

CONCEPT: MOLES & AVOGADROS NUMBER

- Normally we use the mass of a material, but you'll need to know the moles or # of particles.

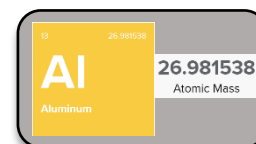
- **Mole (n)** = the _____ of material equal to $N_A =$ _____ particles ← known as Avogadro's Number.

- This applies to ANY substance:
$$\begin{cases} 1 \text{ mol Nitrogen (N)} = 6.022 \times 10^{23} \text{ N atoms} \\ 1 \text{ mol H}_2\text{O} &= 6.022 \times 10^{23} \text{ H}_2\text{O molecules} \\ 1 \text{ mol dollars} &= 6.022 \times 10^{23} \text{ dollars} \end{cases}$$

- You'll need to know how to convert between mass, moles, and # of particles.



M = molar mass of material (a.k.a atomic mass in any periodic table, expressed in $\frac{g}{mol}$)



EXAMPLE: Calculate the following:

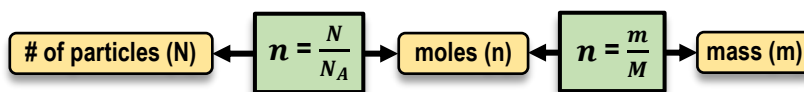
a) How many moles is 8.33×10^{37} Carbon atoms?

b) How many grams of aluminum is 2.35 mol Al? (Molar mass Al = 26.98)

c) How many particles are in 24g of H_2O ? (Molar mass H_2O = 18.02 g/mol)

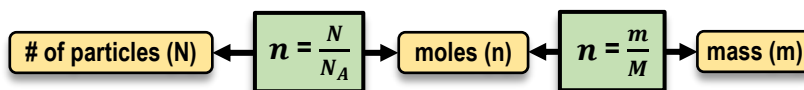
PROBLEM: If the molar mass of hydrogen is 1.008 g/mol, what is the mass (in grams) of 2 hydrogen atoms?

- A) 0.5004
- B) 3.35×10^{-24}
- C) 2.016
- D) 1.69×10^{-24}



CONSTANTS
$N_A = 6.022 \times 10^{23}$

PROBLEM: If the molar mass of water (H₂O) is 18 g/mol, how many molecules of H₂O are in a 1.5L bottle of water?



CONVERSIONS
$1 \text{ L} = 1 \text{ kg}$