

Redox reactions – half equations

Lesson 2

All redox reactions can be divided into two equations called **half equations**, representing the reduction and oxidation processes of the overall redox reaction.

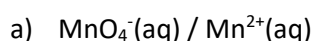
The following rules apply to writing half equations

- 1) Balance the equation for all elements other than H or O
- 2) Balance for oxygen by adding water to the side deficient in oxygen.
- 3) Balance for hydrogen by adding H^+ to the side deficient in H
- 4) Balance for charge by adding electrons to the most positive side.

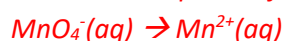
Example Write a half equation for the reduction of $Cr_2O_7^{2-}(aq) \rightarrow Cr^{3+}(aq)$

- 1) Balance the equation for all elements other than H or O
 $Cr_2O_7^{2-}(aq) \rightarrow 2Cr^{3+}(aq)$
- 2) Balance for oxygen by adding water to the side deficient in oxygen.
 $Cr_2O_7^{2-}(aq) \rightarrow 2Cr^{3+}(aq) + 7H_2O(l)$
- 3) Balance for hydrogen by adding H^+ to the side deficient in H
 $Cr_2O_7^{2-}(aq) + 14H^+(aq) \rightarrow 2Cr^{3+}(aq) + 7H_2O(l)$
- 4) Balance for charge by adding electrons to the most positive side.
 $Cr_2O_7^{2-}(aq) + 14H^+(aq) + 6e \rightarrow 2Cr^{3+}(aq) + 7H_2O(l)$

Write the half equations for:



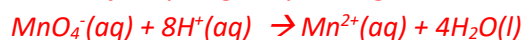
Balance the equation for all elements other than H or O



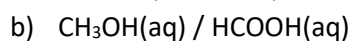
Balance for oxygen by adding water to the side deficient in oxygen.



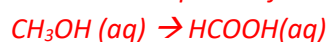
Balance for hydrogen by adding H^+ to the side deficient in H



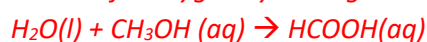
Balance for charge by adding electrons to the most positive side.



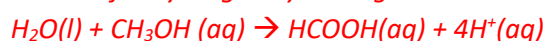
Balance the equation for all elements other than H or O



Balance for oxygen by adding water to the side deficient in oxygen.

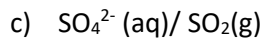


Balance for hydrogen by adding H^+ to the side deficient in H

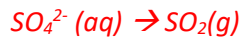


Balance for charge by adding electrons to the most positive side.





Balance the equation for all elements other than H or O



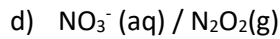
Balance for oxygen by adding water to the side deficient in oxygen.



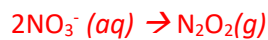
Balance for hydrogen by adding H^+ to the side deficient in H



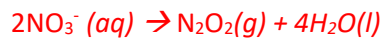
Balance for charge by adding electrons to the most positive side.



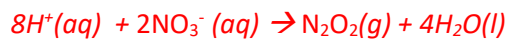
Balance the equation for all elements other than H or O



Balance for oxygen by adding water to the side deficient in oxygen.



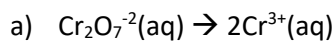
Balance for hydrogen by adding H^+ to the side deficient in H



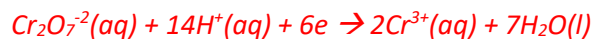
Balance for charge by adding electrons to the most positive side.



In an alkaline solutions



=> write the equation as per acidic solutions



=> Remove H^+ (aq) by adding OH^- (aq)



=> Cancel for water

