$$= -142 \; kJ$$

(b) $\Delta G = \Delta G° + RT \ln \dfrac{P_{SO_3}^2}{P_{SO_2}^2 \, P_{O_2}}$ any increase in P_{O_2} results in ~~an increase of~~ to ⋯ and a decrease of $\ln Q$ and a decrease in ΔG.

(c) $\Delta G°$ does not change

chapter 17

1. (a) Ca^{2+} (b) Mn^{3+} (c) Au^{+} (d) Fe^{2+} (e) Al^{3+}
the lower $\mathcal{E}_{red}$ is oxidized the higher $\mathcal{E}_{red}$ is the oxidizing agent

2. the higher $\mathcal{E}_{red}$ is reduced and the lower $\mathcal{E}_{red}$ is the reducing agent
(a) Ca (b) I^{-} (c) Li (d) Ni (e) Ag

3. (a) $2Fe^{3+} + 2e^{-} \longrightarrow 2Fe^{2+}$ oxidizing agent (reduction)
$2I^{-} \longrightarrow I_2 + 2e^{-}$ reducing agent (oxidation)

$$2Fe^{3+} + 2I^{-} \longrightarrow 2Fe^{2+} + I_2$$

(b) $Tl^{3+} + 2e^{-} \longrightarrow Tl^{+}$ reduction
$2Cr^{2+} \longrightarrow 2Cr^{3+} + 2e^{-}$ oxidation

$$Tl^{3+} + 2Cr^{2+} \longrightarrow Tl^{+} + 2Cr^{3+}$$

(c) $Br_2 + 2e^{-} \longrightarrow 2Br^{-}$ reduction
$In^{+} \longrightarrow In^{3+} + 2e^{-}$ oxidation

$$Br_2 + In^{+} \longrightarrow In^{3+} + 2Br^{-}$$

4. (a) $MnO_4^{-} \longrightarrow Mn^{2+}$ unbalanced $C_2O_4^{2-} \longrightarrow CO_2$
$8H^{+} + MnO_4^{-} \longrightarrow Mn^{2+} + 4H_2O$ atoms balanced $C_2O_4^{2-} \longrightarrow 2CO_2$
$5e^{-} + 8H^{+} + MnO_4^{-} \longrightarrow Mn^{2+} + 4H_2O$ charge balanced $C_2O_4^{2-} \longrightarrow 2CO_2 + 2e^{-}$

add them together: $5(C_2O_4^{2-} \longrightarrow 2CO_2 + 2e^{-})$
$$2(5e^{-} + 8H^{+} + MnO_4^{-} \longrightarrow Mn^{2+} + 4H_2O)$$

$$5C_2O_4^{2-} + 16H^{+} + 2MnO_4^{-} \longrightarrow 10CO_2 + 2Mn^{2+} + 8H_2O$$