

N25 - MOLAR MASS AND

MOLAR CONVERSIONS -

REVIEW

In the next chapter called “Stoichiometry” we will start doing quantitative problems with the reactions we are learning to write during this current “Reactions” chapter. We will start figuring out problems like “if I start with 15g of this reactant, how many grams of that product can I make?” In order to help with the transition to that chapter, we need to pause and review our molar mass and molar conversions topics.

MOLAR

MASS

1 mole = 6.02×10^{23} objects

How much does ONE MOLE of something weigh?

1 atom of Hydrogen = 1.01 amu*
1 MOLE of Hydrogen = 1.01 grams

1 atom of Carbon = 12.01 amu
1 MOLE of Carbon = 12.01 grams

Use
Periodic
Table!

* "Atomic mass unit" = 1.661×10^{-24} grams

MOLAR MASS

Multiple atoms in a molecule? Add up their individual masses to find molar mass of molecule

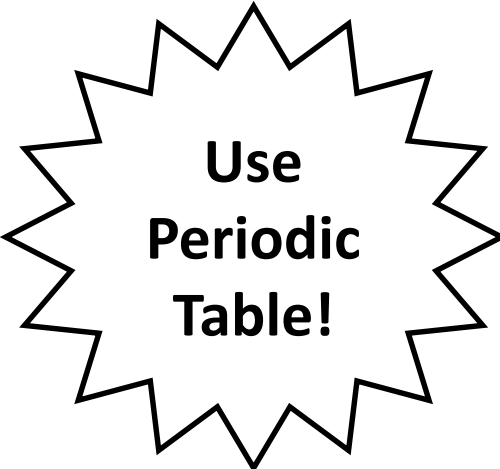
CO₂ = 1 carbon + 2 oxygens

Molar mass = **12.01g** + **2(16.00g)**

CO₂

= **44.01g** *per ONE mole*

= **44.01 g/mol**



Use
Periodic
Table!

MOLAR

Careful with parenthesis!

MASS

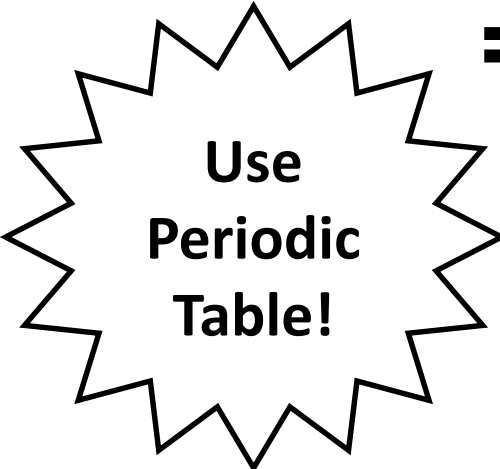


$$\text{Molar mass} = 2(14.01) + 8(1.01) + 1(32.07)$$



$$= 68.17g \text{ per ONE mole}$$

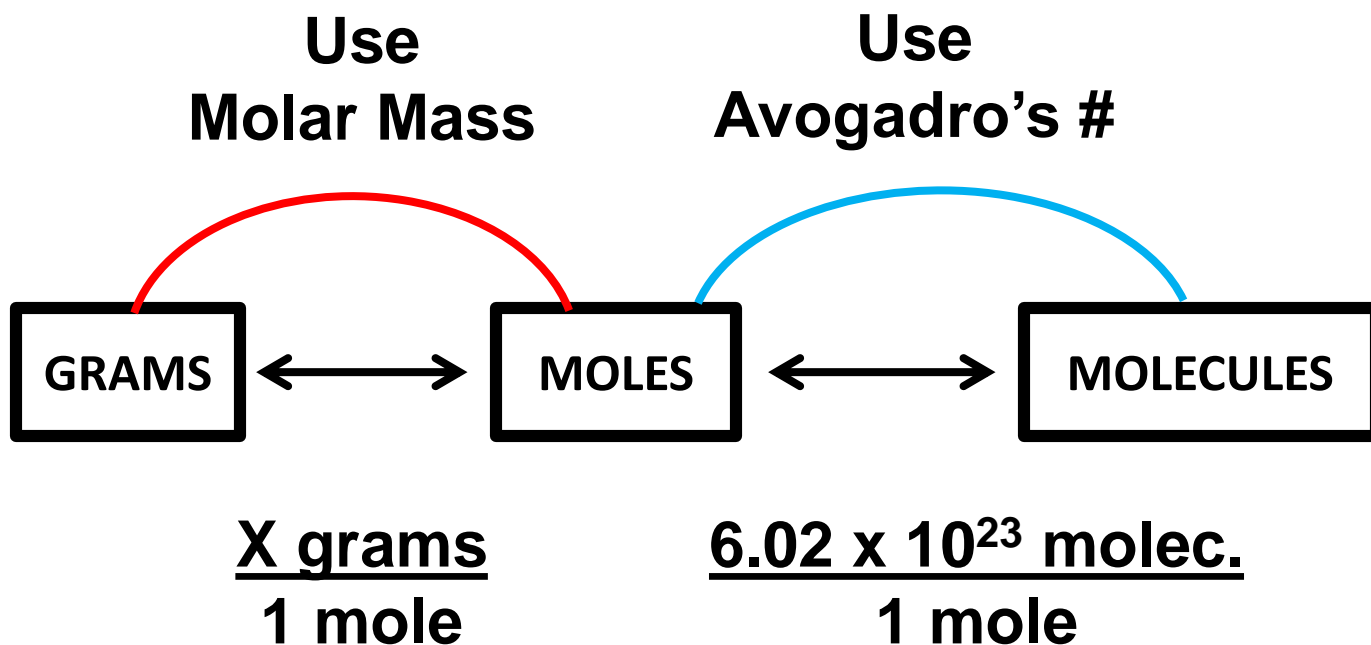
$$= 68.17 \text{ g/mol}$$



Use
Periodic
Table!

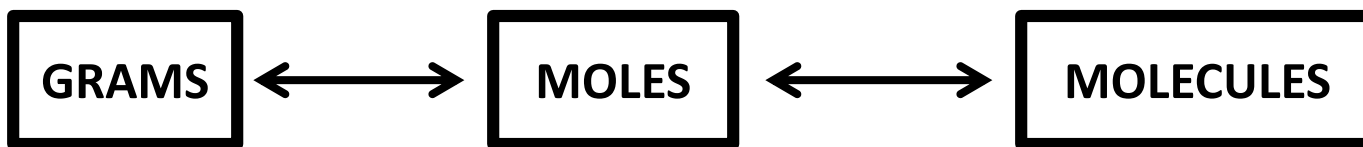
MOLAR CONVERSIONS

Conversions related to moles



Moles → Grams

How many grams does 1.7 moles of NaCl weigh?



Use Molar Mass

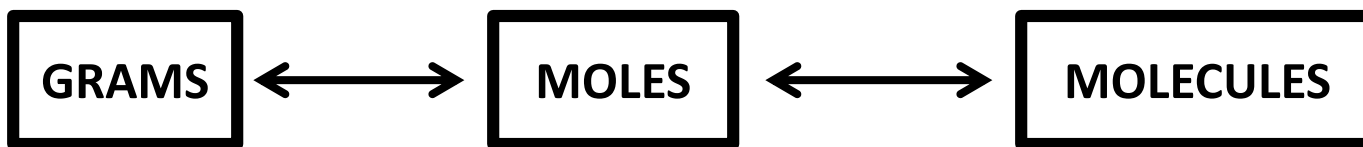
$$\begin{aligned} \text{mm} &= (22.99) + (35.45) \\ &= 58.44 \text{ g/mol} \end{aligned}$$

1.7 moles	58.44 g
	1 mol

$$= 99.35 \text{ g}$$

Grams → Moles

How many moles are in 14 g of CO₂?



Use Molar Mass

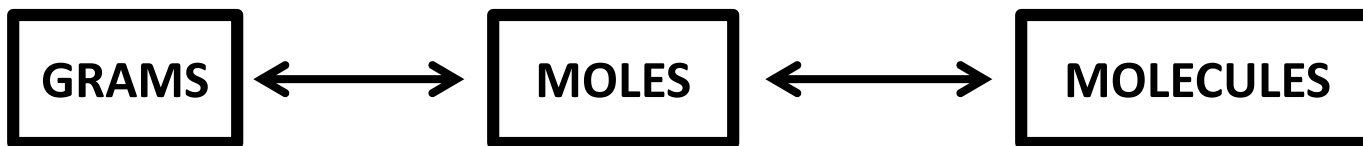
$$\begin{aligned} \text{mm} &= (12.01) + (2 \times 16.00) \\ &= 44.01 \text{ g/mol} \end{aligned}$$

14 grams	1 mol
	44.01 g

$$= 0.32 \text{ mol}$$

Moles → Molecules

How many molecules are in 5.3 moles of H₂O?



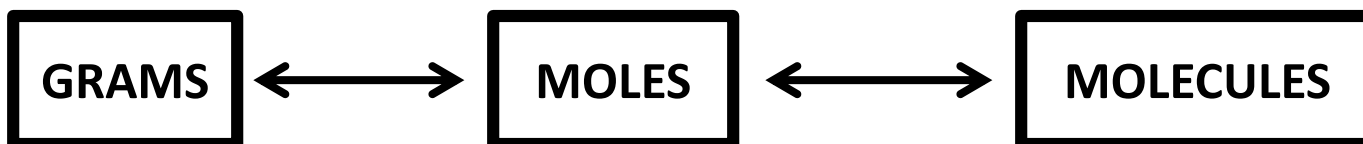
Use Avo.'s # 6.02×10^{23} molec./mol

$$\frac{5.3 \text{ moles}}{1 \text{ mol}} \times \frac{6.02 \times 10^{23} \text{ molec.}}{1 \text{ mol}}$$

**= 3.19×10^{24}
molecules**

Molecules → Moles

How many moles are in 3.17×10^{43} molecules?



Use Avo.'s #

6.02×10^{23} molec./mol

3.17×10^{43}
molec.

1 mol

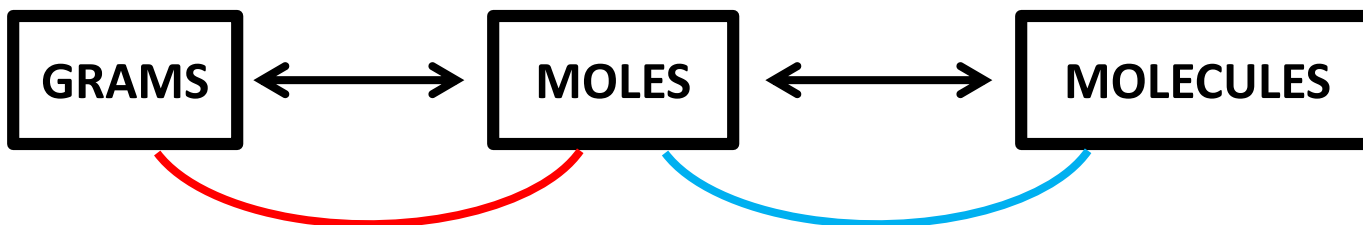
6.02×10^{23}
molec.

= 5.27×10^{19}
moles

Use
parenthesis!!!!

Grams → Molecules

How many molecules are in 45 grams of H₂O?



Use Molar Mass
= 18.02 g/mol

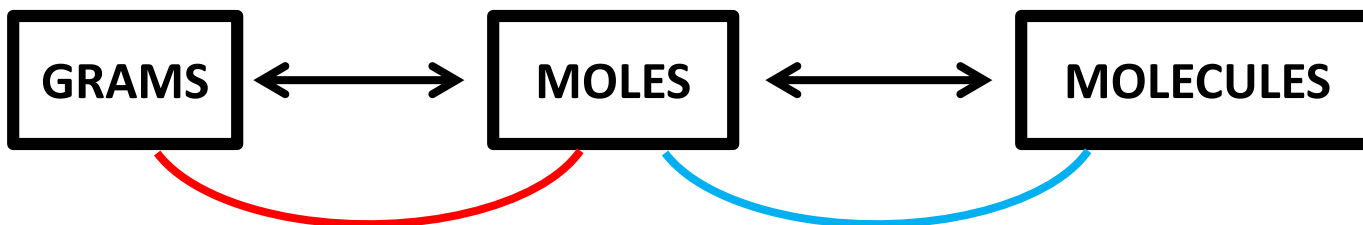
Use Avogadro's #

$$\frac{45 \text{ g}}{18 \text{ g}} \times \frac{1 \text{ mol}}{1 \text{ mol}} \times \frac{6.02 \times 10^{23} \text{ molec.}}{1 \text{ mol}}$$

$$= 1.51 \times 10^{24} \text{ molecules}$$

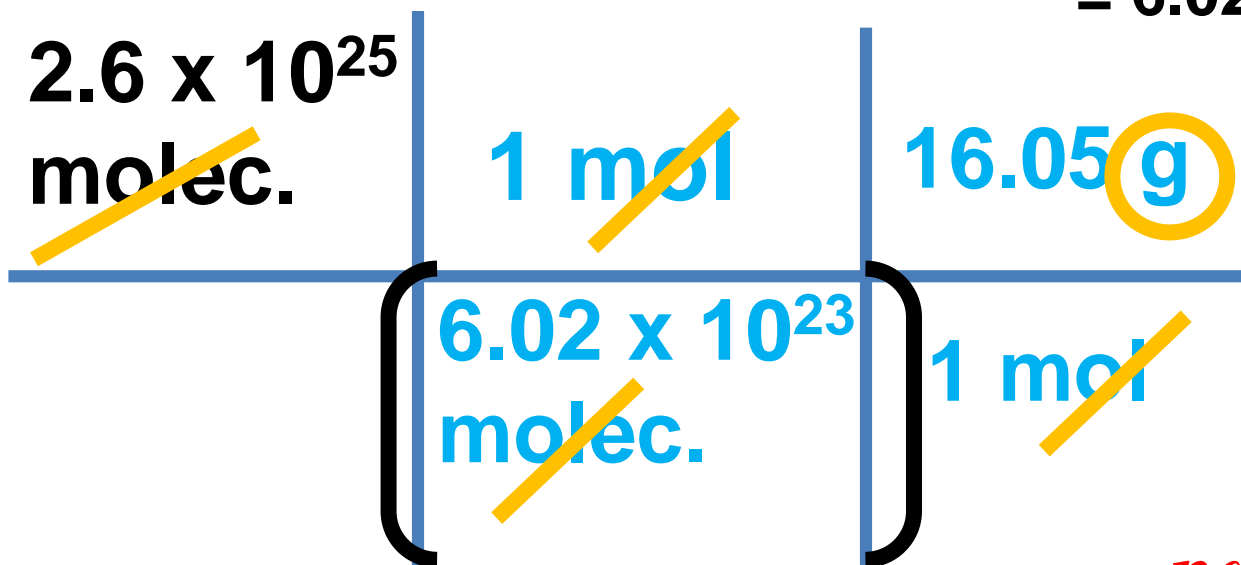
Molecules → Grams

How many grams in 2.6×10^{25} molecules of CH_4 ?



Use Molar Mass
= 16.05 g/mol

Use Avogadro's #
= 6.02×10^{23} molec./mol



**= 693.19
grams**

*Use
parenthesis!!!!*