CHECK YOUR LEARNING

Suggested Answers

1. **(a)** Neutral solutions have a pH at or near 7.
   (b) As acid is added to the base, the pH drops, becoming nearer to 7.
2. **(a)** The chemical equation for hydrochloric acid and potassium hydroxide is $HCl(aq) + KOH(aq) \rightarrow KCl(aq) + H_2O(l)$
   (b) The chemical equation for sulfuric acid and potassium hydroxide is $H_2SO_4(aq) + 2\ KOH(aq) \rightarrow K_2SO_4(aq) + 2\ H_2O(l)$
3. **(a)** The chemical equation for the neutralization of potassium hydroxide solution with carbonic acid is $H_2CO_3(aq) + 2\ KOH(aq) \rightarrow K_2CO_3(aq) + 2\ H_2O(l)$
   (b) The pH will fall from quite high (possibly around 12) to closer to 7 (possibly around 8).
4. Some students might answer that NaOH would be better to use because it neutralizes the acid without producing $CO_2(g)$. Others might suggest that baking soda is a safer choice.
5. Lemon juice is acidic. It and the NaOH underwent a neutralization reaction. Because the solution in the lemon was no longer basic, the phenolphthalein was no longer pink.
6. Calcium oxide reacts vigorously in water and even more vigorously with acids. Bricklayers should be sure to keep acidic substances away from the quicklime.
7. A neutralization reaction occurs when acids are in contact with calcium carbonate.
   (b) The chemical equation is $H_2SO_4(aq) + CaCO_3(s) \rightarrow CaSO_4(aq) + H_2O(l) + CO_2(g)$
   (c) The acid would react with the coral, weakening it. It might become easier for predators to eat the animals that make coral. Large coral reefs could eventually crumble and die.
8. Sodium hydroxide could be used to neutralize sulfuric acid and produce sodium sulfate. (NaOH); $H_2SO_4(aq) + 2\ NaOH(aq) \rightarrow 2\ H_2O(l) + Na_2SO_4(aq)$
9. The acid in the lemon juice neutralizes the smelly bases in the fish.
10. Adding an acid such as lemon juice or vinegar to the kettle would react with and remove the calcium carbonate.