.

The oxidation state method for redox reactions is mostly used for solid chemicals or for reactions in concentrated acid media.

For the reaction

$$K_4\left[Fe(CN)_6\right] \rightarrow Fe^{3+} + CO_2 + NO_3^{\ominus}$$

the n-factor is

A. 1

B. 11

C. $\frac{5}{3}$

D. 61

Answer: D

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15. Redox equations are balanced either by ion-electron method or by oxidation number method. Both methods lead to the correct from of the balanced equation. The ion electron methodd has two advantages. So some chemists prefer to use the ion-electron method for redox reactions carried out in dilute aqueous solutions, where free ions have more or less independent existance.

The oxidation state method for redox reactions is mostly used for solid chemicals or for reactions in concentrated acid media.

For the reaction

$FeS_2 \rightarrow Fe^{3+} + SO_2$

the n-factor is

A. 1

B. 11

C. 28

D. 61

Answer: B

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16. Redox equations are balanced either by ion-electron method or by oxidation number method. Both methods lead to the correct from of the balanced equation. The ion electron methodd has two advantages. So some chemists prefer to use the ion-electron method for redox reactions carried out in dilute aqueous solutions, where free ions have more or less independent existance.

The oxidation state method for redox reactions is mostly used for solid chemicals or for reactions in concentrated acid media.

For the reaction $Br_2 + 2NaOH \rightarrow NaBrO_3 + NaBr + H_2O$

n-factor is

A. 11

B. 28

C. 61

D. $\frac{5}{3}$

Answer: D

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17. Redox equations are balanced either by ion-electron method or by oxidation number method. Both methods lead to the correct from of the balanced equation. The ion electron methodd has two advantages. So some chemists prefer to use the ion-electron method for redox reactions carried out in dilute aqueous solutions, where free ions have more or less independent existance.

The oxidation state method for redox reactions is mostly used for solid chemicals or for reactions in concentrated acid media.

For the reaction

$As_2S_3 \rightarrow As^{5+} + SO_4^{2-}$

the n-factor is

A. 11

B. 28

C. 61

D. $\frac{5}{3}$

Answer: B

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18. Cartain materials such as turpentine oil, unsaturated organic compound, phosophorus, metals such as Zn, and Pb, etc., can absorb O_2 from air in the presence of H_2O, which is converted to absorb O_2 from air in the presence of H_2O, which is converted to H_2O_2. This is called autoxidation. Intermolecular redox reactions are those in which one molecule is oxidised and the other is reduced. Intramolecular redox reactions are those in which oen atom of a molecule is oxidised and the other atom is reduced.

Which of the following reactions is//are intramolecular redox reactions (s) ?

A. $2Mn_2O_7 \rightarrow 4MnO_2 + 3O_2$

B.

$$K_3\left[Fe(CN)_6\right] + 30H_2O \rightarrow Fe^{3+} + 6CO_2 + 6NO_3^{\ominus} + 60H^{\oplus} + 60e$$

C. $2HgO \rightarrow 2Hg + O_2$

D. $PhCHO \xrightarrow{NaOH} PhCH_2OH + PhCOONa$

Answer: A::C

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19. Cartain materials such as turpentine oil, unsaturated organic compound, phosophorus, metals such as Zn, and Pb, etc., can absorb O_2 from air in the presence of H_2O, which is converted to absorb O_2 from air in the presence of H_2O, which is converted to H_2O_2. This is called autoxidation. Intermolecular redox reactions are those in which one molecule is oxidised and the other is reduced. Intramolecular redox reactions are those in which oen atom of a molecule is oxidised and the other atom is reduced.

Which of the following reactions is/are disproportionation reactions (s) ?

A. $Cl_2 + 2\overset{\ominus}{O}H \rightarrow Cl^{\ominus} + ClO^{\ominus} + H_2O$

B. $2HCuCl_2 \rightarrow Cu + Cu^{2+}4Cl^{\ominus} + 2H^{\oplus}$

C. $HCHO + \overset{\ominus}{O}H \rightarrow CH_3OH + HCOO^{\ominus}$

D. $MgCO_3 \rightarrow MgO + CO_2$

Answer: A::B::C

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20. Cartain materials such as turpentine oil, unsaturated organic compound, phosophorus, metals such as Zn, and Pb, etc., can absorb O_2 from air in the presence of H_2O, which is converted to absorb O_2 from air in the presence of H_2O, which is converted to H_2O_2. This is called autoxidation. Intermolecular redox reactions are those in which one molecule is oxidised and the other is reduced. Intramolecular redox reactions are those in which oen atom of a molecule is oxidised and the

other atom is reduced.

Which of the following reactions is / are intermolecular redox reaction (s)

A. $5KI + KIO_3 + 6HCl \rightarrow 3I_2 + 6KCl + 3H_2O$

B. $Fe + N_2H_4 \rightarrow NH_3 + Fe(OH)_2$

C. $NO_3^{\ominus} + H_2S + H_2O + H^{\oplus} \rightarrow NH_4^{\oplus} + HSO_4^{\ominus}$

D. $CrO_7^{2-} + 2\overset{\ominus}{O}H \rightarrow 2CrO_4^{2-} + H_2O$s

Answer: A::B::C

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21. Cartain materials such as turpentine oil, unsaturated organic compound, phosophorus, metals such as Zn, and Pb, etc., can absorb O_2 from air in the presence of H_2O, which is converted to absorb O_2 from air in the presence of H_2O, which is converted to H_2O_2. This is called autoxidation. Intermolecular redox reactions are those in which one molecule is oxidised and the other is reduced. Intramolecular redox reactions are those in which oen atom of a molecule is oxidised and the

other atom is reduced.

Which of the following reactions is/are auto redox or induced oxidation reaction (s)

A. $Pb + O_2 + H_2O \rightarrow PbO + H_2O_2$

B. $Na_2SO_3 + Na_3AsO_3 + O_2 \rightarrow Na_2SO_4 + Na_3AsO_4$

C. $RCH = CHR + O_2 + 2H_2O \rightarrow 2RCH = O + 2H_2O_2$

D.

Answer: A::B::C::D

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22. Cartain materials such as turpentine oil, unsaturated organic compound, phosophorus, metals such as Zn, and Pb, etc., can absorb O_2 from air in the presence of H_2O, which is converted to absorb O_2 from air in the presence of H_2O, which is converted to H_2O_2. This is called autoxidation. Intermolecular redox reactions are those in which one molecule is oxidised and the other is reduced. Intramolecular redox

reactions are those in which oen atom of a molecule is oxidised and the other atom is reduced.

Which of the following reactions is / are none of the reactions mentioned in the question?

A. $Ag(NH_3)^{\oplus} \xrightarrow{2H^{\oplus}} Ag^{\oplus} + NH_4^{\oplus}$

B. $Cr_2O_7^{2-} + 2\overset{\ominus}{O}H \rightarrow 2CrO_4^{2-} + H_2O$

C. $NH_4^{\oplus} \rightarrow NH_3$

D. $2NO_2 \rightarrow N_2O_4$

Answer: A::B::C::D

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23. Cartain materials such as turpentine oil, unsaturated organic compound, phosophorus, metals such as Zn, and Pb, etc., can absorb O_2 from air in the presence of H_2O, which is converted to absorb O_2 from air in the presence of H_2O, which is converted to H_2O_2. This is called autoxidation. Intermolecular redox reactions are those in which one

molecule is oxidised and the other is reduced. Intramolecular redox reactions are those in which oen atom of a molecule is oxidised and the other atom is reduced.

Which of the following statements about the reaction is/are correct?

$2AsCl_4^{\ominus} + 3Zn \rightarrow 2Au + 3Zn^{2+} + 8Cl^{\ominus}$

A. $AuCl_4^{\ominus}$ is reduced to Au

B. Zn is oxidised to Zn^{2+}

C. $Cl^{\ominus}$ is a spectator ion.

D. It is an intermolecular redox reaction.

Answer: A::B::C::D

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24. Cartain materials such as turpentine oil, unsaturated organic compound, phosophorus, metals such as Zn, and Pb, etc., can absorb O_2 from air in the presence of H_2O, which is converted to absorb O_2 from air in the presence of H_2O, which is converted to H_2O_2. This is called

autoxidation. Intermolecular redox reactions are those in which one molecule is oxidised and the other is reduced. Intramolecular redox reactions are those in which oen atom of a molecule is oxidised and the other atom is reduced.

Which of the following reactions has / have spectator ions?

A. $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$

B. $KIO_3 + KI + H_2SO_4 \rightarrow KI_3 + K_2SO_4 + H_2O$

C.

$$2KMnO_4 + 10KCl + 8H_2SO_4 \rightarrow 5Cl_2 + 2MnSO_4 + 8H_2O + 6K_2S$$

D. $[CrCl_6]^{3-} + Zn[ZnCl_4]^{2-} + Cr^{2+}$

Answer: A::B::C::D

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Exercises Multiple Correct

1. Which of the following compounds can be oxidised further with a strog oxidising agent?

A. CrO_3

B. Al_2O_3

C. SO_2

D. MnO_3

Answer: C::D

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2. Which of the following statements is / are correct?

A. The oxidation state of H in $LiAlH_4$ is -1

B. The oxidation state of H in $LiAlH_4$ is $+1$

C. The reaction of hydrogen in that oxidation state with H_2O is

$$H^{\ominus} + H_2O \rightarrow H_2 + \overset{\ominus}{O}H$$

D. The reaction of hydrogen in that oxidation state with H_2O is

$$H^{\oplus} + H_2O \rightarrow H_3O^{\oplus}$$

Answer: A::C

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3. Which of the following statements is / are correct?

A. The oxidation states of N in NH_3, HN_3, and N_2H_4 are -3, $-1/3$, and -2, respectively.

B. The oxidation state of N in NO_2, N_2O_4, and NO_(2)^(-)are+4, +4, and +3`, respectively.

C. The oxidation states of N in NH_2OH, NO, and HNO_3 are -1, $+2$, and $+5$, respectively.

D. The oxidation states of N in N_2O and HCN are $+1$ and -3, respectively.

Answer: A::B::C::D

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4. Which of the following reactions should be balanced in basic medium?

A. $NH_3 + MnO_4^{\ominus} \rightarrow MnO_2 + NO_2$

B. $Cr(OH)_2 + I_2 \rightarrow Cr(OH)_3 + 2I^{\ominus}$

C. $HNO_3 + Fe^{3+} + NO_2$

D. $H_2O_2 + Fe^{3+} \rightarrow O_2 + Fe^{2+}$

Answer: A::B

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5. Which of the following reactions is not a redox reaction?

A. $H_2O_2 + KOH \rightarrow KHO_2 + H_2O$

B. $Cr_2O_7^{2-} + 2\overset{\ominus}{O}H \rightarrow 2CrO_4^{2-} + H_2O$

C. $Ca(HCO_3)_3 \xrightarrow{\Delta} CaCO_3 + CO_2 + H_2O$

D. $H_2O_2 \rightarrow H_2O + \frac{1}{2}O_2$

Answer: A::B::C

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6. No reaction occurs in which of the following equations?

A. $I^{\ominus} - Fe^{2+} \rightarrow$

B. $F_2 + 2NaCl \rightarrow$

C. $Cl_2 + 2NaF \rightarrow$

D. $I_2 + 2NaBe \rightarrow$

Answer: A::C::D

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7. Which of the following satements is / are correct?

A. In the reaction $H_2O_2 + I_2 \rightarrow I^{\ominus} + ?$

the missing product is O_2.

B. In the above reaction (a), the missing product is H_2O

C. In the reaction $H_2O_2 + Sn^{2+} \rightarrow Sn^{4+} + ?$,

the missing product is O_2

D. In the above reaction (c), the missing product is H_2O

Answer: A::D

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8. Which of the following statements is / are correct?

A. In the reaction $MnO_4^{2-} + H^{\oplus} \rightarrow Mn^{2+} + ?$

the missing product is $MnO_4^{\ominus}$.

B. In the above reaction (a), the missing product is MnO_2.

C. In the reaction $NO_2 + H_2O \rightarrow NO + ?$

the missing product is $NO_3^{\ominus}$.

D. In the above reaction (c), the missing product is i$NO_2^{\ominus}$.

Answer: A::C

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9. Which of the following statements is / are correct?

In the reaction $xCu_3P + yCr_2O_7^{2-} \rightarrow Cu^{2+} + H_3PO_4 + Cr^{3+}$

A. Cu in Cu_3P is oxidised to Cu^{2+} whereas P in Cu_3P is also oxidised to PO_4^{3-}.

B. Cu in Cu_3P is oxidised to Cu^{2+} whereas P in Cu_3P is reduced to H_3PO_4.

C. In the conversion of Cu_3P to Cu^{2+} and `H_(3)PO_(4),11 "electrons" are involved.

D. The value of x is 6

Answer: A::C::D

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10. Which of the following statements is / are correct about the following reactions?

I. $C_6H_{12}O_6 \xrightarrow{H_2SO_4\,(conc)} 6C + 6H_2O$

II. $H_2SO(dil) + ZnCO_3 \rightarrow Zn^{2+} + CO_2 + SO_4^{2-} + H_2O$

III. $H_2SO_4(dil) + Zn \rightarrow Zn^{2+} + H_2 + SO_4^{2-}$

IV. $5H_2SO_4(conc) + 4Zn \rightarrow H_2S + 4Zn^{2+} + 4SO_4^{2-} + 4H_2O$

A. In reaction (I), H_2SO_4 acts as a dehydrating agent.

B. In reaction (II), H_2SO_4 acts as an acid.

C. In reaction (III), H_2SO_4 acts both as an acid and an oxidising agent.

D. In reaction (IV), H_2SO_4, acts as an oxidising agent.

Answer: A::B::C::D

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11. In the reaction

$$I_2 + C_2H_5OH + \overset{\ominus}{O}H \rightarrow CHI_3 + HCOO^{\ominus} + H_2O + I^{\ominus}$$

Which of the following statements is / are correct?

A. The coefficients of $\overset{\ominus}{O}H$ and $I^{\ominus}$ in the given in balanced equation are, respectively, 6 and 5.

B. The coefficients of $\overset{\ominus}{O}H$ and $I^{\ominus}$ in the given balanced equation are, respectively, 5 and 6.

C. C_2H_5OH is oxidised to CHI_3 and $HCOO^{\ominus}$.

D. The number of electrons in the conversion of C_2H_5OH to CHI_3 and $HCOO^{\ominus}$ is 8

Answer: A::C::D

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12. Which of the following statements is / are correct?

A. PbO_2 reacts with HCl to evolve Cl_2 gas.

B. PbO_2 reacts with HNO_3 to form O_2 gas.

C. Pb_3O_4 reacts with HCl to evolve Cl_2 gas.

D. Pb_3O_4 reacts with HNO_3 to form PbO_2, but O_2 is not liberated.

Answer: A::B::C::D

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13. Which of the following statements about the following reaction is / are Wrong?

$2Cu_2O(s) + Cu_2S(s) \rightarrow 6Cu(s) + 5O_2(g)$

A. Both Cu_2 and Cu_2S are reduced.

B. Only Cu_2S is reduced.

C. Cu_2S is the oxidant.

D. Only Cu_2O is reduced.

Answer: B::C::D

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14. The oxidation number of Cr is $+6$ in

A. $FeCr_2O_4$

B. $KCrO_3Cl$

C. CrO_5

D. $\left[Cr(OH)_4\right]^{\ominus}$

Answer: B::C

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15. The oxidation number of carbon is zero in

A. $HCHO$

B. CH_2Cl_2

C. CrO_5

D. $C_{12}H_{22}O_{11}$

Answer: A::B::C::D

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16. Which of the following has//have been arranged in order of decreasing oxidation number of sulphur?

A. $H_2S_2O_7 > Na_2S_4O_6 > Na_2S_2O_3 > S_8$

B. $SO^{2+} > SO_4^{2-} > SO_3^{2-} > HSO_4^{\ominus}$

C. $H_2SO_5 > H_2SO_3 > SCl_2 > H_2S$

D. $H_2SO_4 > SO_2 > H_2S > H_2S_2O_8$

Answer: A::C

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17. The oxidation number of carboxylic carbon atom in CH_3COOH is

A. $+2$

B. $+4$

C. $+1$

D. $+3$

Answer: D

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18. Which of the following is//are autoredox reactions?

A. $P_4 + \overset{\ominus}{O}H \rightarrow H_2PO_2^{\ominus} + PH_3$

B. $S_2O_3^{2-} \rightarrow SO_4^{2-} + S$

C. $H_2O_2 \rightarrow H_2O + O_2$

D. $AgCl + NH_3 \rightarrow \left[Ag(NH)_3\_(2)\right]Cl$

Answer: A::B::C

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19. Which of the following is / disproportionatin reactions?

A. $2O_3 \rightarrow 3O_2$

B. $4KClO_3 \rightarrow 3KClO_4 + KCl$

C. $2H_2O_2 \rightarrow 2H_2O + O_2$

D. $2KO_2 + 2H_2O \rightarrow 4KOH + 3O_2$

Answer: A::B::C::D

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20. For the reaction $KO_2 + H_2O + CO_2 \rightarrow KHCO_3 + O_2$, the mechanism of reaction suggest.

A. Acid-base reaction

B. Disproportionation reaction

C. Hydrolysis

D. Redox change

Answer: A::B::C::D

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21. Which of the following can be used both as an oxidant and a reductant?

A. HNO_2

B. SO_2

C. O_2

D. CO

Answer: A::B::C::D

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22. Which molecule represent by the bold atoms are in their highest oxidation state?

A. $H_2S_2O_8$

B. P_4O_{10}

C. F_2O

D. Mn_2O_7

Answer: A::B::D

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23. Which molecule represent by the bold atoms are in their lowest oxidation state?

A. F_2O

B. H_2S

C. PH_3

D. N_2H_4

Answer: B::C

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24. Which of the following statements is / are correct about $CH_2 = CCl_2$

A. Both carbons are in $+2$ oxidation state.

B. Both carbons are in -2 oxidation state

C. The first carbons has $+2$ and the second has -2 oxidation states.

D. The average oxidation number of carbon is zero.

Answer: A::B::D

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25. Which of the following statemetns about tailing of Hg is / are correct?

A. It is due to Hg_2O.

B. It is due to HgO

C. It is removed by H_2O_2

D. It is removed by O_3

Answer: A::C

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26. Which of the following is / are disproportionation redox changes?

A. $(NH_4)_2Cr_2O_7 \rightarrow N_2 + Cr_2O_3 + 4H_2O$

B. $5H_2O_2 + 2ClO_2 + 2\overset{\ominus}{O}H \rightarrow 2Cl^{\ominus} + 5O_2 + 6H_2O$

C. $3ClO^{\ominus} \rightarrow ClO_3^{\ominus} + Cl^{\ominus}$

D. $2HCuCl_2 \xrightarrow[\text{with water}]{\text{Dilution}} Cu + Cu^{2+} + 4Cl^{\ominus} + 2H^{\oplus}$

Answer: C::D

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27. Which of the following statements about the reaction is / are correct?

$HgS + HCl + HNO_3 \rightarrow H_2HgCl_4 + NO + S + H_2O$

A. Hg is reduced.

B. Sulphide is oxidised.

C. N is reduced

D. HNO_3 is an oxidant.

Answer: B::C::D

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28. Which of the following substances undergo(s) disproportionation reactions under basic medium?

A. F_2

B. P_4

C. S_8

D. Br_2

Answer: B::C::D

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29. Which of the following represents redox reactions?

A. $Cr_2O_7^{2-} + 2\overset{\ominus}{O}H \rightarrow 2CrO_4^{2-} + H_2O$

B. $SO_3^{2-} + H_2O + I_2 \rightarrow SO_4^{2-} + 2I^{\ominus} + 2H^{\oplus}$

C. $Ca(OH)_2 + Cl_2 \rightarrow Ca(Ocl)_2 + CaCl_2$

D. $PCl_5 \rightarrow PCl_3 + Cl_2$

Answer: B::C::D

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30. Consider the redox reaction

$2S_2O_3^{2-} + I_2 \rightarrow S_4O_6^{2-} + 2I^{\ominus}$

A. $S_2O_3^{2-}$ gets reduced to $S_4O_6^{2-}$

B. $S_2O_3^{2-}$ gets oxidised to $S_4O_6^{2-}$

C. I_2 gets reduced to $I^{\ominus}$

D. I_2 gets oxidised to $I^{\ominus}$

Answer: B::C

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31. Which of the following compounds acts both as an oxidising as wll as a reducing agent?

A. HNO_2

B. H_2O_2

C. H_2S

D. SO_2

Answer: A::B::D

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32. Which of the following reactions does not involve oxidation-reduction ?

A. $2Rb + 2H_2O \rightarrow 2RbOH + H_2$

B. $2CuI_2 \rightarrow 2CuI + I_2$

C. $NH_4Cl + NaOH \rightarrow NaCl + NH_3 + H_2O$

D. $4KCN + Fe(CN)_2 \rightarrow K_4[Fe(CN)_6]$

Answer: C::D

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Exercises Single Correct

1. Which of the following represents a redox reaction?

A. $NaOH + HCl \rightarrow NaCl + H_2O$

B. $BaCl_2 + H_2SO_4 \rightarrow BaSO_4 + 2HCl$

C. $CuSO_4 + 2H_2O \rightarrow Cu(OH)_2 + H_2SO_4$

D. $Zn + 2HCl \rightarrow ZnCl_2 + H_2$

Answer: D

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2. In the reaction

$SO_2 + 2H_2S \rightarrow 3S + 2H_2O$

the substance oxidised is

A. H_2S

B. SO_2

C. S

D. H_2O

Answer: A

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3. In the reaction

$3Cl_2 + 6NaOH \rightarrow NaClO_3 + 5NaCl + 3H_2O$

the element which loses as well as gains electrons is

A. Na

B. O

C. Cl

D. None of these

Answer: C

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4. The oxidation number of oxygen in OF_2 is

A. $+2$

B. -2

C. $+1$

D. -1

Answer: A

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5. An oxidation process involves

A. Increase in oxidation number

B. Decrease in oxidation number

C. Both decrease and increase in oxidation number

D. No change in oxidation number

Answer: A

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6. Which of the following is the strongest reducing agent in aqueous medium?

A. Mg

B. Na

C. Li

D. `Ca

Answer: C

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7. Which of the following is the strongest oxidising agent?

A. I_2

B. F_2

C. Cl_2

D. Br_2

Answer: B

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8. The oxidation number of phosphorus do not involve oxidation reduction?

A. $+3$

B. $+2$

C. $+1$

D. -1

Answer: C

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9. Which of the following reactions do not involve oxidation reduction ?

I. $2Cs + 2H_2O \rightarrow 2CsOH + H_2$

II. $2CuI_2 \rightarrow 2CuI + I_2$

III. $NH_4Br + KOH \rightarrow KBr + NH_3 + H_2O$

IV. $4KCN + Fe(CN)_2 \rightarrow K_4\left[Fe(CN)_6\right]$

A. I, II

B. I, III

C. I, III, IV

D. III, IV

Answer: D

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10. For the redox reaction

$$MnO_4^{\ominus} + C_2O_4^{2-} + H^{\oplus} \rightarrow Mn^{2+} + CO_2 + H_2O$$

the correct coefficients of the reactions for the balanced reaction are

A. $MnO_4^{\ominus} = 2, C_2O_4^{2-} = 5, H^{\oplus} = 16$

B. $MnO_4^{\ominus} = 16, C_2O_4^{2-} = 5, H^{\oplus} = 2$

C. $MnO_4^{\ominus} = 5, C_2O_4^{2-} = 16, H^{\oplus} = 2$

D. $MnO_4^{\ominus} = 2, C_2O_4^{2-} = 16, H^{\oplus} = 5$

Answer: A

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11. The oxidation state of nitrogen is correctly given for

A. Compound = $\left[CO(NH_3)_5Cl\right]Cl_2$, Oxidation state = 0

B. Compound = NH_2OH , Oxidation state = -2

C. Compound =$(N_2H_5)_2SO_4$, Oxidation state = $+2$

D. Compound = Mg_3N_2 , Oxidation state = -3

Answer: D

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12. The oxidation state of chrominium in $Cr(CO)_6$ is

A. 0

B. $+2$

C. -2

D. $+6$

Answer: A

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13. Which of the following is not a redox reaction?

A. $CaCO_3 \rightarrow CaO + CO_2$

B. $O_2 + 2H_2 \rightarrow 2H_2O$

C. $Na + H_2O \rightarrow NaOH + \frac{1}{2}H_2$

D. $MnCl_3 \rightarrow MnCl_2 + (1/2)Cl_2$

Answer: A

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14. In the chemical reaction,

$K_2Cr_2O_7 + xH_2SO_4 + ySO_2 \rightarrow K_2SO_4 + Cr_2(SO_4)_3 + zH_2O$

$x, y,$ and z are

A. $1, 3, 1$

B. $4, 1, 4$

C. $3, 2, 3$

D. $2, 1, 2$

Answer: A

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15. One mole of N_2H_4 loses ten moles of electrons to form a new compound A. Assuming that all the nitrogen appears in the new compound, what is the oxidation state of nitrogen in A? (There is no change in the oxidation state of hydrogen.)

A. -1

B. -3

C. $+3$

D. $+5$

Answer: C

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16. When copper is treated with a certain concentration of nitric acid, nitric oxide and nitrogen dioxide are liberated in equal volumes according to the equation

$xCu + yHNO_3 \rightarrow Cu(NO_3)_2 + NO + NO_2 + H_2O$

The coefficients x and y are

A. 2 and 3

B. 2 and 6

C. 1 and 3

D. 3 and8

Answer: B

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17. In which of the following pairs in there the greatest difference in the oxidation numbers of the underlined elements?

A. $\underline{N}O_2$ and $\underline{N_2}O_4$

B. $\underline{P_2})O_5$ and $\underline{P_4}O_{10}$

C. $\underline{N_2}O$ and $\underline{N}O$

D. $\underline{S}O_2$ and $\underline{S}O_3$

Answer: D

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18. In the reaction

$$3Br_2 + 6CO_3^{2-} + 3H_2O \rightarrow 5Br^{\ominus} + BrO_3^{\ominus} + 6HCO_3^{\ominus}$$

A. Bromine is oxidised and carbonate is reduced

B. Bromide is reduced and water is oxidised

C. Bromine is neither reduced nor oxidised

D. Brominde is both reduced and oxidised

Answer: D

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19. In the reaction

$2FeCl_3 + H_2S \rightarrow 2FeCl_2 + 2HCl + S$

A. $FeCl_3$ acts as an oxidising agent

B. Both H_2S and $FeCl_3$ are oxidised

C. $FeCl_3$ is oxidised while H_2S is reduced

D. H_2S acts as an oxidising agent

Answer: A

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20. The oxidation number of cobalt in $K\left[Co(CO)_4\right]$ is

A. $+1$

B. $+3$

C. -1

D. -3

Answer: C

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21. Which of the following is not a disproportionation reaction?

I. $NH_4NO_3 \xrightarrow{\Delta} N_2O + H_2O$

II. $P_4 \xrightarrow{\Delta} PH_3 + HPO_2^{\ominus}$

III. $PCl_5 \xrightarrow{\Delta} PCl_3 + Cl_2$

IV. $IO_3^{\ominus} + I^{\ominus} \rightarrow I_2$

A. I, II

B. I, III, IV

C. II, IV

D. I, III

Answer: B

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22. which of the following represent redox reactions?

I. $Cr_2O_7^{2-} + 2\overset{\ominus}{O}H \rightarrow 2CrO_4^{2-} + H_2O$

II. $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$

III. $\overset{\ominus}{MnO_4} + 3Mn^{2+} + 4\overset{\ominus}{O}H \rightarrow 5MnO_2 + 2H_2O$

IV. $2Cu^{\oplus} \rightarrow Cu + Cu^{2+}$

A. I, II

B. I, III

C. III, IV

D. II, III, IV

Answer: D

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23. In which of the following cases is the oxidation state of N atom wrongly calculated?

A. Compound= NH_4Cl, Oxidation state= -3

B. Compound= $(N_2H_5)_2SO_4$, Oxidation state= $+2$

C. Compound= Mg_3N_2, Oxidation state= -3

D. Compound= NH_2OH, Oxidation state= -1

Answer: B

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24. Which of the following is not a disproprotionation reaction?

A. $KO_2 + H_2O + CO_2 \rightarrow KHCO_3 + O_2$

B. $KClO_3 \rightarrow KClO_4 + KCl$

C. $PbO_2 + H_2O \rightarrow PbO + H_2O_2$

D. $OHC - COOH \xrightarrow{\overset{\ominus}{OH}} HOH_2C - COOH + \overset{\ominus}{O}OC - COO^{\ominus}$

Answer: C

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25. The number of moles of $K_2Cr_2O_7$ reduced by $1mol$ of Sn^{2+} ions is

A. $1/3$

B. 3

C. $1/6$

D. 6

Answer: A

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26. Which of the following is redox reaction ?

A. H_2SO_4 with $NaOH$

B. In atmosphere, O_3 from O_2 by lighting

C. Nitrogen oxides from nitrogen and oxygen by lightning

D. Evaporation of H_2O

Answer: C

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27. The oxidation state of Fe in $Fe(CO)_5$ is

A. 0

B. $+2$

C. -2

D. $+6$

Answer: A

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28. In which of the following pairs is there the greatest difference in the oxidation numbers of the underlined elements?

A. $\underline{N}O_2$ and $\underline{N_2}O_4$

B. $\underline{S}O_3^{2}$ and $\underline{S}O_4^{2-}$

C. $\underline{S}^{2-}$ and $\underline{S}O_3^{2-}$

D. $\underline{S}^{2-}$ and $\underline{S}O_4^{2-}$

Answer: D

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29. [Which of the following is not an intermolecular redox reaction?

A. $MgCO_3 \rightarrow MgO + CO_2$

B. $O_2 + 2H_2 \rightarrow 2H_2O$

C. $K + H_2O \rightarrow KOH + (1/2)H_2$

D. $MnBr_3 \rightarrow MnBr_2 + (1/2)Br_2$

Answer: A

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30. The number of moles of $KMnO_4$ required to oxidise $1mol$ of $Fe(C_2O_4)$ in acidic medium is

A. 0.6

B. 1.67

C. 0.2

D. 0.4

Answer: A

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31. In the reaction

$K + O_2 \rightarrow KO_2$

A. O_2 acts as an oxidising agent

B. Both K and O_2 are oxidised

C. O_2 is oxidised while K is reduced

D. K acts as an oxidising agent

Answer: A

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32. Which of the following is the best description of the behaviour of bromine in the reaction given below?

A. Proton acceptor only

B. Both oxidised and reduced

C. Oxidised only

D. Reduced only

Answer: B

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33. $Cr_2O_7^{2-} + X \xrightarrow{H^{\oplus}} Cr^{3+} + H_2O + \text{oxidised product of } X$, X in the above reaction cannot be

A. $C_2O_4^{2-}$

B. Fe^{2+}

C. SO_4^{2-}

D. SO_{2-}

Answer: C

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34. The oxidation state of chrominium in the final product formed in the reaction between KI and acidified potassium dichromate soluttion is

A. $+4$

B. $+6$

C. $+2$

D. $+3$

Answer: D

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35. The number of moles of $KMnO_4$ reduced by $1\text{mol of}KI$ in alkaline medium is

A. 1

B. 2

C. 5

D. $1/5$

Answer: B

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36. In the balanced chemical reaction

$$IO_3^{\ominus} + aI^{\ominus} + bH^{\ominus} \rightarrow cH_2O + dI_2$$

a, b, c, and d, respectively, correspond to

A. 5, 6, 3, 3

B. 5, 3, 6, 3

C. 3, 5, 3, 6

D. 5, 6, 5, 5

Answer: A

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37. For the reaction

$$M^{x+} + MnO_4^{\ominus} \rightarrow MO_3^{\ominus} + Mn^{2+} + (1/2)O_2$$

if $1\text{mol of} MnO_4^{\ominus}$ oxidises $1.67\text{mol of} M^{x+}$ to $MO_3^{\ominus}$, then the value of x in the reaction is

A. 5

B. 3

C. 2

D. 1

Answer: C

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38. $aK_2Cr_2O_7 + bKCl + cH_2SO_4 \rightarrow xCrO_2Cl_2 + yKHSO_4 + zH_2O$

The above equation balances when

A. $a = 2, b = 4, c = 6$ and $x = 2, y = 6, z = 3$

B. $a = 4, b = 2, c = 6$ and $x = 6, y = 2, z = 3$

C. $a = 6, b = 4, c = 2$ and $x = 6, y = 3, z = 2$

D. $a = 1, b = 4, c = 6$ and $x = 2, y = 6, z = 3$

Answer: D

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39. The oxidation number of carbon in CH_2Cl_2 is

A. 0

B. 2

C. 3

D. 5

Answer: A

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40. Excess of KI reacts with $CuSO_4$ solution and Na_2SO_3 solution is added to it. Which of the following statements in incorrect for the reaction?

A. Evolved I_2 is reduced

B. CuI_2 is formed.

C. $Na_2S_2O_3$ is oxidised.

D. Cu_2I_2 is formed.

Answer: B

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41. The oxidation number of S in H_2SO_5 is

A. $+8$

B. $+6$

C. $+4$

D. $+2$

Answer: B

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42. The number of peroxide bonds in perxenate ion $[XeO_6]^{4-}$ is

A. 0

B. 2

C. 3

D. 1

Answer: A

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43. The oxidation number of Pr in Pr_6O_{11} is

A. $\frac{22}{6}$

B. $\frac{20}{6}$

C. 3

D. 4

Answer: A

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44. In which of the following is the highest oxidation state not possible?

A. $[XeO_6]^{4-}$

B. XeF_8

C. OSO_4

D. RuO_4

Answer: B

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45. which of the following statements is not correct about the reaction given below?

$$K_4\left[Fe(CN)_6\right] \xrightarrow{\text{Oxidation}} Fe^{3+} + CO_2 + NO_3^{\ominus}$$

A. Fe is oxidised from Fe^{2+} to Fe^{3+}

B. Carbon is oxidised from C^{2+} to C^{4+}

C. N is oxidised from N^{3-} to N^{5+}

D. carbenes

Answer: D

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46. Which of the following is not a disproportionation reaction ?

A. $P_4 + \overset{\ominus}{O}H \rightarrow H_2PO_2^{\ominus} + PH_3$

B. $Cl_2 + \overset{\ominus}{O}H \rightarrow Cl^{\ominus} + ClO^{\ominus}$

C. $2H_2O_2 \rightarrow 2H_2O + O_2$

D. $2H_2O_2 \rightarrow 2H_2O + O_2$

Answer: D

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47. Which of the following is not an intramolecular redox reaction?

A. $NH_4NO_2 \rightarrow N_2 + 2H_2O$

B. $2Mn_2O_7 \rightarrow 4MnO_2 + 3O_2$

C. $2KCIO_3 \rightarrow 2KCl + 3o_2$

D. $2H_2O_2 \rightarrow 2H_2O + O_2$

Answer: D

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48. In the equation

$$N_2^{\ominus} + H_2O \rightarrow NO_3^{\ominus} + 2H^{\oplus} + \neq^{-}$$

n stands for

A. 1

B. 2

C. 3

D. 4

Answer: B

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49. Which of the following is an intermolecular redox reaction?

A. $2OCH - CHO \xrightarrow{\overset{\ominus}{OH}} HOCH_2 - CH_2OH$

B. $2C_6H_5CHO \xrightarrow{Al(OC_2H_5)_3} C_6H_5COOH + C_6H_5CH_2OH$

C. $4CrO_5 + 6H_2SO_4 \rightarrow 2Cr_2(SO)_4)_3 + 6H_2O + 7O_2$

D. $As_2S_3 + HNO_3 \rightarrow H_3AsO_4 \rightarrow H_3AsO_4 + H_2SO_4 + NO$

Answer: D

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50. The oxidation state of A, B, and C in a compound are $+2$, $+5$, and -2, respectively. The compounds is

A. $A_2(BC)_2$

B. $A_2(BC)_3$

C. $A_3(BC_4)_2$

D. $A_2(BC_4)_3$

Answer: C

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51. The number of electrons lost in the following change is

$$Fe + H_2O \rightarrow Fe_3O_4 + H_2$$

A. 2

B. 4

C. 6

D. 8

Answer: D

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52. The oxidation number of Pt in $[Pt(C_2H_4)Cl_3)]^{\ominus}$ is

A. $+1$

B. $+2$

C. $+3$

D. $+4$

Answer: B

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53. The oxidation number of P in $Mg_2P_2O_7$ is

A. $+3$

B. $+2$

C. $+5$

D. -3

Answer: C

Watch Video Solution

54. The oxidation number of phosphorus in PO_4^{3-}, P_4O_{10}, and $P_2O_7^{4-}$ is

A. $+5$

B. $+3$

C. -3

D. $+2$

Answer: A

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55. which of the following leads to redox reaction ?

A. $AgNO_3 + HCl$

B. $KOH + HCl$

C. $KI + Cl_2$

D. $NH_3 + HCl$

Answer: C

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56. The oxidation number of sulphur in $Na_2S_4O_6$ is

A. $+0.5$

B. 2.5

C. $+4$

D. $+6$

Answer: B

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57. The oxidiant state of iodine in $H_4IO_6^{\ominus}$ is

A. $+7$

B. -1

C. $+5$

D. $+1$

Answer: A

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58. When iron is rusted, it is

A. Oxidised

B. Reduced

C. Evaporated

D. Decomposed

Answer: A

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59. An element that never has a positive oxidation state in any of its compounds is

A. Boron

B. Oxygen

C. Chlorine

D. Fluorine

Answer: D

Watch Video Solution

60. Starch iodide paper is used to test for the presence of

A. Iodine

B. Iodide ion

C. Oxidising agnet

D. Reducing agent

Answer: C

Watch Video Solution

61. Which of the following acids possesses oxidising, reducing, and complex forming properties ?

A. HNO_3

B. H_2SO_4

C. HCL

D. HNO_2

Answer: D

Watch Video Solution

62. In the reaction

$8Al + 3Fe_3O_4 \rightarrow 4Al_2O_3 + 9Fe$

the number of electrons transferred from the reductant to the oxidant is

A. 8

B. 4

C. 16

D. 24

Answer: D

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63. Which of the following examples does not represent disproportionation ?

A. $MnO_2 + 4HCl \rightarrow MnCl_2 + Cl_2 + 2H_2O$

B. $2H_2O_2 \rightarrow 2H_2O + O_2$

C. $4KClO_3 \rightarrow 3KCiO_4 + KCl$

D. $3Cl_2 + 6NaOH \rightarrow 5NaCl + NaClO_3 + 3H_2O$

Answer: A

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64. Which of the following statements is not correct ?

A. The oxidation number of S in $(NH_4)_2S_2O_8$ is $+6$.

B. The oxidation number of O s in OsO_4 is $+8$.

C. The oxidation number of S in H_2SO_5 is $+8$.

D. The oxidation number of O in KO_2 is $-1/2$.

Answer: C

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65. The oxidant which cannot act as a reducing agent is

A. SO_2

B. NO_2

C. CO_2

D. ClO_2

Answer: C

Watch Video Solution

66. The coordination number and oxidation number of Cr in $K_3\left[Cr(C_2O_4)_3\right]$ are, respectively,

A. 4 and $+2$

B. 6 and $+3$

C. 3 and -3

D. 3 and 0

Answer: B

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67. Which of the following reactions does not involve either oxidation or reduction ?

A. $VO^{2+} \rightarrow V_2O_3$

B. $Na \rightarrow Na^{\oplus}$

C. $CrO_4^{2-} \rightarrow Cr_2O_7^{2-}$

D. $Zn^{2+} \rightarrow Zn$

Answer: C

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68. In which of the following processess is nitrogen oxidised ?

A. $NH_4^{\oplus} \rightarrow N_2$

B. $NO_3^{\ominus} \rightarrow NO$

C. $NO_2 \rightarrow NO_2^{\ominus}$

D. $NO_3^{\ominus} \rightarrow NH_4^{\ominus}$

Answer: A

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69. The oxidation number of C in HNC is

A. $+2$

B. -3

C. $+3$

D. 0

Answer: A

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70. The oxidation number of Fe in $Fe_{0.94}O$ is

A. 200

B. $200/94$

C. $94/200$

D. None

Answer: B

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71. The oxidant number of Fe in $Na_2\left[Fe(CN)_5NO\right]$ is

A. $+2$

B. $+1$

C. $+3$

D. -2

Answer: A

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72. The oxidation number of Cl in $CaOCl_2$ is

A. -1 and $+1$

B. $+2$

C. -2

D. None

Answer: A

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73. The equivalent weight of FeC_2O_4 in the change

$FeC_2O_4 \rightarrow Fe^{3+} + CO_2$ is

A. $M/3$

B. $M/6$

C. $M/2$

D. $M/1$

Answer: A

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74. The oxidation state of Fe in Fe_3O_8 is

A. $3/2$

B. $4/5$

C. $5/4$

D. `16//3

Answer: D

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75. In which of the following compounds, the oxidation state of transition metal is zero ?

A. CrO_5

B. $4/5$

C. $FeSO_4$

D. $Fe(CO)_5$

Answer: D

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76. The oxidation state of S in $H_2S_2O_8$ is

A. $+2$

B. $+4$

C. $+6$

D. $+7$

Answer: C

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77. Which of the following is not a disproportionation reaction ?

A. $2PhCHO \xrightarrow{Al(OEt)_3} PhCOOCH_2Ph$

B. $\underset{COOH}{\overset{CHO}{|}} + \overset{\ominus}{OH} \rightarrow \underset{COO^{\ominus}}{\overset{CH_2OH}{|}} + \begin{array}{|c} COO^{\ominus} \\ | \\ | \\ COO^{\ominus} \end{array}$

C. $NaH + H_2O \rightarrow NaOH + H_2$

D. All

Answer: C

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78. Which of the following is a disproporationation reaction ?

A. $Cu_2O + 2H^{\oplus} \rightarrow Cu + Cu^{2+} + H_2O$

B. $2CrO_4^{2-} + 2H^{\oplus} \rightarrow Cr_2O_7^{2-} + H_2O$

C. $CaCO_3 + 2H^{\oplus} \rightarrow Ca^2 + H_2O + CO_2$

D. $Cr_2O_7^{2-} \rightarrow \overset{\ominus}{2OH} \rightarrow 2CrO_4^{2-} + H_2O$

Answer: A

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79. When $KMnO_4$ acts as an oxidising agnet and ultimetely from MnO_4^{2-}, MnO_2, Mn_2O_3, and Mn^{2+}, then the number of electrons transferred in each case, respectively, are

A. $4, 3, 1, 5$

B. $1, 5, 3, 7$

C. $1, 3, 4, 5$

D. $3, 5, 7, 1$

Answer: C

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80. which of the following is a redox reaction ?

A. $NaCl + KNO_3 \rightarrow NaNO_3 + KCl$

B. $CaC_2O_4 + 2HCl \rightarrow CaCl_2 + H_2C_2O_4$

C. $Mg(OH)_2 + 2NH_4Cl \rightarrow MgCl_2 + 2NH_4OH$

D. $Zn + 2AgCN \rightarrow 2Ag + Zn(CN)_2$

Answer: D

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81. The oxidation states of sulphur in the anions SO_3^{2-}, $S_2O_4^{2-}$, and $S_2O_6^{2-}$ follow the order

A. $S_2O_4^{2-} < SO_3^{2-} < S_2O_6^{2-}$

B. $SO_3^{2-} < S_2O_4^{2-} < S_2O_6^{2-}$

C. $S_2O_4^{2-} < S_2O_6^{2-} < SO_3^{2-}$

D. $S_2O_6^{2-} < S_2O_4^{2-} < S_2O_4^{2-} < SO_3^{2-}$

Answer: A

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82. For decolourisation of $1\text{mol of}KMnO_4$, the moles of H_2O_2 required is

A. $1/2$

B. $3/2$

C. $5/2$

D. $7/2$

Answer: C

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83. A metal ion M^{3+} loses three electrons , its oxidation number will be

A. $+3$

B. $+6$

C. 0

D. -3

Answer: B

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84. To an acidic solution of an anion, a few drops of $Kmno_4$ solution are added. Which of the following, if present, will not decolourise the $KMnO_4$ solution?

A. CO_3^{2-}

B. $NO_2^{\ominus}$

C. S^{2-}

D. $Cl^{\ominus}$

Answer: A

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85. The number of moles of $K_2Cr_2O_7$ reduced by $1mol$ of Sn^{2+} ions is

A. $1/6$

B. $1/3$

C. $2/3$

D. 1

Answer: C

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86. Which of the following is not a reducing agent ?

A. SO_2

B. H_2O_2

C. CO_2

D. NO_2

Answer: C

Watch Video Solution

87. The oxidation state of chromium is $\left[Cr(PPh_3)_3\right]$ is

A. $+3$

B. $+8$

C. 0

D. $+5$

Answer: C

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88. The values of the x and y in the following redox reaction.

$$xCl_2 + 6\overset{\ominus}{O}H \rightarrow ClO_3^{\ominus} + yCl^{\ominus} + 3H_2O$$

A. $x = 2, y = 4$

B. $x = 5, y = 3$

C. $x = 3, y = 5$

D. $x = 4, y = 2$

Answer: C

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89. Which gas is evolved when PbO_2 is treated with conc HNO_3 ?

A. NO_2

B. O_2

C. N_2

D. N_2O

Answer: B

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90. The equivalent mass of oxidising agent in the following reaction is

$SO_2 + 2H_2S \rightarrow 3S + 2H_2O$

A. 32

B. 64

C. 16

D. 8

Answer: C

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91. In alkaline medium, ClO_2 oxidises $H_2O_2 \text{to} O_2$ and is itself reduced to $Cl^{\ominus}$. How many moles of H_2O_2 are oxidised by $1 \text{mol of } ClO_2$?

A. 1

B. $3/2$

C. $5/2$

D. $7/2$

Answer: C

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Exercises Assertion Reasoning

1. Assertion (A): H_2O_2 acts only as an oxidising agnet.

$H_2O_2 \rightarrow H_2O + O$

Reason (R): All peroxides behave as oxidising agnets only.

A. If both (A) and (R) are correct and (R) is the correct explanation of (A).

B. If both (A) and (R) are correct but (R) is not the correct explanation of (A).

C. If (A) is correct but (R) is incorrect.

D. If both (A) and (R) are incorrect.

Answer:

Watch Video Solution

2. Assertion (A): $KMnO_4$ is a stronger oxidising agent than $K_2Cr_2O_7$.

Reason (R): This is due to increasing stability of the lower species to which they are reduced.

A. If both (A) and (R) are correct and (R) is the correct explanation of (A).

B. If both (A) and (R) are correct but (R) is not the correct explanation of (A).

C. If (A) is correct but (R) is incorrect.

D. If (A) and (R) are incorrect.

Answer:

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3. Assertion (A): SO_2 and Cl_2 are both bleaching agents.

Reason (R): Both are reducing agents.

A. If both (A) and (R) are correct and (R) is the correct explanation of (A).

B. If both (A) and (R) are correct but (R) is not the correct explanation of (A).

C. If (A) is correct but (R) is incorrect.

D. If (A) and (R) are incorrect.

Answer: C

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4. Assertion (A): F_2 undergoes disproportionation reaction.

Reason (R): Fluorine shows both positive and negative oxidation states.

A. If both (A) and (R) are correct and (R) is the correct explanation of (A).

B. If both (A) and (R) are correct but (R) is not the correct explanation of (A).

C. If (A) is correct but (R) is incorrect.

D. If both (A) and (R) are incorrect.

Answer: D

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5. Assertion (A): Sn reacts with HCl to produce H_2 gas.

Reason (R): Sn is a better reducing agent than H_2 gas.

A. If both (A) and (R) are correct and (R) is the correct explanation of (A).

B. If both (A) and (R) are correct but (R) is not the correct explanation of (A).

C. If (A) is correct but (R) is incorrect.

D. If (A) and (R) are incorrect.

Answer: A

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6. Assertion (A): In aqueous solution, SO_2 reacts with H_2S liberating sulphur

Reason (R): SO_2 is an effective reducing agent.

A. If both (A) and (R) are correct and (R) is the correct explanation of (A).

B. If both (A) and (R) are correct but (R) is not the correct explanation of (A).

C. If (A) is correct but (R) is incorrect.

D. If (A) and (R) are incorrect.

Answer: B

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7. Assertion (A): $PbCl_4$ is more stable than $PbCl_2$.

Reason (R): $PbCl_4$ is a powerful oxidising agent.

A. If both (A) and (R) are correct and (R) is the correct explanation of (A).

B. If both (A) and (R) are correct but (R) is not the correct explanation of (A).

C. If (A) is correct but (R) is incorrect.

D. If (A) and (R) are incorrect.

Answer: A

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8. Assertion (A):O_2 is stronger reducing agent than F_2

Reason (R): F_2 is more electronegative.

A. If both (A) and (R) are correct and (R) is the correct explanation of (A).

B. If both (A) and (R) are correct but (R) is not the correct explanation of (A).

C. If (A) is correct but (R) is incorrect.

D. If (A) and (R) are incorrect.

Answer: D

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9. Assertion (A): The two Fe atoms in FeO_3O_4 hace different oxidation numbers.

Reason (R): Fe^{2+} ions decolourise $KMnO_4$ solution.

A. If both (A) and (R) are correct and (R) is the correct explanation of (A).

B. If both (A) and (R) are correct but (R) is not the correct explanation of (A).

C. If (A) is correct but (R) is incorrect.

D. If (A) and (R) are incorrect.

Answer: B

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10. Assertion (A): HNO_3 acts only as an oxidising agent, while HNO_2 acts both as an oxidising agnet and a reducing agent.

Reason (R): The oxidation number of N in HNO_3 is mximum.

A. If both (A) and (R) are correct and (R) is the correct explanation of (A).

B. If both (A) and (R) are correct but (R) is not the correct explanation of (A).

C. If (A) is correct but (R) is incorrect.

D. If (A) and (R) are incorrect.

Answer: A

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11. Assertion (A): O_3 can act as an oxidising agent as wll as a reducing agent, but SO_2 can act only as an oxidant.

Reason (R): The oxidation number of O in O_3 is zero, and the oxidiation number of S in SO_2 is $+4$.

A. If both (A) and (R) are correct and (R) is the correct explanation of (A).

B. If both (A) and (R) are correct but (R) is not the correct explanation of (A).

C. If (A) is correct but (R) is incorrect.

D. If both (A) and (R) are incorrect.

Answer: D

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12. Assertion (A): Sodium perxenate (Na_4XeO_6) reacts with NaF in acidic medium to give XeO_3 and F_2

Reason (R): XeO_6^{4-} is a stronger oxidant than F_2.

A. If both (A) and (R) are correct and (R) is the correct explanation of (A).

B. If both (A) and (R) are correct but (R) is not the correct explanation of (A).

C. If (A) is correct but (R) is incorrect.

D. If (A) and (R) are incorrect.

Answer: A

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13. Assertion (A): In the process of drying dishes with a towel, the wetting agent is the dish and the drying agent is the towel.

Reason (R): The wetting agent gets wet during the process.

A. If both (A) and (R) are correct and (R) is the correct explanation of (A).

B. If both (A) and (R) are correct but (R) is not the correct explanation of (A).

C. If (A) is correct but (R) is incorrect.

D. If (A) and (R) are incorrect.

Answer: C

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14. Assertion (A): A reaction between Fe and I_2 occurs, but a reaction between Fe^{2+} and $I^{\ominus}$ does not occur.

Reason (R): Fe is a better reducing agent than $I^{\ominus}$.

A. If both (A) and (R) are correct and (R) is the correct explanation of (A).

B. If both (A) and (R) are correct but (R) is not the correct explanation of (A).

C. If (A) is correct but (R) is incorrect.

D. If (A) and (R) are incorrect.

Answer: A

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15. Assertion: (A): The reactions between NH_3 and $MnO_4^{\ominus}$ occurs in an acidic medium.

$NH_3 + MnO_4^{\ominus} \rightarrow MnO_2 + NO_2$

Reason (R): $MnO_4^{\ominus}$ is reduced to MnO_2 in acidic medium.

A. If both (A) and (R) are correct and (R) is the correct explanation of (A).

B. If both (A) and (R) are correct but (R) is not the correct explanation of (A).

C. If (A) is correct but (R) is incorrect.

D. If both (A) and (R) are incorrect.

Answer: D

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Exercises Integers

1. Among the following, what is the total number of compounds having $+3$ oxidation state of the underlined elements?

a. $K_4\underline{P_2}O_7$

b. $Na\underline{Au}Cl_4$

c. $Rb_4Na\left[HV\underline{V_{10}}O_{28}\right]$

d. $\underline{I}Cl$

e. $Ba_2\underline{Xe}O_6$

f. $\underline{O}F_2$

g. $Ca(\underline{C}O_2)_2$

h. $\underline{N}O_2^{\ominus}$

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2. Among the following, what is the total number of compounds having $+3$ oxidation state of the underlined elements?

a. $K_4\underline{P_2}O_7$

b. $Na\underline{Au}Cl_4$

c. $Rb_4Na\left[HV\underline{V_{10}}O_{28}\right]$

d. $\underline{I}Cl$

e. $Ba_2\underline{Xe}O_6$

f. $\underline{O}F_2$

g. $Ca(\underline{C}O_2)_2$

h. $\underline{N}O_2^{\ominus}$

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3. Among the following, what is the total number of compounds having zero oxidation state of the underlined elements?

a. $\underline{S}O_3^{2-}$

b. $H_2\underline{C}O$

c. $\underline{C}H_2Cl_2$

d. $Na_2\underline{cl_2}$

e. $\underline{O}_3$

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4. Among the following, what is the total number of compounds having zero oxidation state of the underlined elements?

a. $\underline{S}O_3^{2-}$

b. $H_2\underline{C}O$

c. $\underline{C}H_2Cl_2$

d. $Na_2\underline{cl_2}$

e. $\underline{O_3}$

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5. Among the following elements, what is the total number of elements having the lowest oxidation state of zero?

Tab. Tec. Tcd. Tie. Tl`

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6. Among the following , what is the total number of speices which are very good oxidising agents ?

a. F_2

b. $F^{\ominus}$

c. Na

d. $Na^{\oplus}$

e. $MnO_4^{\ominus}$

f. $I^{\ominus}$

$Cl^{\ominus}$

h. Ce^{4+}

i. $Cr_2O_7^{2-}$

j. CrO_4^{2-}

k. HNO_3

l. Fe^{2+}

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7. Among the following , what is the total number of speices which are very good oxidising agents/reducing agents/neither oxidising nor reducing ones ?

a. F_2

b. $F^{\ominus}$

c. Na

d. $Na^{\oplus}$

e. $MnO_4^{\ominus}$

f. $I^{\ominus}$

$Cl^{\ominus}$

h. Ce^{4+}

i. $Cr_2O_7^{2-}$

j. CrO_4^{2-}

k. HNO_3

l. Fe^{2+}

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8. Among the following , what is the total number of speices which are very good oxidising agents/reducing agents/neither oxidising nor reducing ones ?

a. F_2

b. $F^{\ominus}$

c. Na

d. $Na^{\oplus}$

e. $MnO_4^{\ominus}$

f. $I^{\ominus}$

$Cl^{\ominus}$

h. Ce^{4+}

i. $Cr_2O_7^{2-}$

j. CrO_4^{2-}

k. HNO_3

l. Fe^{2+}

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9. Balance the following equation in a basic solution stepwise:

$NO_3^{\ominus} + Zn \rightarrow Zn^{2+} + NH_4^{\oplus}$

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10. $CN^{\ominus}$ ion is oxidised by a powerful oxidising agent to $NO_3^{\ominus}$ and CO_2 or CO_3^{2-} depending on the acidity of the reaction mixture.

$CN^{\ominus} \rightarrow CO_2 + NO_3^{\ominus} + H^{\oplus} + \neq^{-}$

What is the number (n) of electrons involved in the process, divided by 10 ?

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11. What is the n- factor for the phenol in the following reaction?

$$\text{phenol} \xrightarrow{(NH_4)_2Cr_2O_7} ?$$

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Archives Single Correct

1. The oxidation number of C in CH_2O is

A. -2

B. $+2$

C. 0

D. $+4$

Answer: C

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2. The brown ring complex compound is formulated as $[Fe(H_2O_5)No]SO_4$. The oxidation state of Fe is

A. 1

B. 2

C. 3

D. 0

Answer: A

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3. The equivalent weight of $MnSO_4$ is half its molecular weight when it is converted to

A. Mn_2O_3

B. MnO_2

C. $MnO_4\_(4)^{\ominus}$

D. MnO_4^{2-}

Answer: B

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4. Oxidation number of P in $Ba(H_2PO_2)_2$ is

A. $+3$

B. $+2$

C. $+1$

D. -1

Answer: A

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5. The oxidation states of the most electronegative elements in the products of the reaction between BaO_2 and H_2SO_4 are

A. 0 and -1

B. -1 and -2

C. -2 and 0

D. -2 and $+1$

Answer: B

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6. For the redox reaction

$$MnO_4^{\ominus} + C_2O_4^{2-} + H^{\oplus} \rightarrow Mn^{2+} + CO_2 + H_2O$$

the correct coefficients of the reactions for the balanced reaction are

A. $2, 5, 16$

B. $16, 5, 2$

C. $5, 16, 2$

D. $2, 16, 5$

Answer: A

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7. In the compound $Yba_2Cu_3O_7$ which shows superconductivity, what is the oxidation state of Cu ?

Assume that the rare earth element yttrium is in its usual $+3$ oxidation state.

A. $+\frac{7}{3}$

B. $-\frac{7}{3}$

C. $\frac{5}{3}$

D. $-\frac{5}{2}$

Answer: A

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8. In the reaction

$$3Br_2 + 6CO_3^{2-} + 3H_2O \rightarrow 5Br^{\ominus} + BrO_3^{\ominus} + 6HCO_3^{\ominus}$$

A. Br_2 is oxidised and CO_3^{2-} is reduced.

B. Br_2 is reduced and H_2O is oxidised.

C. Br_2 is neither reduced nor oxidised.

D. Br_2 is both reduced and oxidised.

Answer: D

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9. The number of moles of $KMnO_4$ that will be needed to react with $1mol$ of sulphite ion in acidic solution is

A. $\frac{2}{5}$

B. $\frac{3}{5}$

C. $\frac{4}{5}$

D. 1

Answer: A

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10. The oxidation number of S in S_8, S_2F_2, and H_2S, respectively, are

A. $0, \ +1$ and -2

B. $+2, \ +1$ and -2

C. $0, \ +1$ and $+2$

D. $-2, \ +1$ and -2

Answer: A

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11. Among the following identify the species with an atom in $+6$ oxidation state.

A. $MnO_4^{\ominus}$

B. $\left[Cr(CN)_6\right]^{3-}$

C. $[NiF_6]^{2-}$

D. CrO_2Cl_2

Answer: D

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12. In the neutralization of $Na_2S_2O_3$ using $K_2Cr_2O_7$ by idometry, the equivalent weight of $K_2Cr_2O_7$ is

A. $M/2$

B. $M/6$

C. $M/3$

D. M

Answer: B

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13. The reaction

$3ClO^{\ominus}(aq) \rightarrow ClO_3(aq) + 2Cl^{\ominus}(aq)$

is an example of

A. Oxidation

B. Reduction

C. Disproprtionation

D. Decomposition

Answer: C

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14. Maximum oxidation state is present in

A. CrO_2Cl_2 and $MnO_4^{\ominus}$

B. MnO_2

C. $\left[Fe(CN)_6\right]^{3-}$ and $\left[Co(CN)_6\right]^{3-}$

D. MnO

Answer: A

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15. Which of the following will not be oxidised by O_3 ?

A. KI

B. $FeSO_4$

C. $KMnO_4$

D. K_2MnO_4

Answer: C

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16. Oxidation states of the metal in the minerals haematite and magnetite, respectively, are

A. II, III in haematite and III in magnetite

B. II, III in heamatite and II in magnitite

C. II in haematite and II, III in magnetite

D. III is haematite and II, III in magnetite

Answer: D

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Archives Integers

1. The difference in the oxidation numbers of two types of sulphul atoms in $Na_2S_4O_6$ is.....

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