



1 Complete the table with ticks to show whether each of the following is an acid, base, salt and/or alkali.

formula	name	acid	base	alkali	salt
CaO	calcium oxide		✓		
K <sub>2</sub> SO <sub>4</sub>	potassium sulfate				✓
KOH	potassium hydroxide		✓	✓	
HNO <sub>3</sub>	nitric acid	✓			
NH <sub>3</sub>	ammonia		✓	✓	
AlCl <sub>3</sub>	aluminium chloride				✓

2 A sample of hydrochloric acid with pH 2.3 has a concentration of H<sup>+</sup> ions of 0.0050 mol/dm<sup>3</sup>. Water was added to dilute the acid which reduced the concentration of H<sup>+</sup> ions to 0.00050 mol/dm<sup>3</sup>. What is the pH of the diluted acid?

**3.3**

3 Ethanoic acid is a weak acid. Explain the terms *acid* and *weak*.

Acid = **substance that reacts with water to form H<sup>+</sup> ions**

Weak = **acid where only a small fraction of the molecules react with water to form H<sup>+</sup> ions**

4 a Complete the word equation for each of the following reactions.

i sodium hydroxide + sulfuric acid → **sodium sulfate + water**

ii copper carbonate + hydrochloric acid → **copper chloride + water + carbon dioxide**

iii ammonia + nitric acid → **ammonium nitrate**

iv zinc + sulfuric acid → **zinc sulfate + hydrogen**

b Write an ionic equation for reaction (i) **H<sup>+</sup> + OH<sup>-</sup> → H<sub>2</sub>O**

c Which of the reactions in (a) are redox reactions? **iv**

d Which of the reactions in (a) are acid-base reactions? **i, ii, iii**

e Write balanced equations for the reactions in (a)

i **2NaOH + H<sub>2</sub>SO<sub>4</sub> → Na<sub>2</sub>SO<sub>4</sub> + 2H<sub>2</sub>O**

ii **CuCO<sub>3</sub> + 2HCl → CuCl<sub>2</sub> + H<sub>2</sub>O + CO<sub>2</sub>**

iii **NH<sub>3</sub> + HNO<sub>3</sub> → NH<sub>4</sub>NO<sub>3</sub>**

iv **Zn + H<sub>2</sub>SO<sub>4</sub> → ZnSO<sub>4</sub> + H<sub>2</sub>**