3 The mole – Part 2

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)		
mole	摩尔			
relative atomic mass	相对原子质量			
relative molecular mass	相对分子质量			
particles	粒子			
Avogadro constant	阿伏伽德罗常数			
molar mass	摩尔质量			

Recall

From Part 1 you can write a balanced equation. Now we count the **amounts**: how much reacts and how much is made, using the **mole** 摩尔.

- Atoms are far too light to weigh one at a time.
- The mole lets us count particles by weighing.

Nothing here is hard —it just needs one equation.

New ideas

Read these first, then do the Practice.

1 Relative masses

- the **relative atomic mass** 相对原子质量 (A_r) is the average mass of an element's atoms.
- the **relative molecular mass** 相对分子质量 (M_r) is the sum of the A_r values in

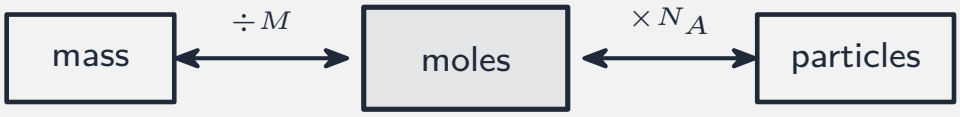
a molecule.

$$M_r(\mathrm{H_2O}) = (2 \times 1) + 16 = 18$$

2 The mole

One **mole** 摩尔 contains 6.02×10^{23} **particles** 粒子 (the **Avogadro constant** 阿伏伽德罗常数). The **molar mass** 摩尔质量 (in g/mol) has the same number as A_r or M_r. The key equation:

$$\text{amount (mol)} = \frac{\text{mass (g)}}{\text{molar mass (g/mol)}}$$



Worked example. Moles in 36 g of water ($M_r = 18$): $n = 36/18 = 2$ mol.

3 Reacting masses

A balanced equation gives the **ratio** of the amounts. To find a reacting mass: mass → moles → (use the ratio) → moles → mass.

Watch out: apply the equation ratio to **moles**, not to masses —always convert mass → moles **first**. The molar mass (g/mol) has the same number as A_r or M_r.

Practice

Try these in order. Use A_r: H = 1, C = 12, O = 16, Na = 23.

3.1 Calculate the relative molecular mass, M_r, of (a) CO_2, (b) H_2O. [2]

3.2 State the value of the Avogadro constant. [1]

3.3 How many moles are in 46 g of sodium ($A_r = 23$)? [2]

3.4 How many moles are in 88 g of CO_2 ($M_r = 44$)? [2]

3.5 How many particles are in 2 mol of a substance? [1]

3.6 Challenge. Magnesium burns: $2Mg + O_2 \rightarrow 2MgO$. What mass of magnesium oxide forms from 48 g of magnesium? (A_r: Mg = 24, O = 16.) [3]