

6 Oxidation number and redox – Part 1

Name: _____ Class: _____ Date: _____

Vocabulary 词汇

Write each word three times. 把每个单词抄写三遍。

English	中文	Write it 3 times (English)
oxidation	氧化	_____
reduction	还原	_____
redox	氧化还原	_____
oxidation number	氧化数	_____
oxidising agent	氧化剂	_____
reducing agent	还原剂	_____

Recall

At IGCSE you learned that **oxidation** 氧化 and **reduction** 还原 happen together in **redox** 氧化还原 reactions. Now we track them exactly using the **oxidation number** 氧化数.

- The oxidation number shows how many electrons an atom has lost or gained.
- Simple rules let you work it out for any atom.

Nothing here is harder than IGCSE — it just adds a counting tool.

New ideas

Read these first, then do the Practice.

1 Oxidation number rules

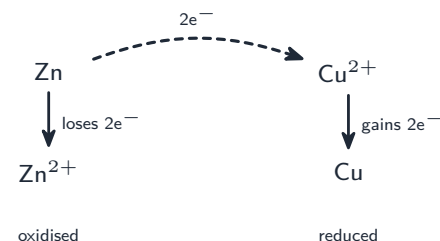
- an uncombined element is 0.
- a simple ion equals its charge (so Mg^{2+} is +2).
- Group 1 is +1, Group 2 is +2.
- hydrogen** is +1, **oxygen** is -2, **fluorine** is -1.
- the numbers add up to 0 in a neutral compound, or to the charge in an ion.



$$(+1) + (+7) + 4(-2) = 0$$

2 Redox is electron transfer

- oxidation** 氧化 is **loss** of electrons — the oxidation number goes **up**.
- reduction** 还原 is **gain** of electrons — the oxidation number goes **down**.

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

3 Oxidising and reducing agents

- an **oxidising agent** 氧化剂 takes electrons from another species (and is itself **reduced**).
- a **reducing agent** 还原剂 gives electrons to another species (and is itself **oxidised**).

Watch out: an oxidation number is *per atom* and always carries a sign (+2, not just 2). Multiply it by the number of those atoms before making the compound add up to zero (or to the ion's charge).

Practice

Try these in order.

6.1 State the oxidation number of (a) an uncombined element, (b) oxygen in most compounds. [2]

6.2 What does OIL RIG stand for? [2]

6.3 Work out the oxidation number of sulfur in SO_2 (O is -2). [2]

6.4 Work out the oxidation number of nitrogen in the nitrate ion, NO_3^- . [2]

6.5 In $\text{Zn} + \text{Cu}^{2+} \rightarrow \text{Zn}^{2+} + \text{Cu}$, which species is oxidised? [1]

6.6 An oxidising agent is itself reduced. Explain why. [1]

6.7 Challenge. Work out the oxidation number of chromium in the dichromate ion, $\text{Cr}_2\text{O}_7^{2-}$ (O is -2). [2]