

Displacement reactions involving solutions of salts

Salts are compounds like copper(II) sulfate, silver nitrate or sodium chloride. You will find a definition of what a salt is on page 71. This section explores some reactions between metals and solutions of salts in water.

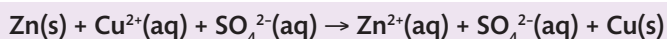
The reaction between zinc and copper(II) sulfate solution

The copper is displaced by the more reactive zinc. The blue colour of the copper(II) sulfate solution fades as colourless zinc sulfate solution is formed.



The zinc and the copper are metals consisting simply of atoms, but the copper(II) sulfate and the zinc sulfate are metal compounds and so are ionic.

If you rewrite the equation showing the ions, you will find that the sulfate ions are spectator ions.



Removing the spectator ions (because they aren't changed during the reaction) leaves you with:



This is another redox reaction.

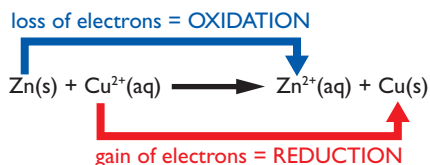
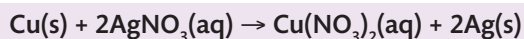


Figure 8.9 Zinc reacting with copper(II) sulfate solution.

The reaction between copper and silver nitrate solution

Silver is below copper in the reactivity series, so a coil of copper wire in silver nitrate solution will produce metallic silver. Figure 8.10 shows the silver being produced as a mixture of grey 'fur' and delicate crystals.

Notice the solution becoming blue as copper(II) nitrate is produced.



This time the nitrate ions are spectator ions, and the final version of the ionic equation looks like this:



This is yet another redox reaction.

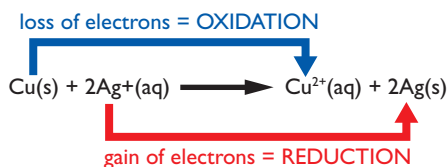


Figure 8.11 Copper reacting with silver nitrate solution.

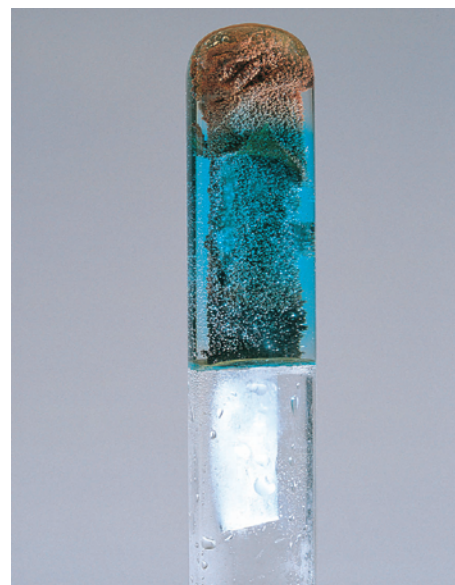


Figure 8.8 Zinc displaces copper from copper(II) sulfate solution.

It wouldn't matter which copper(II) salt you started with, as long as it was soluble in water. Copper(II) chloride or copper(II) nitrate would react in exactly the same way with zinc, because the chloride ions or the nitrate ions would once again be spectator ions, taking no part in the reaction.



Figure 8.10 Displacing silver from silver nitrate solution.