ELECTROCHEMISTRY REVIEW AND PRACTICE 2

ANSWERS

1. (a) $Sn^{2+}(aq) \rightarrow Sn^{4+}(aq) + 2\,e^-$ (oxidation half-reaction)

$Br_2(l) + 2\,e^- \rightarrow 2\,Br^-(aq)$ (reduction half-reaction)

The reaction is spontaneous [$Sn^{2+}(aq)$ is the reducing agent; $Br_2(l)$ is the oxidizing agent].

(b) $Pb(s) \rightarrow Pb^{2+}(aq) + 2\,e^-$ (oxidation half-reaction)

$Cr^{3+}(aq) + 3\,e^- \rightarrow Cr(s)$ (reduction half-reaction)

The reaction is not spontaneous [Pb(s) is the reducing agent; $Cr^{3+}(aq)$ is the oxidizing agent].

2. $12\,OH^-(aq) + Cl_2(aq) + 5\,Pb^{2+}(aq) \rightarrow 2\,ClO_3^-(aq) + 5\,Pb(s) + 6\,H_2O(l)$

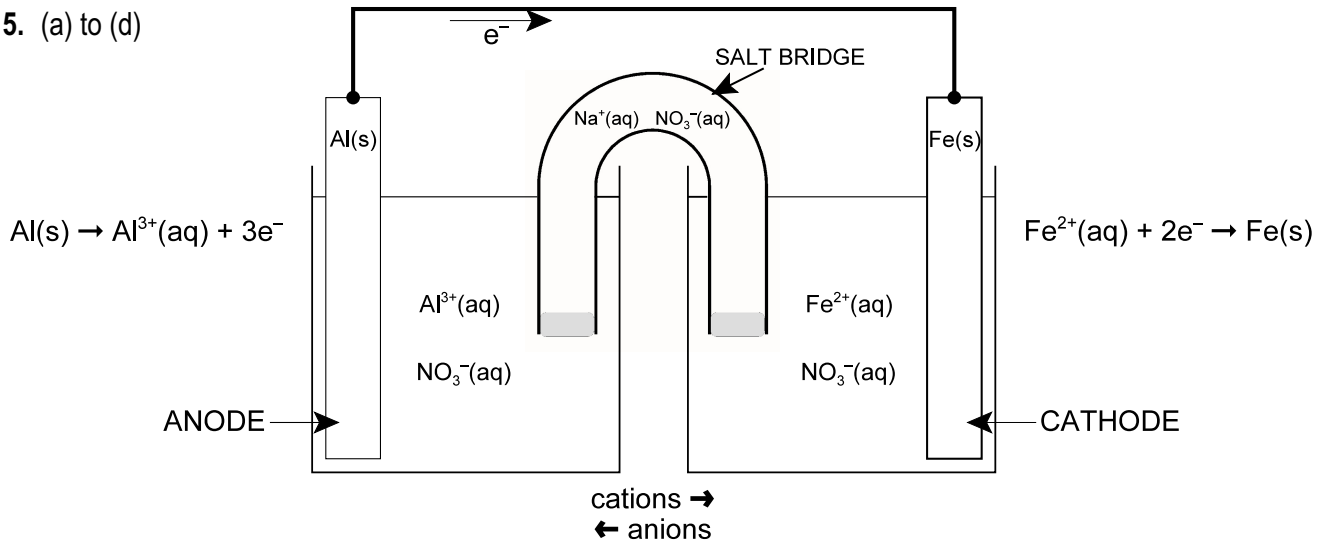
3. $10\,H^+(aq) + Br^-(aq) + 2\,CrO_4^{2-}(aq) \rightarrow BrO_3^-(aq) + 2\,Cr^{3+}(aq) + 5\,H_2O(l)$

$3\,H_2O(l) + Br^-(aq) \rightarrow BrO_3^-(aq) + 6\,H^+(aq) + 6\,e^-$ (balanced oxidation half-reaction)

$3\,e^- + 8\,H^+(aq) + CrO_4^{2-}(aq) \rightarrow Cr^{3+}(aq) + 4\,H_2O(l)$ (balanced reduction half-reaction)

4. $H_2(g) + 2\,Ag^+(aq) \rightarrow 2\,H^+(aq) + 2\,Ag(s)$

5. (a) to (d)



(e) $2\,Al(s) + 3\,Fe^{2+}(aq) \rightarrow 2\,Al^{3+}(aq) + 3\,Fe(s)$

(f) $\Delta E_{cell} = E_r(\text{cathode}) - E_r(\text{anode})$

$= (-0.44\ V) - (-1.66\ V)$

$= +1.22\ V$