Worksheet Ch 4 Sec 4-10

2 a) $Br_2 \longrightarrow Br^- + BrO_3^-$

red Br
ox Br
red ag Br_2
ox ag Br_2

$5\times(2e^- + \frac{1}{2}Br_2 \longrightarrow Br^-)$

$6H_2O + Br_2 \longrightarrow 2BrO_3^- + 12H^+ + 10e^-$

$6Br_2 + 6H_2O \longrightarrow 10Br^- + 2BrO_3^- + 12H^+$

$6OH^- + 3Br_{2(aq)} + 3H_2O_{(l)} \longrightarrow 5Br^-_{(aq)} + BrO_3^-{}_{(aq)} + 6H^+_{(aq)} + 6OH^-$

$6H^+ + 6OH^- \rightarrow 3H_2O$

$6OH^-_{(aq)} + 3Br_{2(aq)} \longrightarrow 5Br^-_{(aq)} + BrO_3^-{}_{(aq)} + 3H_2O_{(l)}$

b) $Cr + ClO_4^- \longrightarrow Cr(OH)_3 + ClO_3^-$

red Cl
ox Cr
red ag Cr
ox ag ClO_4^-

$2\times(3H_2O + Cr \longrightarrow Cr(OH)_3 + 3H^+ + 3e^-)$

$3\times(2e^- + 2H^+ + ClO_4^- \longrightarrow ClO_3^- + H_2O)$

$6OH^- + 6H_2O + 2Cr + 6H^+ + 3ClO_4^- \longrightarrow 2Cr(OH)_3 + 6H^+ + 3ClO_3^- + 3H_2O + 6OH^-$

$3H_2O + 6H_2O$

$3H_2O_{(l)} + 2Cr_{(s)} + 3ClO_4^-{}_{(aq)} \longrightarrow 2Cr(OH)_{3(s)} + 3ClO_{3\,(aq)}^-$

c) $ClO^- + CrO_2^- \longrightarrow Cl^- + CrO_4^{2-}$

red Cl
ox Cr
red ag CrO_2^-
ox ag ClO^-

$3\times(2e^- + 2H^+ + ClO^- \longrightarrow Cl^- + H_2O)$

$2\times(2H_2O + CrO_2^- \longrightarrow CrO_4^{2-} + 4H^+ + 3e^-)$

$8OH^- + 6H^+ + 3ClO^- + 4H_2O + 2CrO_2^- \longrightarrow 3Cl^- + 3H_2O + 2CrO_4^{2-} + 8H^+ + 8OH^-$

$2OH^- + 6H_2O$ $\qquad$ $8H_2O$

$2OH^-_{(aq)} + 3ClO^-_{(aq)} + 2CrO_2^-{}_{(aq)} \longrightarrow 3Cl^-_{(aq)} + 2CrO_4^{2-}{}_{(aq)} + H_2O_{(l)}$