An Abundance of Isotopes

Annotation

Robbie forms an equation to solve to find an unknown proportion. He shows an understanding of percentages used as a proportion of a whole and can incorporate this in a successful problem solving strategy.

Problem: An Abundance of Isotopes

The teacher gives this task:

Pure substances, such as magnesium are made up of different types of atoms, called isotopes. Magnesium is made up of three different isotopes, Mg-24, Mg-25 and Mg-26. The mass of each isotope is measured in atomic mass units, u.

Mg-24 has mass of 24

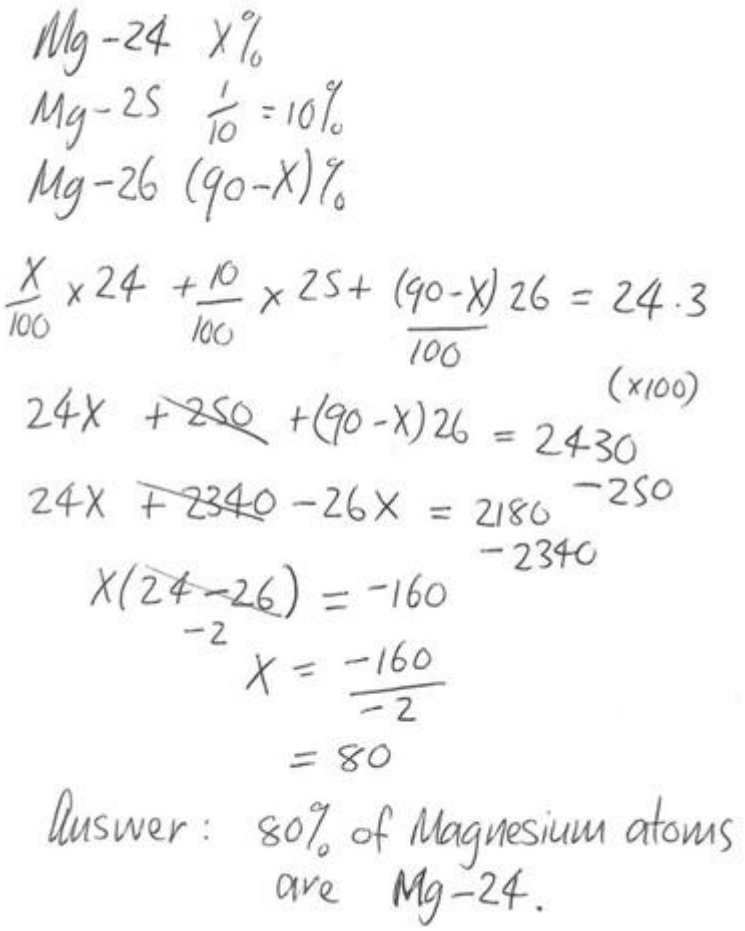
u Mg-25 has mass of

25 u Mg-26 has mass

of 26 u

The average mass of the magnesium atom is 24.3 u. If one tenth of all magnesium atoms are the Mg-25 isotope, find the percentage of magnesium atoms that are Mg-24.

Student Response



Teacher: How did you arrive at that (90 – x)?

Robbie: I know that if 10% of the atoms are Mg-25, then the other two must add up to 90%. I wanted the answer to Mg-24 so I made that one x. That meant the other one had to add to x to get 90. So it is 90 minus x.

Teacher: And in forming the equation…

Robbie: Yeah it looks big, but really I know that the total of all my percentages has to be 100. Also I know that I've got 10% of Mg-25 which means that I write times the mass of Mg-25. Then I wrote the other two isotopes out like that and they all add up to the average mass.

Teacher: That's a very important idea. Can you explain why those products (percentage times mass) add up to the average mass.

Robbie: It's seeing the percent as a fraction, as a proportion. It's like drawing a pie chart and one tenth is Mg-25, so I had to work out how much of the remaining nine tenths of the pie, the others get.