Relative mass

Learning objectives

1 Explain why relative, rather than actual, masses are used most in chemistry.

2 Combine writing with calculations to give fuller explanations of chemical concepts.

3 Describe how the relative masses of individual atoms, relative atomic mass, relative formula mass and percentage composition are linked.

Introduction

In chemistry we compare the masses of subatomic particles, atoms, elements and compounds using relative masses, rather than stating the actual mass of the species in grams. The relative mass of any particle is its mass relative (compared) to $\frac{1}{12}$ of the mass of a single carbon-12 (^{12}C) atom. Relative masses are important because we count atoms using their masses as they are far too small to see.

Instructions

1. Stick the structure strip in the margin of your exercise book/paper.
2. Reflect on what you already know about relative mass and where you have seen the key terms before. Follow the prompts and use your knowledge to write a summary of relative mass. If you'd like more support, what other sources could you use to find the information, e.g. a copy of the periodic table, a textbook, online?
3. Answer the extended answer question to apply your knowledge of relative mass to a new context.

Key words

Use these key words and phrases in your responses:

• proton • neutron • electron • standard form • isotope • relative atomic mass • weighted average • relative formula mass • percentage

Structure strip Relative mass	Structure strip Relative mass	Structure strip Relative mass	Structure strip Relative mass	Structure strip Relative mass
State the number of each subatomic particle you would find in a ^{12}C atom. Explain why the atom has a relative mass of 12.	State the number of each subatomic particle you would find in a ^{12}C atom. Explain why the atom has a relative mass of 12.	State the number of each subatomic particle you would find in a ^{12}C atom. Explain why the atom has a relative mass of 12.	State the number of each subatomic particle you would find in a ^{12}C atom. Explain why the atom has a relative mass of 12.	State the number of each subatomic particle you would find in a ^{12}C atom. Explain why the atom has a relative mass of 12.
Explain why we use relative masses when discussing atoms, instead of using grams.	Explain why we use relative masses when discussing atoms, instead of using grams.	Explain why we use relative masses when discussing atoms, instead of using grams.	Explain why we use relative masses when discussing atoms, instead of using grams.	Explain why we use relative masses when discussing atoms, instead of using grams.
Boron occurs naturally as ^{10}B and ^{11}B. What do we call these and how do they compare?	Boron occurs naturally as ^{10}B and ^{11}B. What do we call these and how do they compare?	Boron occurs naturally as ^{10}B and ^{11}B. What do we call these and how do they compare?	Boron occurs naturally as ^{10}B and ^{11}B. What do we call these and how do they compare?	Boron occurs naturally as ^{10}B and ^{11}B. What do we call these and how do they compare?
Explain how relative atomic mass (A_r) is calculated. Why is the A_r of boron 10.8, not 10.5? What does that tell you about boron atoms?	Explain how relative atomic mass (A_r) is calculated. Why is the A_r of boron 10.8, not 10.5? What does that tell you about boron atoms?	Explain how relative atomic mass (A_r) is calculated. Why is the A_r of boron 10.8, not 10.5? What does that tell you about boron atoms?	Explain how relative atomic mass (A_r) is calculated. Why is the A_r of boron 10.8, not 10.5? What does that tell you about boron atoms?	Explain how relative atomic mass (A_r) is calculated. Why is the A_r of boron 10.8, not 10.5? What does that tell you about boron atoms?
Explain how relative formula mass is calculated. Use the example of $FeCO_3$ (M_r 116).	Explain how relative formula mass is calculated. Use the example of $FeCO_3$ (M_r 116).	Explain how relative formula mass is calculated. Use the example of $FeCO_3$ (M_r 116).	Explain how relative formula mass is calculated. Use the example of $FeCO_3$ (M_r 116).	Explain how relative formula mass is calculated. Use the example of $FeCO_3$ (M_r 116).
$FeCO_3$ is an iron ore. Explain, using a calculation, what mass of iron you should expect to extract from 100 kg of $FeCO_3$.	$FeCO_3$ is an iron ore. Explain, using a calculation, what mass of iron you should expect to extract from 100 kg of $FeCO_3$.	$FeCO_3$ is an iron ore. Explain, using a calculation, what mass of iron you should expect to extract from 100 kg of $FeCO_3$.	$FeCO_3$ is an iron ore. Explain, using a calculation, what mass of iron you should expect to extract from 100 kg of $FeCO_3$.	$FeCO_3$ is an iron ore. Explain, using a calculation, what mass of iron you should expect to extract from 100 kg of $FeCO_3$.
Without doing a calculation, suggest whether you would expect to get more, or less iron from 100 kg of a different ore, Fe_2O_3. Explain your reasoning.	Without doing a calculation, suggest whether you would expect to get more, or less iron from 100 kg of a different ore, Fe_2O_3. Explain your reasoning.	Without doing a calculation, suggest whether you would expect to get more, or less iron from 100 kg of a different ore, Fe_2O_3. Explain your reasoning.	Without doing a calculation, suggest whether you would expect to get more, or less iron from 100 kg of a different ore, Fe_2O_3. Explain your reasoning.	Without doing a calculation, suggest whether you would expect to get more, or less iron from 100 kg of a different ore, Fe_2O_3. Explain your reasoning.

Extended answer question

Bromine has an atomic number of 35. Some bromine atoms have a relative mass of 79, and some have a relative mass of 81. The relative atomic mass of bromine is 80. Elemental bromine exists as diatomic molecules, Br_2.

- Use this information to determine the relative formula mass of bromine.
- Explain how these four different relative masses all apply to the same element.