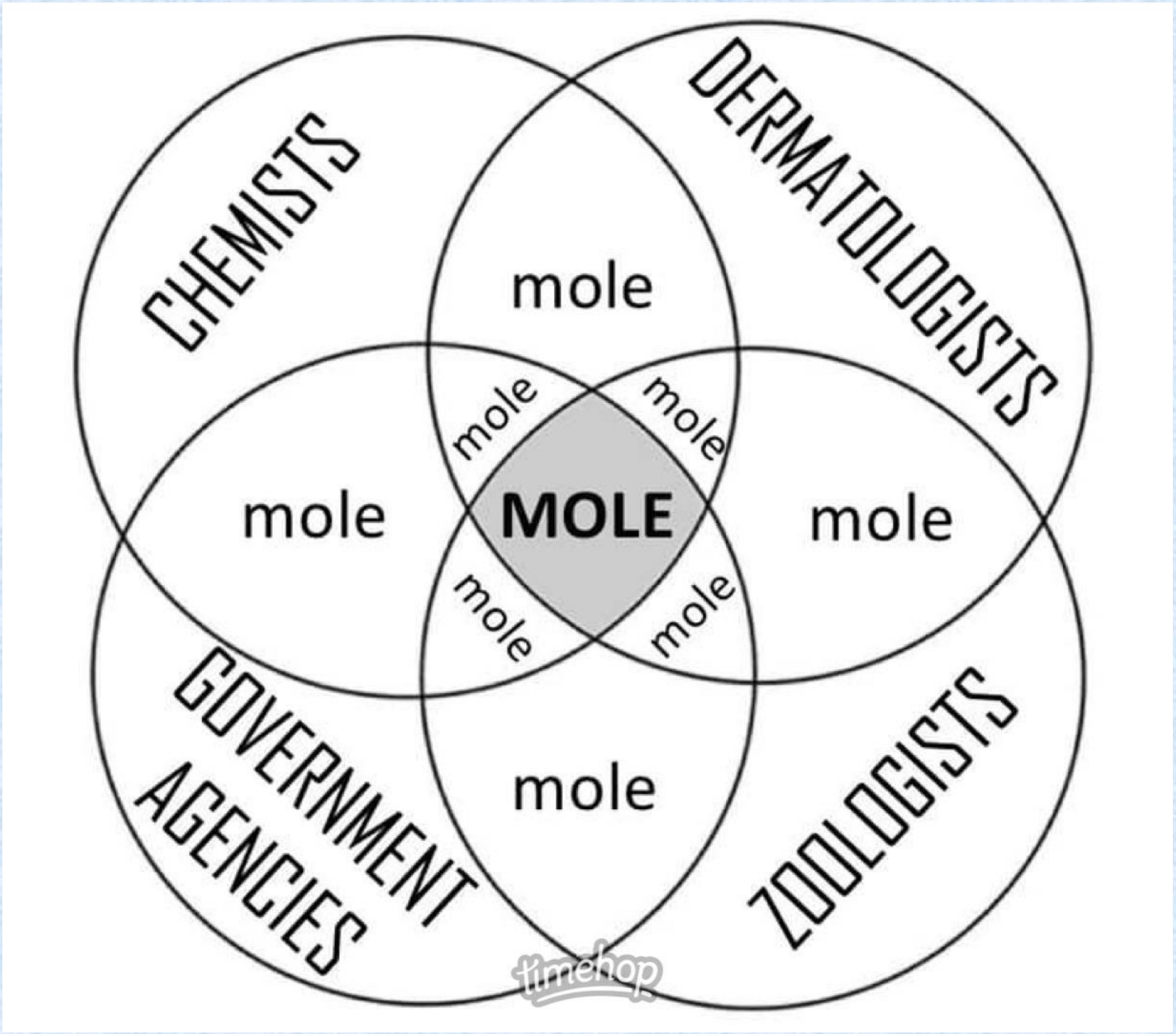
Target: I can calculate Molar Mass

K	C	Q

The "Mole"

and

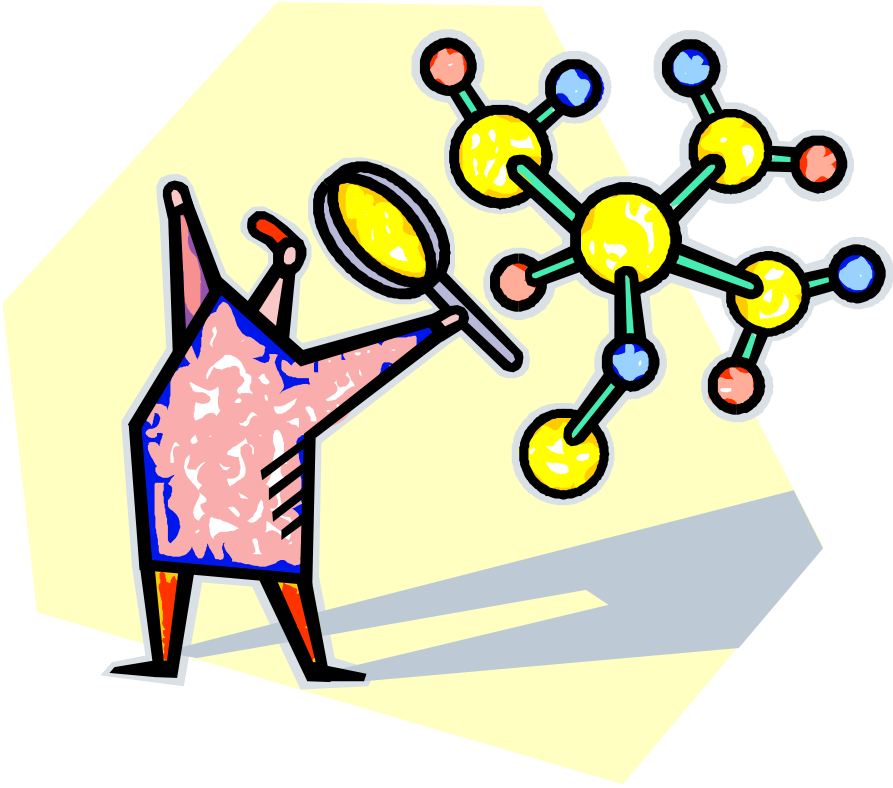
"Molar Mass"


CHEMISTS
DERMATOLOGISTS
GOVERNMENT AGENCIES
ZOOLOGISTS
mole
mole
mole
mole
MOLE
mole
mole
mole
mole
timehop

ATOMS ARE REALLY SMALL!!

- We can't work with individual atoms in the LAB

- Because we can't see things that small



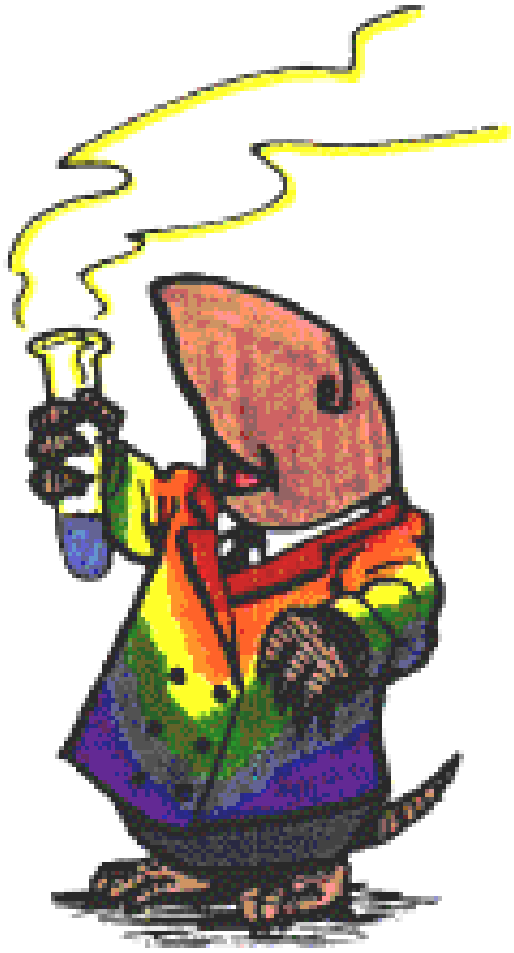
So let's count a
WHOLE BUNCH all at once!

A NEW UNIT OF MEASURMENT

THE MOLE

6.02×10^{23}

- A counting unit
- Like a “dozen” but really, really big!



The Mole

Don't need to write down what's in the orange boxes

- Similar to a dozen, except instead of 12, it's 602 billion trillion

602,000,000,000,000,000,000,000

Avogadro's Number

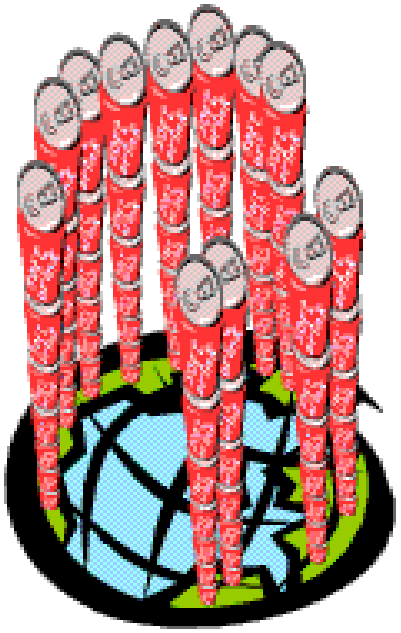
Amedeo Avogadro 1776 – 1856

Decided that:

6.02×10^{23} molecules per mole

Just How Big is a Mole?

- **Soda cans to cover the surface of the earth over 200 miles deep.**
- **Avogadro's number of unpopped popcorn kernels spread across the USA…over 9 miles deep.**
- **Count atoms at the rate of 10 million per second, it would take about 2 billion years to count the atoms in one mole.**



A Mole of "Particles"

Particles is a generic term

ATOMS → 1 mole C

MOLECULES → 1 mole H_2O

COMPOUNDS → 1 mole $CaCl_2$

IONS → NH_4^+

1 mole H_2O

1 mole molecules

2 moles H atoms

1 mole O atoms

The Mole is a Unit Song

https://www.youtube.com/watch?v=1R7NiIum2TI

COUNTING VERSUS WEIGHING!

- **1 dozen donuts = 12 donuts**
- **1 mole of donuts = 6.02×10^{23} donuts**

- **1 dozen Al atoms = 12 Al atoms**
- **1 mole of Al atoms = 6.02×10^{23} atoms**

The NUMBER in a mole is always the same, but the MASS is very different!

MASS OF AN ATOM

TINY TINY TINY!!!!! - USE A SPECIAL UNIT:

Atomic mass unit = "amu"

1 amu = 1.66×10^{-24} grams

1 atom of H = 1.66×10^{-24}g =

1 atom of C = 1.99×10^{-23}g =

1 atom of O = 2.656×10^{-23}g =

Molar Mass

How many GRAMS PER MOLE?

LOOK ON THE PERIODIC TABLE!

How much does a mole of something weigh???

1 mole of C atoms	**=**	**12.0 g**
1 mole of Mg atoms	**=**	**24.3 g**
1 mole of Cu atoms	**=**	**63.5 g**

THE CONVERSION FACTOR VERSION!

Molar Mass of C = 12.01g/mol

Molar Mass of Mg = 24.3 g/mol

Like saying 12in/ft

Learning Check!

Find the molar mass

1) Br = 79.9 g/mole
2) Sn = 118.7 g/mole

We usually round to one or two decimal places no big deal!

Molar Mass of Molecules & compounds

Add up the mass for each part of the molecule

1 mole of $CaCl_2$ = 1 Ca + 2 Cl

Ca = 40.1 g/mol Cl = 35.5 g/mol

1Ca + 2Cl =

40.1 + 35.5 + 35.5 = 111.1 g/mol

Molar Mass of Molecules & compounds

Molar Mass of N_2O_4 = ?

N = 14.0 g/mol O = 16.0 g/mol

2N + 4O =

(2* 14.0) + (4*16.0) = 92 g/mol

Molar Mass of Molecules & compounds

Molar Mass of antacid $Al(OH)_3$ = ?

Molar Mass of Molecules & compounds

Molar Mass of antacid $Al(OH)_3$ = ?

1Al + 3 O + 3H

Al = 27.0 g/mol O = 16 g/mol H = 1.0 g/mol

(1* 27.0g/mol)+(3*16.0g/mol) + (3*1.0) = 78g/mol

YouTube Link for Presentation

https://youtu.be/3aZmqU91xYU