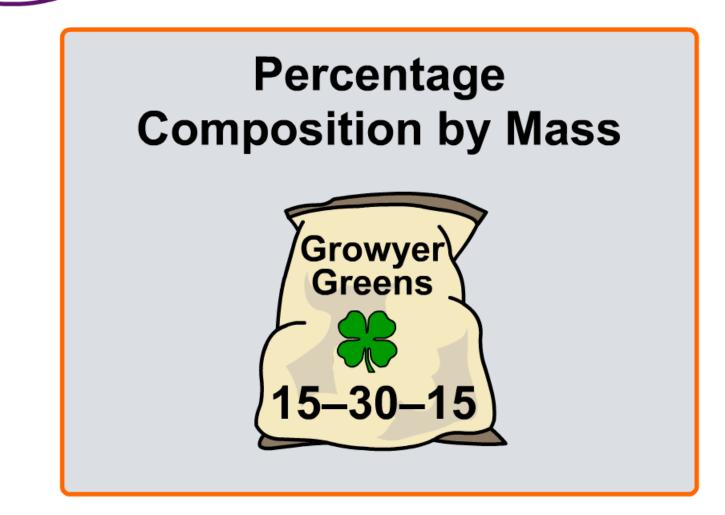
Boardworks High School Science





board works

Can you figure out which fertilizer is best?

(board works)

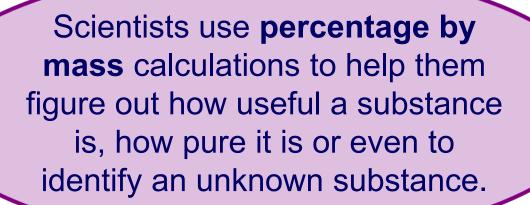
My uncle uses fertilizers on his garden to grow his prize-winning pumpkins.

How can he tell which fertilizer contains the most nitrogen?

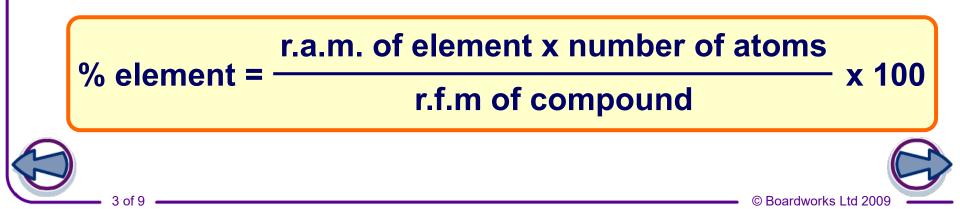
Different fertilizers contain different compounds. Your uncle needs to find out the **percentage by mass** of nitrogen in each compound.

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How is percentage by mass calculated?



The percentage by mass of an element in a compound is sometimes known as the **percentage composition**. Percentage by mass is calculated using r.a.m. and r.f.m.



Calculating percentage by mass – example 1 (board work

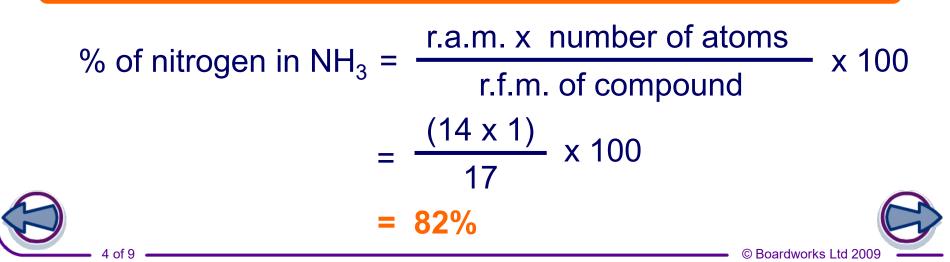
What percentage by mass of **nitrogen** is in ammonia (NH_3) ? (r.a.m.: H = 1, N = 14)

Step 1: Find the relative formula mass (r.f.m.) of NH₃.

r.f.m. of NH₃ = 1 nitrogen atom + 3 hydrogen atoms
=
$$(1 \times 14) + (3 \times 1)$$

= 17

Step 2: Find the percentage by mass of nitrogen.



Calculating percentage by mass – example 2 (board work

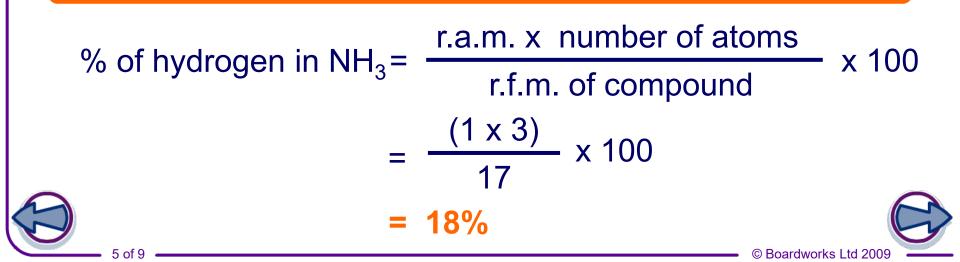
What percentage by mass of **hydrogen** is in ammonia (NH_3) ? (r.a.m.: H = 1, N = 14)

Step 1: Find the relative formula mass (r.f.m.) of NH₃.

r.f.m. of NH₃ = 1 nitrogen atom + 3 hydrogen atoms
=
$$(1 \times 14) + (3 \times 1)$$

= 17

Step 2: Find the percentage by mass of hydrogen.





What is the percentage by mass of oxygen in each compound?

Compound	Relative formula mass	% of oxygen
MgO	?	?
K₂O	?	?
NaOH	?	?
SO ₂	?	?
?		<u> </u>
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How much nitrogen?



How much nitrogen does each fertilizer contain?

an

Supergro

·B

big

My uncle still can't decide which fertilizer to buy. There are three to choose from, each containing a different source of nitrogen.

What is the percentage of nitrogen in each one?





Comparing fertilizers





8 of 9





Fertilizer	Compound	% nitrogen
MEGA pumpkin	NH ₄ NO ₃	35%
Supergro	$(NH_4)_2SO_4$	21%
Plant-B-big	CON ₂ H ₄	47%

'Plant-B-big', which contains urea, has the highest percentage of nitrogen.

So, if my uncle puts the same amount of each fertilizer on his pumpkins, 'Plant-B-big' will provide the most nitrogen.