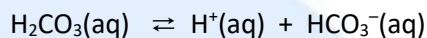


## SL & HL Answers to questions on Acid deposition

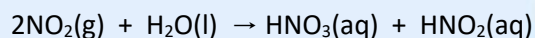
1. i. Carbonic acid is a weak acid so is only very slightly dissociated



so that, even in a saturated solution, the concentration of hydrogen ions can never give a pH lower than 5.6.

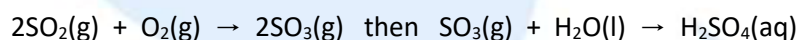
- ii. Ten times more acidic (as the pH has decreased by one unit)

2. i.  $2\text{NO}(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{NO}_2$



(nitric acid can also be formed from:  $4\text{NO}_2(\text{g}) + \text{O}_2(\text{g}) + 2\text{H}_2\text{O}(\text{l}) \rightarrow 4\text{HNO}_3(\text{aq})$ )

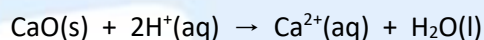
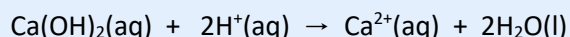
- ii.  $\text{SO}_2(\text{g}) + \text{H}_2\text{O}(\text{l}) \rightarrow \text{H}_2\text{SO}_3(\text{aq})$



3. Tree growth is stunted with thinning of the tops and loss and yellowing of leaves. This is due to the leaching of important nutrients, such as  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$  and  $\text{K}^+$  from the soil. The loss of  $\text{Mg}^{2+}$  causes a reduction of chlorophyll which lowers the ability of the tree to photosynthesise. The leaching of  $\text{Al}^{3+}$  from rocks into the soil affects the ability of the roots of the tree to take up sufficient water and nutrients to survive.

4.  $\text{CO}_3^{2-}(\text{s}) + 2\text{H}^+(\text{aq}) \rightarrow \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l})$

5. Calcium hydroxide and calcium oxide are both strong bases and can neutralise the acid.



This increases the amount of calcium ions in the lake water and also helps to precipitate aluminium ions from the water.