

Content

- 1 mol = 6.022×10^{23} particles (Avogadro's Number)
- Regardless of the substance, a mole always contains the same number of particles, but moles of different substances have different masses.
- Mathematical conversion between mass, moles, and number of particles is possible using Avogadro's number.

Objective

- Relate and convert between the mass of an atom to the mass of a mole of atoms
- Convert between moles and the mass of an element or compound

Assessment

Formative

- Think, Pair, Share Activity: Students work in small groups to complete a portion of the table below, given values are bold. Students complete using a Google Sheet/Form or Clickers in order for the instructor to assess understanding.

Element	Molar Mass (g/mol)	Mass (g)	Moles	Number of Atoms
Au	196.97	2.5	0.0127	7.64×10^{21}
Zn	65.41	324	4.95	2.98×10^{24}
C	12.01	7.88	0.656	3.95×10^{23}
Cu	63.55	794	12.5	7.53×10^{24}
Sc	44.96	0.653	0.0145	8.75×10^{21}
Se	78.96	49.6 g	0.628	3.78×10^{23}
U	238.03	764	3.21	1.93×10^{24}
Ba	137.33	11200	81.9	4.93×10^{25}

Summative

- Air contains several gases. When resting, every breath you take contains approximately 0.600 g of air. If argon makes up 0.934% of the air, calculate the number of argon atoms inhaled with each breath.
 - $0.934\% * 0.6 \text{ g air} = 0.005604 \text{ g Ar in one breath of air}$
 - $0.005604 \text{ g Ar} * \frac{1 \text{ mol Ar}}{39.948 \text{ g}} * \frac{6.02 * 10^{23} \text{ atoms}}{1 \text{ mol}} = 8.4 * 10^{19} \text{ atoms Ar in one breath}$

What we would already know

All matter is composed of elements and molecules, which are made up of atoms. Atoms are composed of electrons, protons, and neutrons, the presence and amount of which influence chemical properties and mass numbers; these observe periodic trends. Different isotopes of elements exist on earth in varying abundance.

Activities with labels

Activity	Function	Time	Representation of Science
Review	Activate prior knowledge, reinforce recently learned information	1 min.	Definition
Introduction	Provide students with larger context of concept	2 min.	Definition/Example
Explanation Moles → particles	Transmission of information	2 min.	Definition/Example
Example Moles → particles	Model the ideas	1 min.	Example
Explanation Moles → mass	Transmission of information	1 min.	Definition/Example
Example Moles → mass	Model the ideas	1 min.	Example
Explanation Mass → moles → particles	Transmission of information	1 min.	Definition/Example
Example Mass → moles → particles	Model the ideas	1 min.	Example
Formative Assessment	Assess learning	7 min.	Example