

5 (a) Re-write $\text{Mg}_{(s)} + 2\text{HCl}_{(aq)} \rightarrow \text{MgCl}_{2(aq)} + \text{H}_{2(g)}$ in terms of ions.

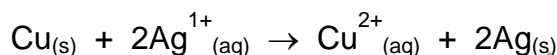
[2]

(b) Re-write $\text{Cl}_{2(aq)} + 2\text{KBr}_{(aq)} \rightarrow \text{Br}_{2(aq)} + 2\text{KCl}_{(aq)}$ in terms of ions.

[2]

Aqueous ions which undergo *no net chemical change* in processes can be removed from both sides of an equation and the species remaining constitute the IONIC EQUATION for the reaction – the usefulness of this procedure is that it emphasises more clearly the changes taking place.

In the reaction $\text{Cu}_{(s)} + 2\text{Ag}^{1+}_{(aq)} + 2\text{NO}_3^{1-}_{(aq)} \rightarrow \text{Cu}^{2+}_{(aq)} + 2\text{NO}_3^{1-}_{(aq)} + 2\text{Ag}_{(s)}$ it is evident that the nitrate ions, $\text{NO}_3^{1-}_{(aq)}$, are identical on the r.h.s. and l.h.s. of the equation – removing them generates the ionic equation for the process, namely



6 Re-write the following as *ionic* equations by eliminating the spectator ion(s)

(a) $\text{Mg}_{(s)} + 2\text{H}^{1+}_{(aq)} + 2\text{Cl}^{1-}_{(aq)} \rightarrow \text{Mg}^{2+}_{(aq)} + 2\text{Cl}^{1-}_{(aq)} + \text{H}_{2(g)}$

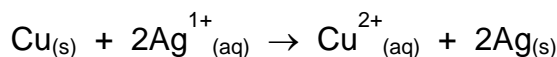
[2]

(b) $\text{Cl}_{2(aq)} + 2\text{K}^{1+}_{(aq)} + 2\text{Br}^{1-}_{(aq)} \rightarrow \text{Br}_{2(aq)} + 2\text{K}^{1+}_{(aq)} + 2\text{Cl}^{1-}_{(aq)}$

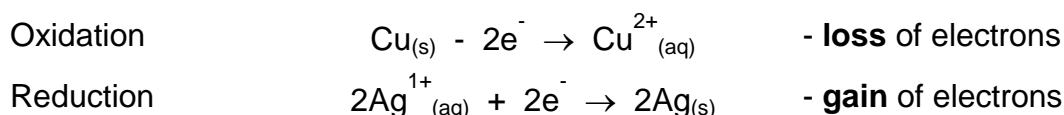
[2]

Ionic equations for **redox** processes can be split into two half-equations (ion-electron equations), one representing the **oxidation process** and the other the *complementary reduction process*.

Consider once again the reaction occurring when a spiral of copper wire is placed in a gas jar filled with aqueous silver nitrate solution which can be represented by the following ionic equation:



By considering the difference in sub-atomic particles (*i.e.*, electrons) between the two copper-containing species, and also between the two silver-containing species, it is possible to write an equation for the oxidation process and the reduction process:



Copper metal, Cu, is the reducing agent since it has been oxidized while the silver(I) ion, Ag^{1+} , is the oxidizing agent since it has been reduced. Remember that

a **good oxidizing agent** is a substance which is *easily reduced* while

a **good reducing agent** is a substance which is *easily oxidized*.

- 7 Split the following ionic equations into two half-equations, one for the **oxidation process** and the other for the **reduction process** and state both the *oxidizing agent* and *reducing agent*:

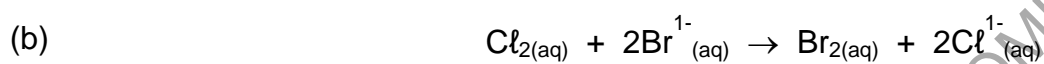


Oxidation process _____ [1]

Reduction process _____ [1]

Oxidizing agent _____ [1]

Reducing agent _____ [1]



Oxidation process _____ [1]

Reduction process _____ [1]

Oxidizing agent _____ [1]

Reducing agent _____ [1]

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