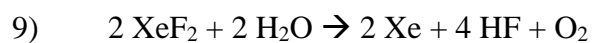
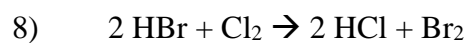
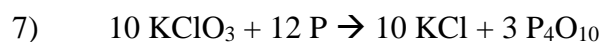
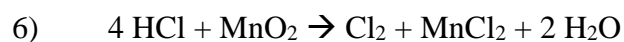
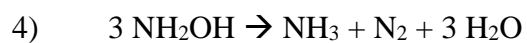
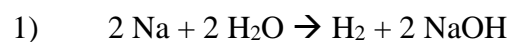


Exercise IX

Separate the following redox reactions into an oxidation reaction and a reduction reaction.



Answers:

- 1) $2 \text{Na} + 2 \text{H}_2\text{O} \rightarrow 2 \text{NaOH} + 2 \text{H}^+ + 2 \text{e}^-$ (Oxidation of Na)
 $2 \text{H}^+ + 2 \text{e}^- \rightarrow \text{H}_2$ (Reduction of H^+)
- 2) $\text{Pb} + \text{H}_2\text{SO}_4 \rightarrow \text{PbSO}_4 + 2 \text{H}^+ + 2 \text{e}^-$ (Oxidation of Pb)
 $\text{PbO}_2 + \text{H}_2\text{SO}_4 + 2 \text{H}^+ + 2 \text{e}^- \rightarrow \text{PbSO}_4 + 2 \text{H}_2\text{O}$ (Reduction of PbO_2)
- 3) $\text{N}_2\text{H}_4 \rightarrow \text{N}_2 + 4 \text{H}^+ + 4 \text{e}^-$ (Oxidation of N_2H_4)
 $2 \text{H}_2\text{O}_2 + 4 \text{H}^+ + 4 \text{e}^- \rightarrow 4 \text{H}_2\text{O}$ (Reduction of H_2O_2)
- 4) $2 \text{NH}_2\text{OH} \rightarrow \text{N}_2 + 2 \text{H}_2\text{O} + 2 \text{H}^+ + 2 \text{e}^-$ (Oxidation of NH_2OH)
 $\text{NH}_2\text{OH} + 2 \text{H}^+ + 2 \text{e}^- \rightarrow \text{NH}_3 + \text{H}_2\text{O}$ (Reduction of NH_2OH)
- 5) $\text{Cu} + \text{H}_2\text{SO}_4 \rightarrow \text{CuSO}_4 + 2 \text{H}^+ + 2 \text{e}^-$ (Oxidation of Cu)
 $\text{H}_2\text{SO}_4 + 2 \text{H}^+ + 2 \text{e}^- \rightarrow \text{SO}_2 + 2 \text{H}_2\text{O}$ (Reduction of H_2SO_4)
- 6) $2 \text{HCl} \rightarrow \text{Cl}_2 + 2 \text{H}^+ + 2 \text{e}^-$ (Oxidation of HCl)
 $\text{MnO}_2 + 2 \text{HCl} + 2 \text{H}^+ + 2 \text{e}^- \rightarrow \text{MnCl}_2 + 2 \text{H}_2\text{O}$ (Reduction of MnO_2)
- 7) $12 \text{P} + 30 \text{H}_2\text{O} \rightarrow 3 \text{P}_4\text{O}_{10} + 60 \text{H}^+ + 60 \text{e}^-$ (Oxidation of P)
 $10 \text{KClO}_3 + 60 \text{H}^+ + 60 \text{e}^- \rightarrow 10 \text{KCl} + 30 \text{H}_2\text{O}$ (Reduction of KClO_3)
- 8) $2 \text{HBr} \rightarrow \text{Br}_2 + 2 \text{H}^+ + 2 \text{e}^-$ (Oxidation of HBr)
 $\text{Cl}_2 + 2 \text{H}^+ + 2 \text{e}^- \rightarrow 2 \text{HCl}$ (Reduction of Cl_2)
- 9) $2 \text{H}_2\text{O} \rightarrow \text{O}_2 + 4 \text{H}^+ + 4 \text{e}^-$ (Oxidation of H_2O)
 $2 \text{XeF}_2 + 4 \text{H}^+ + 4 \text{e}^- \rightarrow 2 \text{Xe} + 4 \text{HF}$ (Reduction of XeF_2)