

Chapter 9

The Mole: Counting by Weighing

Pre-Lecture: Students should [Chemistry Activity; Pennium](#). Find the weighed isotopic mass of pre and 1982 pennys. This should be done after the chapter 6,7,8 Test, Writing Balanced Equations

The Mole: (n)

Mole (mol): Number of elementary particles equal to the number of carbon atoms in exactly 12 grams of ^{12}C .

C-12 Atomic Mass Unit Standard.

A Mole is a Chemistry term defined as the amount of a substance that contains as many elementary entities (atoms, molecules, or other particles) as there are atoms in exactly 12 grams of C-12

N_A , *Avogadro's Number*: 6.022×10^{23}

Lorenzo Romano Amedeo Carlo Avogadro di Quaregua e di Cerreto (1776 - 1856). Italian mathematical physicist. He practiced law for many years before he became interested in science. Project Pic on TV

1 mole of anything = 6.022×10^{23} things

National Mole Day: October 23 6:02AM to 6:02PM (<http://gamstcweb.gisd.k12.mi.us/~nmdf/>)

Magnitude of mole: 1mole of ...

M&M candies scattered over the lower 48 states would have a thickness of (**50 miles**)!

Watermelon seed would be found inside a melon slightly **larger** than the **moon**!

Grains of sand would be more than all grains of sand on Miami Beach!

Water molecules is in this beaker = 18 ml

Cu atoms = 63.5 grams

(Examples: **Mole Jars:** Other substances to compare 1 mole of each to)

Comparison of 1 mole:

Same number of particles, but different mass, (Why does 1 mole of C atoms have a smaller mass than 1 mole of X atoms? (A: atoms of X have a greater mass than carbon)

Finding mass of a mole of substance requires use of the periodic table. (Review Isotopes and % abundance)

Draw samples of substances; 1 mole = 6.02×10^{23} particles = ?? grams

Molar Mass:

Mass of 1 mole of substance as given on the periodic table:

Ex. H_2O , CO_2 , Na_2SO_4 , $\text{Fe}_3(\text{SO}_4)_2$, Magnesium chlorate, etc.

What mass of carbon atoms is equal to the same number of atoms as in 1.00 g of He?

Conversions, Relationships and the Molar Diamond:



Quick Activity: If 1 mole of carbon contains 6.02×10^{23} atoms of CaCO_3 , how many units does it require to write your name with chalk on blackboard?

Conversion Practice Problems: (<http://tqd.advanced.org/2923/calc.html>)

Moles \leftrightarrow Mass \leftrightarrow Volume (gas at STP) \leftrightarrow Particles

What mass of S is equal to the number of particles in 50.0g of Ne atoms

Find the mass of one molecule of H_2O .

Homework Practice:

P.252 #9-19,21,31,35,39 (Show all Work!!! Sig Figs!!! Box final answer!!!)

Mole Worksheet: Concepts, Comparisons and Conversions