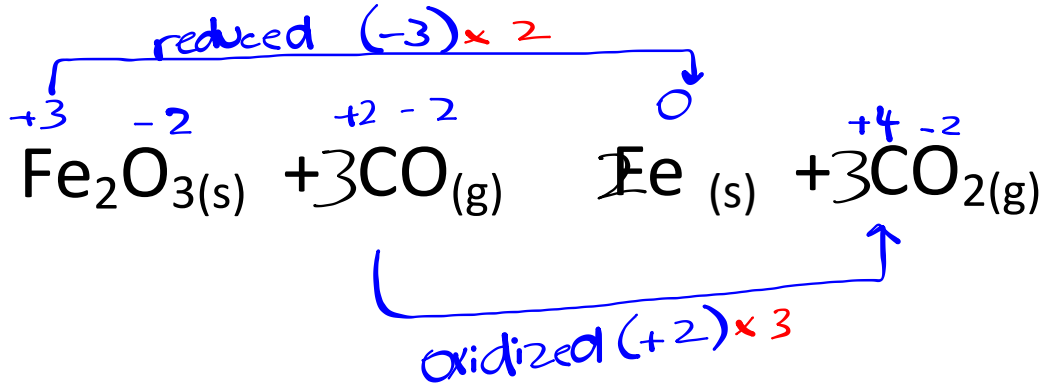
Homework - Worksheets

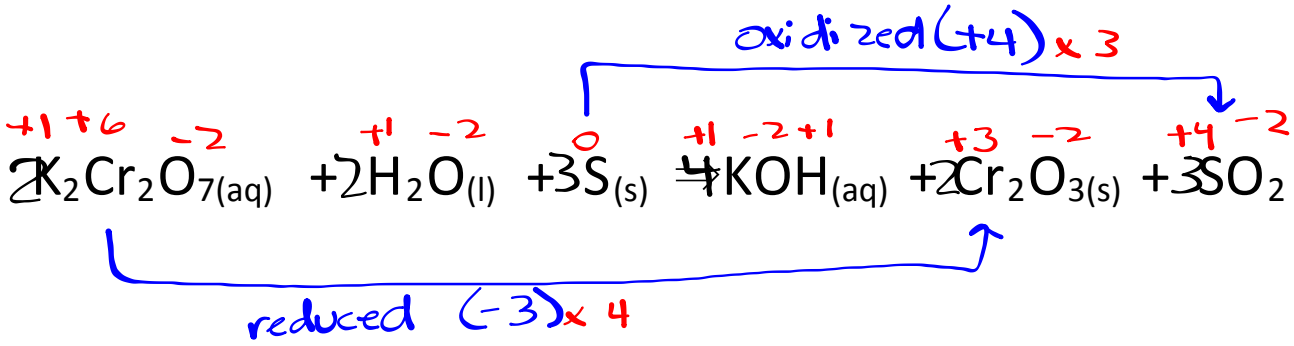
(1) a) SO (−2; +2) SO_3^{2-} (+4 −2)

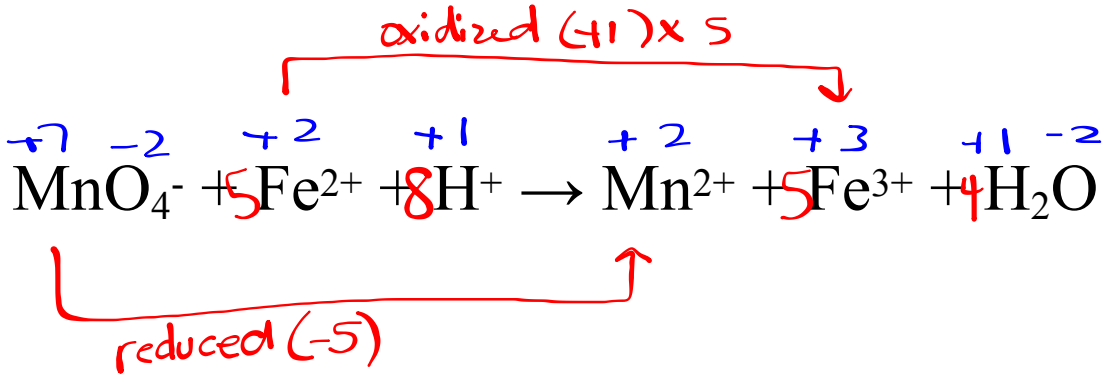
(3) f) $H_5P_3O_{10}$ (+1 +5 −2)

(4) ClF_3 (+3 −1)

Balancing Equations using the Oxidation-Number-Change-Method




oxidized (+4) x 3
+1 +6 -2
+1 -2
0
+1 -2 +1
+3 -2
+4 -2
2K2Cr2O7(aq) + 2H2O(l) + 3S(s) → 4KOH(aq) + 2Cr2O3(s) + 3SO2
reduced (-3) x 4


oxidized (+1) x 5
+7 −2 +2 +1 +2 +3 +1 −2
MnO4- +5Fe2+ +8H+ → Mn2+ +5Fe3+ +4H2O
reduced (−5)

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Balancing Redox Reactions in Acid Solution

$Fe^{2+}_{(aq)} + Cr_2O_7^{2-}{}_{(aq)} \longrightarrow Fe^{3+}_{(aq)} + Cr^{3+}_{(aq)}$ (acid)

1. Identify elements being reduced and oxidized by looking at their oxidation states.

2. Write separate equations for oxidation and reduction half reactions.

3. For each half reaction:
(a) balance all elements except H and O
(b) balance O by adding H_2O
(c) balance H by adding H^+
(d) balance charge by adding e^-

4. Multiply half reaction by an integer to equalize the number of electrons transferred.

5. Add half reactions; cancel identical species.

$$KMnO_{4(aq)} + HCl_{(aq)} \longrightarrow MnCl_{2(aq)} + Cl_{2(g)} + H2O_{(l)} + KCl_{(aq)}$$

$$MnO_4^-{}_{(aq)} + Fe^{2+}{}_{(aq)} \longrightarrow Fe^{3+}{}_{(aq)} + Mn^{2+}{}_{(aq)}$$

$$I_{2(s)} \longrightarrow IO_{3(aq)} + I^-_{(aq)}$$

Balancing Redox Reactions in Base Solution

1. Balance as if in acid solution.

2. Add OH^- ions equal in number to the number of H^+ ions to both sides of the equation.

3. Form H_2O on side containing both H^+ and OH^-. Eliminate H_2O molecules that appear on both side of the equation if necessary.

$$Mn^{2+} + H_2O_2 \longrightarrow MnO_2 + H_2O$$

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p. 652 #21

p. 655 #22-25