# 4 Titration, acids and bases, and redox – Part 2

Name: _____ Class: _____ Date: _____

## Vocabulary

*Write each word three times.*

| English | Write it 3 times (English) | | |
|---|---|---|---|
| titration | | | |
| equivalence point | | | |
| acid | | | |
| base | | | |
| redox | | | |
| oxidation | | | |
| reduction | | | |

## Recall

You have met acids and bases before, and maybe done a titration:

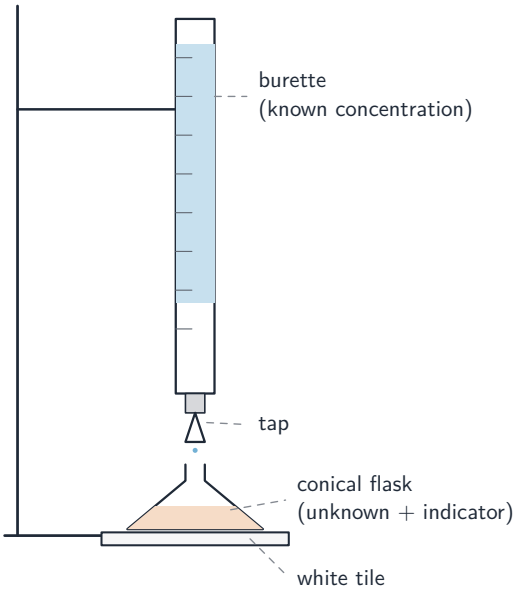
- Acids taste sour and turn litmus red; bases (alkalis) feel soapy and turn it blue.
- An acid and a base react to make a salt and water.
- Some reactions transfer electrons – like a metal reacting with oxygen.

This sheet lines up three important reaction types. Each idea has a worked example.

## New ideas

## 1 Titration

A **titration** finds an unknown concentration by reacting it with a solution of known concentration until they exactly match – the **equivalence point** .

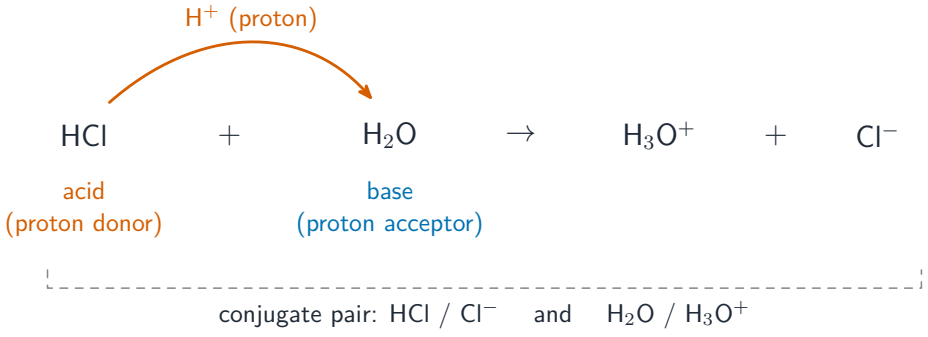



*Worked example.* 25.0 mL of acid is neutralized by 30.0 mL of 0.100 M NaOH (a 1 : 1 reaction). Moles of NaOH $= 0.0300 \times 0.100 = 3.00 \times 10^{-3}$, so moles of acid are the same, giving $[\text{acid}] = \dfrac{3.00 \times 10^{-3}}{0.0250} = 0.120$ M.

## 2 Acid–base reactions

An **acid** gives away a proton ($H^+$); a **base** accepts one. They react to make water and a salt:

$$H^+ + OH^- \rightarrow H_2O.$$

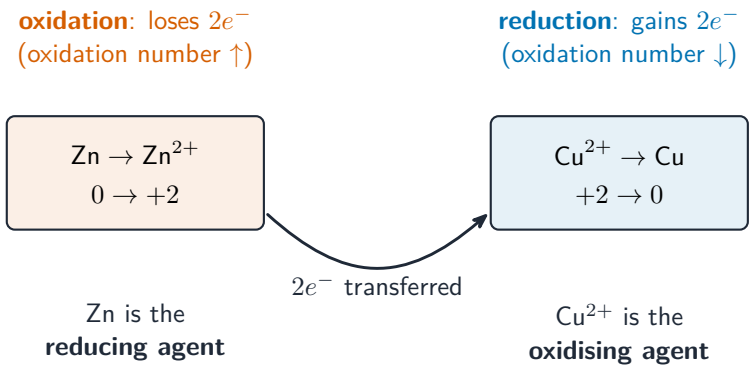





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### 3 Redox reactions

In a **redox** reaction, electrons transfer between substances:




- **oxidation** is **loss** of electrons,
- **reduction** is **gain** of electrons.

Remember "OIL RIG": Oxidation Is Loss, Reduction Is Gain.

*Worked example.* When magnesium burns, $Mg \rightarrow Mg^{2+} + 2e^-$: it **loses** electrons, so magnesium is oxidized.

**Watch out:** every oxidation is paired with a reduction – the electrons one substance loses are exactly the electrons another gains. You cannot have one without the other.

## Practice

Try these in order. The methods are all above.

**2.1** State what happens at the equivalence point of a titration. [1]

**2.2** 20.0 mL of acid is neutralized by 25.0 mL of 0.100 M NaOH (a 1 : 1 reaction). Find the acid's concentration. [3]

**2.3** Write the ionic equation for an acid reacting with a base to form water. [1]

**2.4** State whether oxidation is the loss or gain of electrons, and do the same for reduction. [2]

**2.5** In the reaction $Zn \rightarrow Zn^{2+} + 2e^-$, state whether zinc is oxidized or reduced, and why. [2]



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