

5.3 ANSWERS TO EXERCISES

5.3 Exercise 1

- +7
 - 1
 - +6
 - +6
 - +5
 - +4
- $\text{MnO}_4^- + 8\text{H}^+ + 5\text{e}^- \rightarrow \text{Mn}^{2+} + 4\text{H}_2\text{O}$
 - $\text{Cr}_2\text{O}_7^{2-} + 14\text{H}^+ + 6\text{e}^- \rightarrow 2\text{Cr}^{3+} + 7\text{H}_2\text{O}$
 - $\text{Zn}^{2+} + 2\text{e}^- \rightarrow \text{Zn}$
 - $\text{Fe}^{3+} + \text{e}^- \rightarrow \text{Fe}^{2+}$
 - $\text{H}_2\text{O}_2 + 2\text{H}^+ + 2\text{e}^- \rightarrow 2\text{H}_2\text{O}$
- $\text{Zn} \rightarrow \text{Zn}^{2+} + 2\text{e}^-$
 - $\text{Fe}^{2+} \rightarrow \text{Fe}^{3+} + \text{e}^-$
 - $\text{H}_2\text{O}_2 \rightarrow 2\text{H}^+ + \text{O}_2 + 2\text{e}^-$
 - $\text{SO}_3^{2-} + \text{H}_2\text{O} \rightarrow \text{SO}_4^{2-} + 2\text{H}^+ + 2\text{e}^-$
- $\text{MnO}_4^- + 8\text{H}^+ + 5\text{Fe}^{2+} \rightarrow \text{Mn}^{2+} + 4\text{H}_2\text{O} + 5\text{Fe}^{3+}$
 - $\text{Cr}_2\text{O}_7^{2-} + 8\text{H}^+ + 3\text{H}_2\text{O}_2 \rightarrow 2\text{Cr}^{3+} + 7\text{H}_2\text{O} + 3\text{O}_2$
 - $2\text{VO}_2^+ + 3\text{Zn} + 8\text{H}^+ \rightarrow 2\text{V}^{2+} + 4\text{H}_2\text{O} + 3\text{Zn}^{2+}$
 - $2\text{VO}_2^+ + \text{SO}_3^{2-} + 2\text{H}^+ \rightarrow 2\text{VO}^{2+} + \text{H}_2\text{O} + \text{SO}_4^{2-}$
- $\text{O}_2 + 2\text{H}_2\text{O} + 4\text{e}^- \rightarrow 2\text{OH}^-$ reduction
 - $\text{Cr}^{3+} + 8\text{OH}^- \rightarrow \text{CrO}_4^{2-} + 4\text{H}_2\text{O} + 3\text{e}^-$ oxidation
 - $\text{H}_2\text{O}_2 + 2\text{e}^- \rightarrow 2\text{OH}^-$ reduction
 - $\text{MnO}_4^- + 2\text{H}_2\text{O} + 3\text{e}^- \rightarrow \text{MnO}_2 + 4\text{OH}^-$ reduction

5.3 Exercise 2

- Fe Fe^{2+} Cu^{2+} Cu Cu is +ve, Fe is -ve
 - Pt I, I_2 Fe^{3+} , Fe^{2+} Pt Pt in $\text{Fe}^{3+}/\text{Fe}^{2+}$ is +ve, Pt in I/ I_2 is -ve
 - Zn Zn^{2+} H^+ , H_2 Pt Pt is +ve, Zn is -ve
 - Pt H_2 , H^+ [$\text{O}_2 + 4\text{H}^+$] Pt Pt in O_2/H^+ is +ve, Pt in H^+/H_2 is -ve
- $\text{Zn} + 2\text{Fe}^{3+} \rightarrow \text{Zn}^{2+} + 2\text{Fe}^{2+}$
 - $\text{Fe} + 2\text{Fe}^{3+} \rightarrow 3\text{Fe}^{2+}$
 - $2\text{Ag} + \text{Cl}_2 \rightarrow 2\text{Ag}^+ + 2\text{Cl}^-$

5.3 Exercise 3

1. a) yes b) yes c) no d) no e) yes
2.
 - a) $\text{Pb} + 2\text{H}^+ \rightarrow \text{Pb}^{2+} + \text{H}_2$
 - b) no reaction
 - c) $\text{Cu} + 2\text{NO}_3^- + 4\text{H}^+ \rightarrow \text{Cu}^{2+} + 2\text{NO}_2 + 2\text{H}_2\text{O}$
 - d) no reaction
 - e) $2\text{Fe}^{3+} + 2\text{I}^- \rightarrow 2\text{Fe}^{2+} + \text{I}_2$
 - f) no reaction
 - g) $2\text{H}_2\text{O}_2 \rightarrow 2\text{H}_2\text{O} + \text{O}_2$