

Topic : Mole Concept
Type of Questions

M.M., Min.

Single choice Objective ('-1' negative marking) Q.1 to Q.3

(3 marks, 3 min.)

[9, 9]

Short Subjective Questions ('-1' negative marking) Q.4 to Q.5

(3 marks, 3 min.)

[6, 6]

1. When white phosphorus reacts with caustic soda, the products are PH_3 and NaH_2PO_2 . This reaction is an example of :
- (A) Oxidation (B) Reduction
(C) Disproportionation (D) Neutralisation
2. Which of the following changes does not involve either oxidation or reduction :
- (A) $\text{VO}^{2+} \rightarrow \text{V}_2\text{O}_3$ (B) $\text{Na} \rightarrow \text{Na}^+$
(C) $\text{Zn}^{+2} \rightarrow \text{Zn}$ (D) $\text{CrO}_4^{-2} \rightarrow \text{Cr}_2\text{O}_7^{-2}$
3. Which of the following is not a redox reaction :
- (A) $\text{Mg} + \text{N}_2 \longrightarrow \text{Mg}_3\text{N}_2$ (B) $\text{MnO}_4^- + \text{C}_2\text{O}_4^{2-} \longrightarrow \text{Mn}^{2+} + \text{CO}_2$
(C) $\text{CuSO}_4 + \text{KI} \longrightarrow 2\text{CuI} + \text{I}_2 + \text{K}_2\text{SO}_4$ (D) $\text{AgCl} + \text{NH}_3 \longrightarrow [\text{Ag}(\text{NH}_3)_2]\text{Cl}$
4. Identify the oxidant and the reductant in the following reactions :
- (a) $\text{KMnO}_4 + \text{KCl} + \text{H}_2\text{SO}_4 \longrightarrow \text{MnSO}_4 + \text{K}_2\text{SO}_4 + \text{H}_2\text{O} + \text{Cl}_2$
(b) $\text{FeCl}_2 + \text{H}_2\text{O}_2 + \text{HCl} \longrightarrow \text{FeCl}_3 + \text{H}_2\text{O}$
(c) $\text{Cu} + \text{HNO}_3 (\text{dil}) \longrightarrow \text{Cu}(\text{NO}_3)_2 + \text{H}_2\text{O} + \text{NO}$
(d) $\text{Na}_2\text{HAsO}_3 + \text{KBrO}_3 + \text{HCl} \longrightarrow \text{NaCl} + \text{KBr} + \text{H}_3\text{AsO}_4$
(e) $\text{I}_2 + \text{Na}_2\text{S}_2\text{O}_3 \longrightarrow \text{Na}_2\text{S}_4\text{O}_6 + \text{NaI}$
5. Balance the following redox equations :
- (i) $\text{K}_2\text{Cr}_2\text{O}_7 + \text{H}_2\text{O}_2 + \text{H}_2\text{SO}_4 \longrightarrow \text{K}_2\text{SO}_4 + \text{Cr}_2(\text{SO}_4)_3 + \text{H}_2\text{O} + \text{O}_2$
(ii) $\text{Zn} + \text{NaNO}_3 + \text{NaOH} \longrightarrow \text{Na}_2\text{ZnO}_2 + \text{H}_2\text{O} + \text{NH}_3$
(iii) $\text{Al} \longrightarrow [\text{Al}(\text{OH})_4]^- + \text{H}_2$ (basic)
(iv) $\text{Cu}_3\text{P} + \text{Cr}_2\text{O}_7^{2-} \longrightarrow \text{Cu}^{2+} + \text{H}_3\text{PO}_4 + \text{Cr}^{3+} + \text{H}_2\text{O}$
(v) $\text{ClO}_3^- + \text{Fe}^{2+} + \text{H}^+ \longrightarrow \text{Cl}^- + \text{Fe}^{3+} + \text{H}_2\text{O}$
(vi) $\text{N}_2\text{O}_4 + \text{BrO}_3^- \longrightarrow \text{NO}_3^- + \text{Br}^-$ (in acidic medium)
(vii) $\text{S}_2\text{O}_3^{2-} + \text{Sb}_2\text{O}_5 \longrightarrow \text{SbO} + \text{H}_2\text{SO}_3$
(viii) $\text{Cr}_2\text{O}_7^{2-} + \text{I}^- + \text{H}^+ \longrightarrow \text{Cr}^{3+} + \text{I}_2 + \text{H}_2\text{O}$
(ix) $\text{IO}_4^- + \text{I}^- + \text{H}^+ \longrightarrow \text{I}_2 + \text{H}_2\text{O}$



Answer Key

DPP No. # 7

1. (C) 2. (D) 3. (D)
4. (a) $\overset{(+7)}{\text{KMnO}_4}$ (oxidant) ; $\overset{(-1)}{\text{KCl}}$ (reductant) (b) $\overset{(-2)}{\text{FeCl}_2}$ (reductant) ; $\overset{(-1)}{\text{H}_2\text{O}_2}$ (oxidant)
- (c) $\overset{(0)}{\text{Cu}}$ (reductant) ; $\overset{(+5)}{\text{HNO}_3}$ (oxidant) (d) $\overset{(+3)}{\text{Na}_2\text{HAsO}_3}$ (reductant) ; $\overset{(-5)}{\text{KBrO}_3}$ (oxidant)
- (e) $\overset{0}{\text{I}_2}$ (oxidant) ; $\overset{(+2)}{\text{Na}_2\text{S}_2\text{O}_3}$ (reductant)
5. (i) $\text{K}_2\text{Cr}_2\text{O}_7 + 3\text{H}_2\text{O}_2 + 4\text{H}_2\text{SO}_4 \longrightarrow \text{K}_2\text{SO}_4 + \text{Cr}_2(\text{SO}_4)_3 + 7\text{H}_2\text{O} + 3\text{O}_2$.
- (ii) $4\text{Zn} + \text{NaNO}_3 + 7\text{NaOH} = 4\text{Na}_2\text{ZnO}_2 + 2\text{H}_2\text{O} + \text{NH}_3$.
- (iii) $2\text{OH}^- + 6\text{H}_2\text{O} + 2\text{Al} \longrightarrow 3\text{H}_2 + 2(\text{Al}(\text{OH})_4)^-$.
- (iv) $6\text{Cu}_3\text{P} + 11\text{Cr}_2\text{O}_7^{2-} + 124\text{H}^+ \longrightarrow 18\text{Cu}^{+2} + 6\text{H}_3\text{PO}_4 + 22\text{Cr}^{+3} + 53\text{H}_2\text{O}$.
- (v) $6\text{H}^+ + \text{ClO}_3^- + 6\text{Fe}^{2+} \longrightarrow \text{Cl}^- + 6\text{Fe}^{3+} + 3\text{H}_2\text{O}$.
- (vi) $3\text{N}_2\text{O}_4 + \text{BrO}_3^- + 3\text{H}_2\text{O} \longrightarrow 6\text{NO}_3^- + \text{Br}^- + 6\text{H}^+$.
- (vii) $3\text{S}_2\text{O}_3^{2-} + 2\text{Sb}_2\text{O}_5 + 6\text{H}^+ + 3\text{H}_2\text{O} \longrightarrow 4\text{SbO} + 6\text{H}_2\text{SO}_3$
- (viii) $\text{Cr}_2\text{O}_7^{2-} + 6\text{I}^- + 14\text{H}^+ \longrightarrow 2\text{Cr}^{3+} + 3\text{I}_2 + 7\text{H}_2\text{O}$.
- (ix) $\text{IO}_4^- + 7\text{I}^- + 8\text{H}^+ \longrightarrow 4\text{I}_2 + 4\text{H}_2\text{O}$.

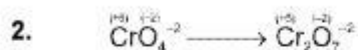


Hints & Solutions

DPP No. # 7

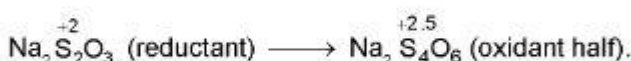
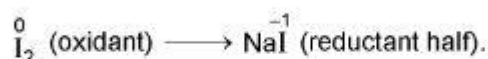
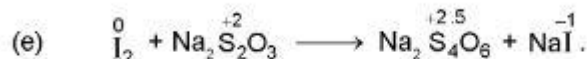
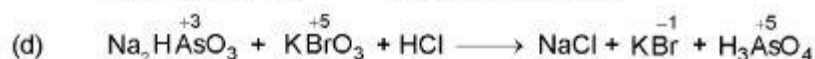
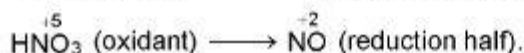
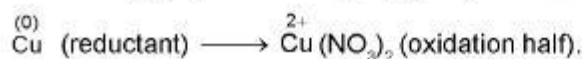
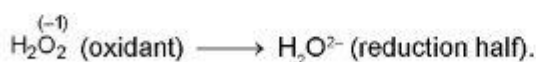
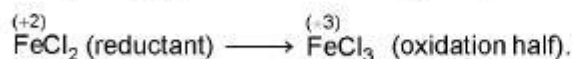
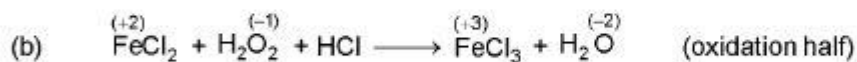
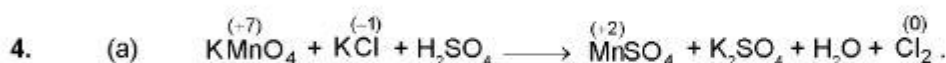


Disproportionation reaction. In this reaction, P element present in intermediate oxidation state and P undergoes both oxidation and reduction.



Oxidation number of both element Cr & O does not change.

3. Those reaction in which oxidation number of any element do not change not a redox reaction.



5.

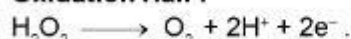


Mass Balance and Charge Balance :

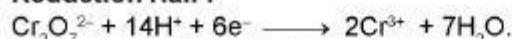
Remove the spectator ion — $2K^+$, SO_4^{2-} .



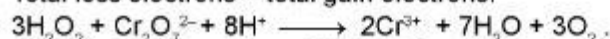
Oxidation Half :



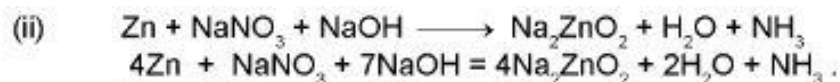
Reduction Half :



Total loss electrons = total gain electrons.



Add the spectator ion — $2K^+$, SO_4^{2-} .

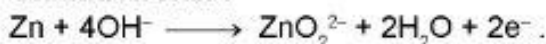


Mass Balance and Charge Balance :

Remove the spectator ion — Na^+



Oxidation Half :



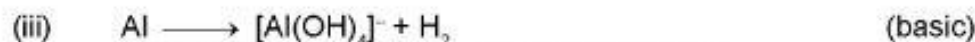
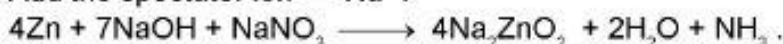
Reduction Half :



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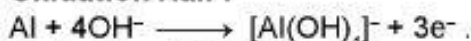


Add the spectator ion — Na^+ .



Mass Balance and Charge Balance :

Oxidation Half :



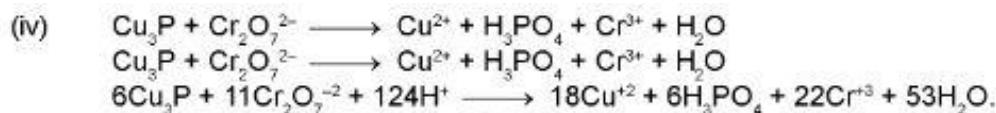
Reduction Half :



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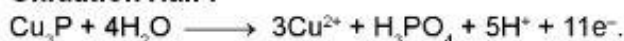


Note : If H_2 or O_2 formed in reaction. It means H_2 or O_2 produced from H_2O molecule.

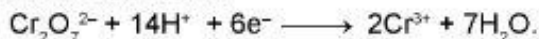


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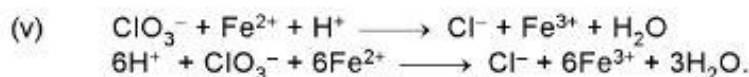
Oxidation Half :



Reduction Half :

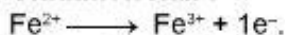


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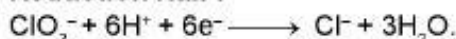


Mass Balance and Charge Balance :

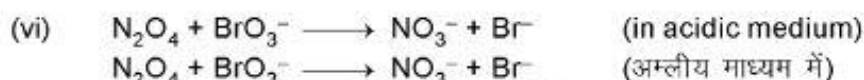
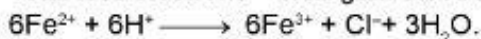
Oxidation Half :



Reduction Half :

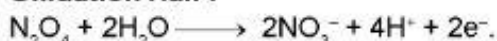


Total loss electrons = total gain electrons.

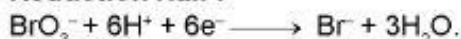


Mass Balance and Charge Balance :

Oxidation Half :

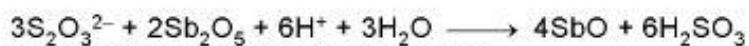
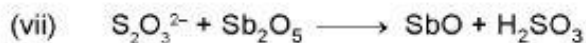


Reduction Half :



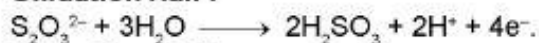
Total loss electrons = total gain electrons.





Mass Balance and Charge Balance :

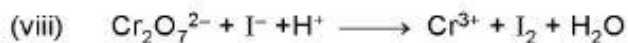
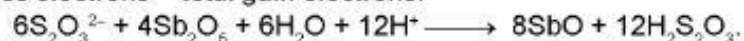
Oxidation Half :



Reduction Half :

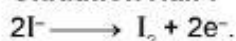


Total loss electrons = total gain electrons.

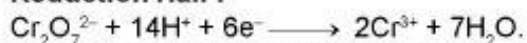


Mass Balance and Charge Balance :

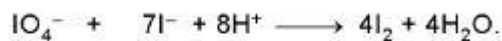
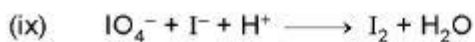
Oxidation Half :



Reduction Half :

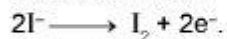


Total loss electrons = total gain electrons.

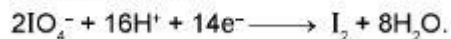


Mass Balance and Charge Balance :

Oxidation Half :



Reduction Half :



Total loss electrons = total gain electrons.

