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Question 1:

Why does the colour of copper sulphate solution change when an iron nail is dipped in it?

Answer 1:

When an iron nail is dipped in a copper sulphate solution, iron (which is more reactive than copper) displaces copper from copper sulphate solution forming iron sulphate, which is green in colour.

$$\underbrace{CuSO_4}_{\substack{Copper\ Sulphate\\ Blue\ Colour}} + \underbrace{Fe}_{Iron} \longrightarrow \underbrace{FeSO_4}_{\substack{Iron\ Sulphate\\ Green\ Colour}} + \underbrace{Cu}_{Copper}$$

Therefore, the blue colour of copper sulphate solution fades and green colour appears.

Question 2:

Give an example of a double displacement reaction other than the one given in Activity 1.10.

Answer 2:

Sodium carbonate reacts with calcium chloride to form calcium carbonate and sodium chloride.

$$\underbrace{Na_2CO_3}_{\text{Sodium carbonate}} + \underbrace{CaCl_2}_{\text{Calcium chloride}} \longrightarrow \underbrace{CaCO_3}_{\text{Calcium carbonate}} + \underbrace{2NaCl}_{\text{Sodium chloride}}$$

In this reaction, sodium carbonate and calcium chloride exchange ions to form two new compounds. Hence, it is a double displacement reaction.

Question 3:

Identify the substances that are oxidised and the substances that are reduced in the following reactions.

(i) $4Na_{(s)} + O_{2(g)} \rightarrow 2Na_2O_{(s)}$

(ii) $CuO_{(s)} + H_{2(g)} \rightarrow Cu_{(s)} + H_2O_{(l)}$

Answer 3:

(i). Sodium (Na) is oxidised as it gains oxygen and oxygen gets reduced.

(ii). Copper oxide (CuO) is reduced to copper (Cu) while hydrogen (H_2) gets oxidised to water (H_2O).