What is a mole in chemistry?

COMPOUND INTEREST

What is a mole?

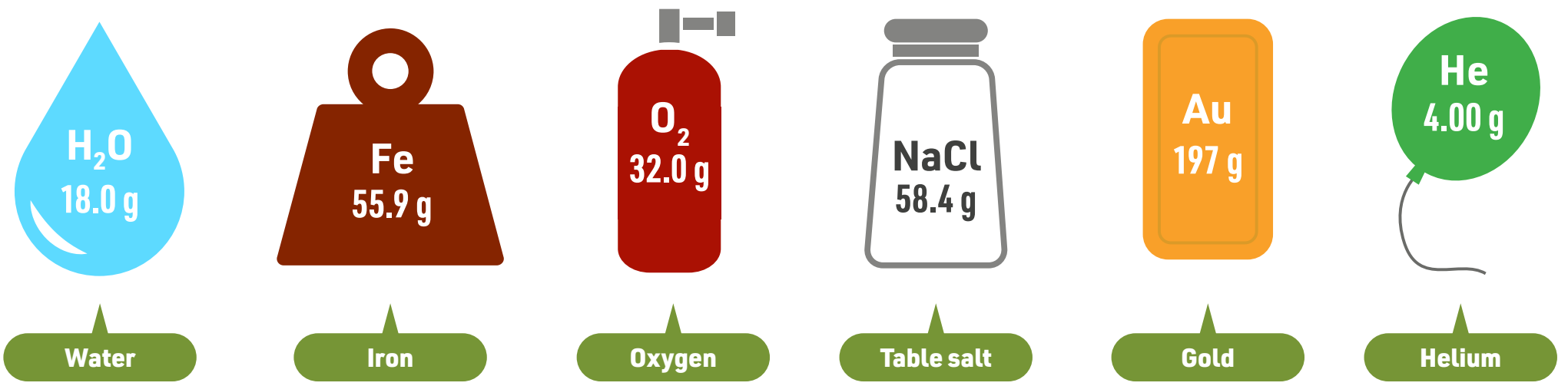
One mole is the amount of substance that contains exactly $6.02214076 \times 10^{23}$ atoms, molecules or ions. This number is also known as 'Avogadro's number'. It's named after Italian scientist Amedeo Avogadro (left), a suggestion put put forward by French scientist Jean Perrin to recognise Avogadro's work. 'Mole' derives from molecule – it's not related to the animal.

602,214,076,000,000,000,000,000

The number of atoms, molecules or ions in one mole of a substance

Atoms, molecules and ions are very small and impossible for chemists to count. Using the mole makes it easier to talk about amounts of substances involved in reactions, by relating the mass of a substance to its atomic or molecular mass.

Amount of substance = mass (g) ÷ mass of 1 mole (g mol^{-1})



One mole contains a different mass for different substances

This makes sense if you think about it. Different substances will have atoms, molecules or ions which have different masses. Gold atoms have a greater mass than iron atoms, so the mass contained in one mole of gold atoms is greater.

Coins and moles: A useful analogy

Using moles to express amount of substance is analogous to weighing coin rolls to estimate the number of coins. In this analogy, the value of the coins is like mass (different for different coins), the number of coins is like number of atoms, and the rolls of coins are like moles of atoms.