
Chapter 6

Calculations: Formula Masses, Moles, and Chemical Equations

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Chapter 6-1

Diamond is a covalent compound with many carbon atoms

→ CO 6.1
Close-up of cut diamonds



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Chapter 6-2

Molar mass: The mass units



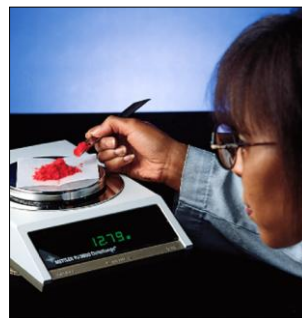
← Fig. 6.1
Oranges may be bought in units of mass or units of amount.

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Chapter 6-3

First chemical compound need to be weighed

→ Fig. 6.2
A basic process in chemical laboratory work is determining the mass of a substance.



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Chapter 6-4

Mole is a counting unit used by chemists



← Fig. 6.3
Everyday counting units.

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Chapter 6-5

Unlike a dozen Avogadro's number is large: 6.002×10^{23}

→ Fig. 6.4
Amadeo Avogadro was the first scientist to distinguish between atoms and molecules.



Edgar Fahs Smith Collection, University of Pennsylvania

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Chapter 6-6

Formula Masses in grams gives a Mole of a chemical compound

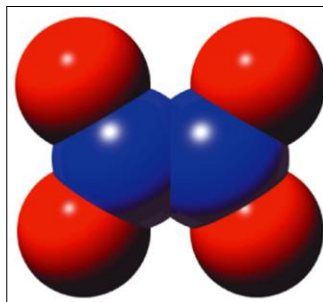


Fig. 6.5
The mass of a mole depends on the substance.

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Chapter 6-7

To get the Formula Masse first find the types of atoms in the compound



← Fig. 6.6
A computer-generated model of the molecular compound N_2O_4 .

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Chapter 6-8

Moles multiplied by Avogadro's number gives number of atoms and molecules

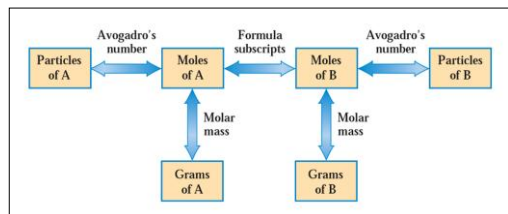


Fig. 6.7

In solving chemical-formula-based problems, the only "transitions" allowed are those between quantities (boxes) connected by arrows.

Law of conservation of mass/atoms

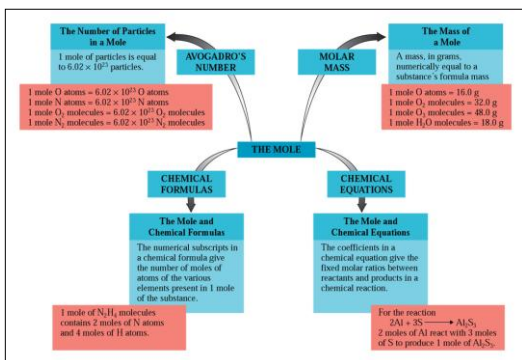
Fig. 6.8

When 16.90g of the compound CaS is decomposed into its constituent elements, the Ca and S produced has an identical mass of 16.90g.



CaS → Ca + S

Conversion factors in chemical calculations: Stoichiometry



→ CAG 6.1

Mole conversion to grams and particles

- Moles multiplied by Avogadro's number gives number of atoms and molecules (mole \times N = particles)
- Mole multiplied formula mass gives grams. (mole \times F.M. = grams)
- Grams divided by formula mass gives moles. (grams \div F.M. = mole)

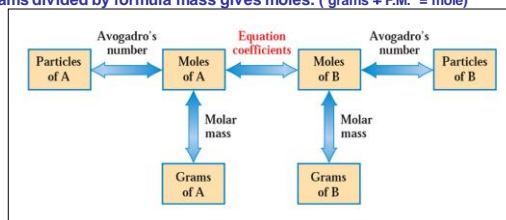


Fig. 6.9 In solving chemical-equation-based problems, the only "transitions" allowed are those between quantities (boxes) connected by arrows.

What does 16-20-0 means in fertilizer?

NITROGEN 16.0% PHOSPHATE 20.0%

→ CC 6.1



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Chapter 6-13

Air bag should have right amount reactants to produce gas or baby will crush.



Courtesy of Daimler Chrysler Corporation

← Fig. 6.10
Testing apparatus for
measuring the effects
of air bag deployment.

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Chapter 6-14