



NEUTRALISATION USING METAL CARBONATES

Answer all the questions below then check your answers

1. Which of the following is a common product when an acid reacts with a metal carbonate?
 - a) Hydrogen gas
 - b) Carbon dioxide
 - c) Water
 - d) Oxygen
2. Which of the following equations represents the reaction between hydrochloric acid and calcium carbonate?
 - a) $\text{HCl} + \text{CaCO}_3 \rightarrow \text{CaCl}_2 + \text{H}_2$
 - b) $2\text{HCl} + \text{CaCO}_3 \rightarrow \text{CaCl}_2 + \text{H}_2\text{O} + \text{CO}_2$
 - c) $2\text{HCl} + \text{CaCO}_3 \rightarrow \text{CaCl}_2 + \text{CO}_2$
 - d) $\text{H}_2\text{SO}_4 + \text{CaCO}_3 \rightarrow \text{CaSO}_4 + \text{CO}_2 + \text{H}_2\text{O}$

3. Match the following acids to the salts they form when neutralised by calcium carbonate:

acid
Hydrochloric (HCl)
Sulfuric (H ₂ SO ₄)
Nitric (HNO ₃)

Salt formed
Calcium nitrate
Calcium chloride
Calcium sulfate

Fill in the gaps to complete the sentences below:

4. When calcium carbonate reacts with sulfuric acid, the products are calcium sulfate, water, and _____.
- b. Powdered limestone, which is primarily composed of _____, is often used to neutralize acidic streams and lakes.
5. Explain the steps involved in carrying out a reaction between hydrochloric acid and calcium carbonate to ensure the acid is neutralised.
6. Write the balanced chemical equation for the reaction between nitric acid and calcium carbonate. (2 marks)
7. Describe how indigestion tablets work to neutralise stomach acid.
8. Explain how powdered limestone is used to treat acidic streams and lakes, including the chemical reaction involved.
9. Discuss the use of metal carbonates in toothpaste, including why they are included and the chemical reactions they undergo.

Answers

1. Which of the following is a common product when an acid reacts with a metal carbonate?

a) Hydrogen gas

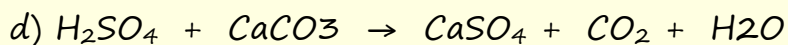
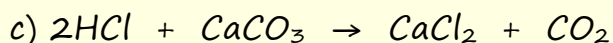
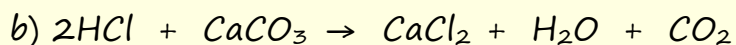
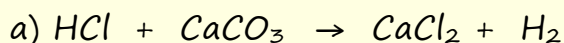
b) Carbon dioxide

c) Water

d) Oxygen

Answer: b) Carbon dioxide

2. Which of the following equations represents the reaction between hydrochloric acid and calcium carbonate?



Answer: b) $2\text{HCl} + \text{CaCO}_3 \rightarrow \text{CaCl}_2 + \text{H}_2\text{O} + \text{CO}_2$

3. Match the following acids to the salts they form when neutralised by calcium carbonate:

acid	Salt formed
Hydrochloric (HCl)	Calcium nitrate
Sulfuric (H ₂ SO ₄)	Calcium chloride
Nitric (HNO ₃)	Calcium sulfate

Fill in the gaps to complete the sentences below:

4. When calcium carbonate reacts with sulfuric acid, the products are calcium sulfate, water, and _____.

Answer: carbon dioxide

- b. Powdered limestone, which is primarily composed of _____, is often used to neutralize acidic streams and lakes.

Answer: calcium carbonate

5. Explain the steps involved in carrying out a reaction between hydrochloric acid and calcium carbonate to ensure the acid is neutralised.

Answer:

- Measure a specific amount of hydrochloric acid and pour it into a conical flask.
- Add an excess of calcium carbonate (in solid form) to the acid in the conical flask. Add the calcium carbonate until there is no further fizzing, that is no more carbon dioxide is being released.
- Observe the reaction, noting the effervescence due to the release of carbon dioxide. The reaction will produce calcium chloride, water, and carbon dioxide.

6. Write the balanced chemical equation for the reaction between nitric acid and calcium carbonate. (2 marks)

Answer:



7. Describe how indigestion tablets work to neutralise stomach acid.

Answer: Indigestion tablets contain bases such as magnesium hydroxide or calcium carbonate. When ingested, these bases react with the hydrochloric acid in the stomach, neutralizing it and thereby relieving symptoms of indigestion and heartburn.

8. Explain how powdered limestone is used to treat acidic streams and lakes, including the chemical reaction involved.

Answer:

Acidic streams and lakes often suffer from low pH due to acid rain or other environmental factors.

Adding powdered limestone (calcium carbonate) helps neutralise the acidity.

This neutralisation process raises the pH of the water, making it less acidic and more hospitable for aquatic life.

9. Discuss the use of metal carbonates in toothpaste, including why they are included and the chemical reactions they undergo.

Answer:

Metal carbonates like calcium carbonate are included in toothpaste primarily as mild abrasives to help remove plaque and stains from teeth.

They also help to neutralize acids produced by bacteria in the mouth, which can prevent tooth decay.