

3 Formulae and equations – 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)		
Stoichiometry	化学计量	_____	_____	_____
formulae	化学式	_____	_____	_____
equations	化学方程式	_____	_____	_____
molecular formula	分子式	_____	_____	_____
empirical formula	实验式	_____	_____	_____
ratio	比例	_____	_____	_____
ionic compound	离子化合物	_____	_____	_____
symbol equation	化学方程式	_____	_____	_____
balanced	配平	_____	_____	_____
state symbols	状态符号	_____	_____	_____
aqueous	水溶液	_____	_____	_____

Recall

Stoichiometry 化学计量 is about the **amounts** of substances in a reaction. It starts with writing **formulae** 化学式 and balancing **equations** 化学方程式.

- A formula shows which atoms are in a substance, and how many.
- An equation shows reactants changing into products.

Nothing here is hard —it just needs careful counting.

New ideas

Read these first, then do the Practice.

■ 1 Formulae

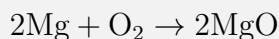
- the **molecular formula** 分子式 gives the actual number of each atom (glucose: $\text{C}_6\text{H}_{12}\text{O}_6$).
- the **empirical formula** 实验式 gives the simplest **ratio** 比例 (glucose: CH_2O).

For an **ionic compound** 离子化合物, balance the charges so the compound is neutral —the charges **cross over** to become the numbers.



■ 2 Balancing equations

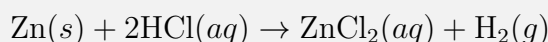
A **symbol equation** 化学方程式 must be **balanced** 配平—the **same number of each atom** on both sides:



left:	2 Mg, 2 O	balanced
right:	2 Mg, 2 O	

■ 3 State symbols

Add **state symbols** 状态符号 in brackets: (*s*) solid, (*l*) liquid, (*g*) gas, (*aq*) **aqueous** 水溶液.



Watch out: when balancing you may change only the **big numbers in front** (coefficients) —never the small subscripts inside a formula, as that would change the substance. For an ionic formula the charges **cross over** to become the subscripts.

Practice

Try these in order.

3.1 State the difference between a *molecular* and an *empirical* formula. [2]

3.2 Work out the formula of the compound of Mg^{2+} and Cl^- . [2]

3.3 Balance this equation: $\text{H}_2 + \text{O}_2 \rightarrow \text{H}_2\text{O}$. [2]

3.4 What does the state symbol (*aq*) mean? [1]

3.5 Write the symbol equation (with state symbols) for solid zinc reacting with hydrochloric acid to give zinc chloride solution and hydrogen gas. [2]

3.6 Challenge. Balance this equation: $\text{Fe} + \text{O}_2 \rightarrow \text{Fe}_2\text{O}_3$. [2]