REDOX REACTIONS OR NOT?

Oxidation and reduction

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of electrons

Redox reactions

In any reaction where one species is oxidised (loses electrons), another must be reduced (gains electrons). Both **red**uction and **ox**idation take place and so they are called **redox** reactions.

Definitions in terms of electrons:

oxidation	=	loss of electrons
reduction	=	gain of electrons
oxidising agent	=	species that removes electrons from another
reducing agent	=	species that gives electrons to another

Note that the oxidising agent removes electrons from a species and so is itself reduced as it gains electrons. Similarly, a reducing agent is itself oxidised.

OXIDATION $Mg \rightarrow Mg^{2+} + 2e^-$
Mg oxidised from 0 to +2 (loses electrons) to form Mg^{2+}
Oxidising agent = HCl (Cl^- in HCl takes away electrons from Mg)

$$Mg + 2\,HCl \longrightarrow MgCl_2 + H_2$$

Mg 0 Mg +2
H +1 H 0
Cl -1 Cl -1

REDUCTION $2H^+ + 2e^- \rightarrow H_2$
H^+ reduced from +1 to 0 (gains electrons) to form H_2
Reducing agent = Mg (Mg gives electrons to H^+ in HCl)

Disproportionation reactions

In a **disproportionation** reaction, a species is simultaneously oxidised and reduced.

e.g. $Cl_2 + H_2O \rightarrow HCl + HOCl$

Cl	0		-1	+1
H		+1	+1	+1
O		-2		-

Cl reduced from 0 to -1 and oxidised from 0 to +1 ∴redox reaction (disproportionation)

Complete the table over the page about the following reactions.

	Equation (write oxidation states)	Redox reaction (✓/×)	Disproportionation (✓/×)	Species oxidised	Species reduced	Oxidising agent	Reducing agent
e.g.	**$Mg + 2\,HCl \rightarrow MgCl_2 + H_2$** Mg 0 +2 H +1 0 Cl -1 -1	✓	×	Mg	HCl	HCl	Mg
1	**$Na_2O + H_2O \rightarrow 2\,NaOH$**						
2	**$2\,SO_2 + O_2 \rightarrow 2\,SO_3$**						
3	**$2\,NaBr + H_2SO_4 \rightarrow Na_2SO_4 + 2\,HBr$**						
4	**$2\,KBr + F_2 \rightarrow Br_2 + 2\,KF$**						
5	**$2\,H_2O_2 \rightarrow 2\,H_2O + O_2$**						
6	**$HCl + NaOH \rightarrow NaCl + H_2O$**						
7	**$Cl_2 + 2\,H_2O \rightarrow 4\,HCl + O_2$**						
8	**$BaCl_2 + H_2SO_4 \rightarrow BaSO_4 + 2\,HCl$**						
9	**$Cl_2 + 2\,NaOH \rightarrow NaCl + NaOCl + H_2O$**						
10	**$3\,MnO_4^{2-} + 4\,H^+ \rightarrow 2\,MnO_4^- + MnO_2 + 2\,H_2O$**						
11	**$(NH_4)_2Cr_2O_7 \rightarrow Cr_2O_3 + N_2 + 4\,H_2O$**						