

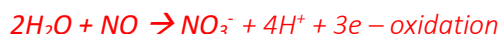
Lesson 3 – an overall redox reaction from two half reactions (oxidation and reduction half reactions).

An overall balanced redox equation must balance for elements and charge. Electrons do not appear in an overall reaction. Number of electrons produced in oxidation equals the number of electrons used in reduction.

Derive the balanced overall equation given the two conjugate pairs. (Make sure electrons balance)

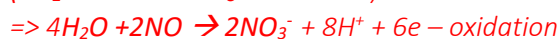
Eg. $\text{Cr}_2\text{O}_7^{2-}(\text{aq}) / \text{Cr}^{3+}(\text{aq})$ and $\text{NO}(\text{aq}) / \text{NO}_3^-(\text{aq})$

Step 1 write the balanced oxidation and reduction half equations



Step 2 Number of electrons produced in oxidation should equal the number of electrons used in reduction.

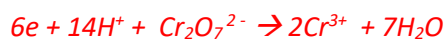
Multiply the oxidation reaction by 2



Step 3 Add the oxidation and reduction reactions



+



Step 4 Eliminate electrons and species that appear on both sides.



a. $\text{MnO}_4^-(\text{aq}) / \text{MnO}(\text{s})$ and $\text{Cu}(\text{s}) / \text{Cu}^{2+}(\text{aq})$

b. $\text{S}(\text{s}) / \text{H}_2\text{S}(\text{g})$ and $\text{Al}(\text{s}) / \text{Al}^{3+}(\text{aq})$

c. $\text{K}(\text{s}) / \text{K}^+(\text{aq})$ and $\text{Cl}_2(\text{g}) / \text{Cl}^-(\text{aq})$

d. $\text{Cr}_2\text{O}_7^{2-}(\text{aq}) / \text{Cr}^{3+}(\text{aq})$ and $\text{CH}_3\text{OH}(\text{aq}) / \text{COOH}(\text{aq})$

e. $\text{H}^+(\text{aq}) / \text{H}_2(\text{g})$ and $\text{Al}(\text{s}) / \text{Al}^{3+}(\text{aq})$