

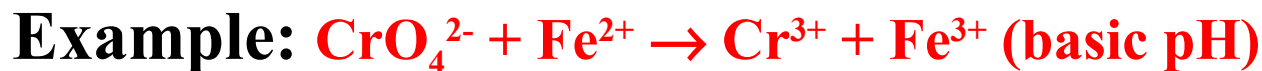
Balancing redox reactions

□ Introduction

□ Balancing redox reaction (acid pH)



□ Balancing redox reactions (basic pH)



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Redox reactions

- Oxidation and reduction can't happen one without the other

One of the
chemicals will
lose e^- (oxidation)

Another one
will gain them
(reduction)

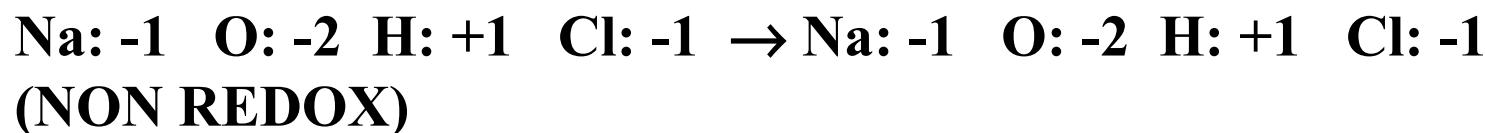
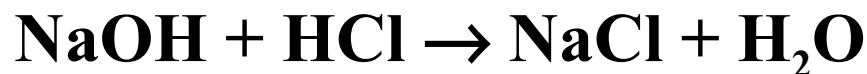
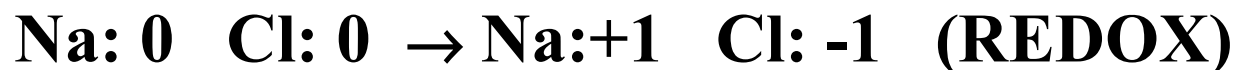
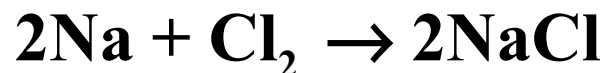
OIL RIG: Oxidation is loss (of e^-), reduction is gain (of e^-)

In a redox reaction there is a transfer of e^- from one reactant to another



Redox reactions

- Oxidation numbers can be used to recognise redox reactions



OXIDATION: loss of e^-

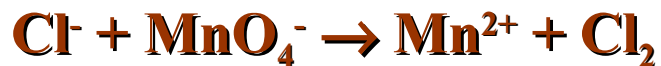
REDUCTION: gain of e^-

OXIDISING AGENT: substance reduced

REDUCING AGENT: substance oxidised



Balancing redox equations (pH acid)



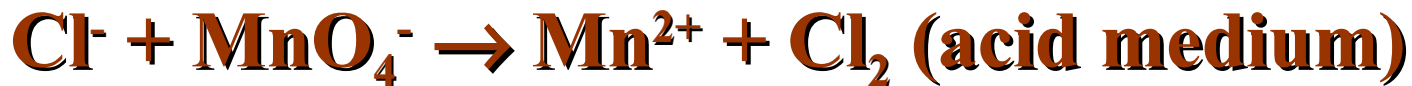
1. Identify the atoms that are oxidised and reduced, using ox. no.
2. Write the half-reactions for oxidation and reduction processes
3. Balance mass, so that the number of atoms of each element oxidised/reduced is the same on both sides

If there is any O atoms present, balance them adding H₂O

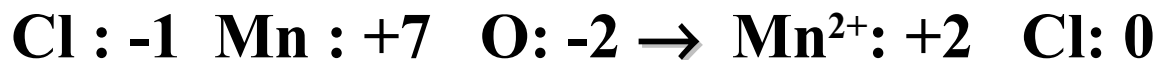
If there is H atoms present, balance them adding H⁺

6. Balance charges with e⁻
7. Multiply the half-equations so that the number of e⁻ lost in one equation is equal to the e⁻ gained in the other
8. Add the two half-equation together and cancel out any substances that appear on both side





1. Identify atoms oxidised and reduced, using ox. no.

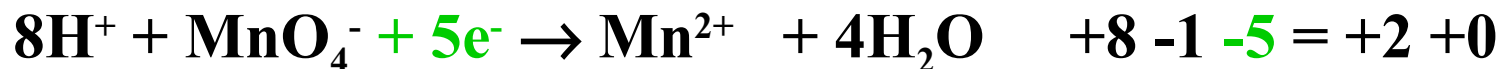


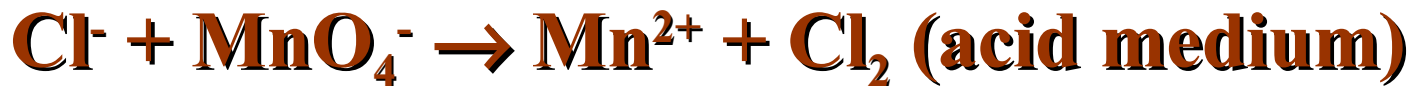
Cl oxidises (goes from -1 to 0) Mn reduces (from +7 to +2)

2-4. Write the half-reactions. Balance mass, if necessary using H_2O (to add O) and/or H^+ (to add H)

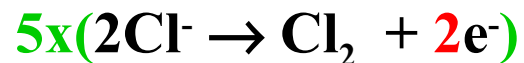


7. Balance the charges using electrons (e^-). Each e^- adds a -1

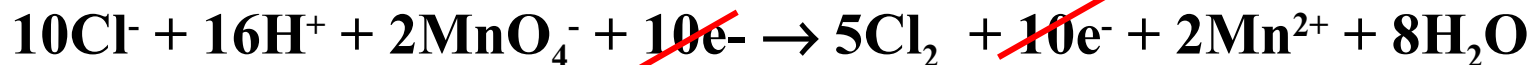




1. Multiply the half-equations so e- lost in one = e- gained in the other



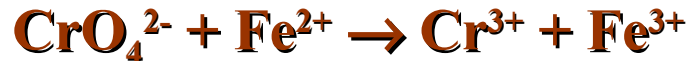
4. Add the two half-equation together and cancel out any substances that appear on both sides



There should be the same number/type of atoms in both sides. IF THAT'S NOT THE CASE, YOU'VE DONE SOMETHING WRONG!!!



Balancing redox equations (pH basic)



1. Identify the atoms that are oxidised and reduced, using ox. no.
2. Write the half reactions for oxidation and reduction processes
3. Balance mass, so that the number of atoms of each element oxidised/reduced is the same on both sides

If there is any O atoms present, balance them adding OH⁻ (double the number necessary)

If there is H atoms present, balance them adding H₂O

6. Balance charges with e⁻
7. Multiply the half-equations so that the number of e⁻ lost in one equation is equal to the e⁻ gained in the other
8. Add the two half-equation together, cancel out any substances that appear on both side.





1. Identify the atoms oxidised and reduced, using ox. no.

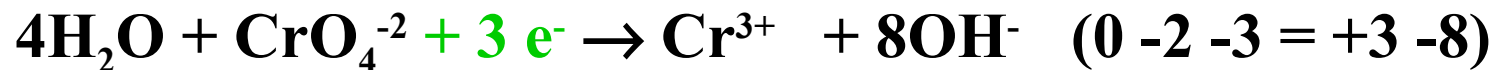


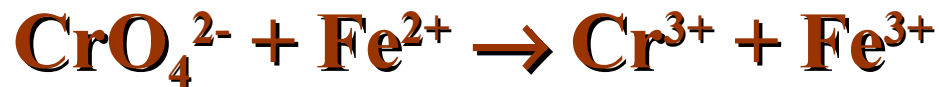
Fe oxidises (goes from +2 to +3) Cr reduces (goes from +6 to +3)

2-4. Write the half-reactions. Balance mass, if necessary using OH^- (to add O, double the number needed) and/or H_2O (to add H)



7. Balance the charges using electrons (e^-). Each e^- adds a -1





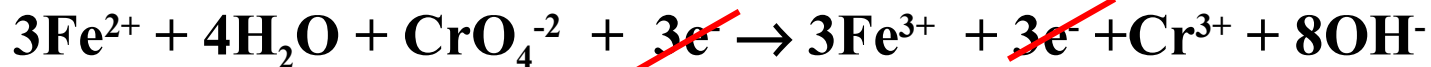
1. Multiply the half-equations so that e- lost in one = e- gained in the other



4. Add the two half-equation together and cancel out any substances that appear on both side



+



Check there is the same number/type of atoms in both sides of the equation. IF THAT'S NOT THE CASE, YOU'VE DONE SOMETHING WRONG!!!

