

Cover Sheet | Determining the Number of Mole of Elements (VCE Unit 1 AoS 2)

Relevant Key Knowledge or Key Science Skills	Avogadro's constant as the number 6.02×10^{23} indicating the number of atoms or molecules in a mole of any substance; determination of the amount, in moles, of atoms (or molecules) in a pure sample of known mass
Recommended timing of activity	Early into teaching the Mole, and measuring with the mole. Students have just grasped the understanding of what a mole represents, and what atomic mass represents. Not many steps, can focus on conceptual ideas (mole and Avogadro's number). This helps to build student confidence and help the teacher to slow down.
Substitute/Conjoin with	Next step, percentage abundance in compound sample

Activity Authors: Alexander Eastwood, Department of Education, Victoria, and Jarrod Bye, Preston High School, Victoria. More activities and resources available at elementsets.net.

Determining the Number of Mole of Elements

Name:

Pre-Activity

1. Define the following terms.

Term	Definition
Molar Mass	
Avagdro's Number	
Mole	

Worked Example - How to determine the amount of Boron (B) present in a sample

<p><u>How to determine the Number of Moles</u></p> <p>Calculate the difference between the container with the sample and the empty container (use the "N (78%)" sample) to obtain the mass of Boron (use this formula):</p> $m(B) = \text{mass of Boron (B) container} - \text{mass of empty container}$ <p>Number of moles (n) = Mass (m) / Molar Mass (M)</p> $n = \frac{m}{M}$ $n(B) = \frac{m(B)}{M(B)}$ <p>$m(B) = 2.07 \text{ g}$</p> <p>Identify the molar mass of Boron (B) in the periodic table; enter this into the formula.</p> <p>$M(B) = 10.8 \text{ g/mol}$</p> $n(B) = \frac{m(B)}{10.8 \text{ g/mol}}$ <p>$n(B) = 0.19 \text{ mol}$</p>	<p><u>How to determine the Number of Atoms</u></p> <p>Number of Atoms (N) = Number of Moles (n) x Avogadro's Number (N_A)</p> $N = n \times N_A$ <p>Avogadro's number is a constant; you can identify it in your Data Sheet.</p> $N(B) = n(B) \times N_A$ <p>Number of Boron Atoms = $0.19 \text{ mol} \times 6.02 \times 10^{23}$</p> <p>Number of Boron Atoms = 1.14×10^{23} atoms</p>
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Activity

2. Mass of Empty Container =

3. For **each element**, determine the **number of moles** and the **number of atoms** present in the sample.

Element:	Element:
Element:	Element:
Element:	Element:
Element:	Element:

Element:	Element:
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