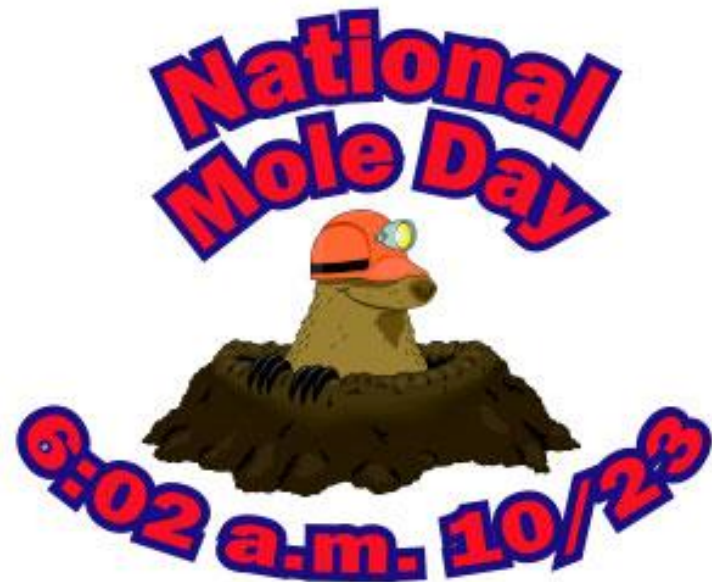
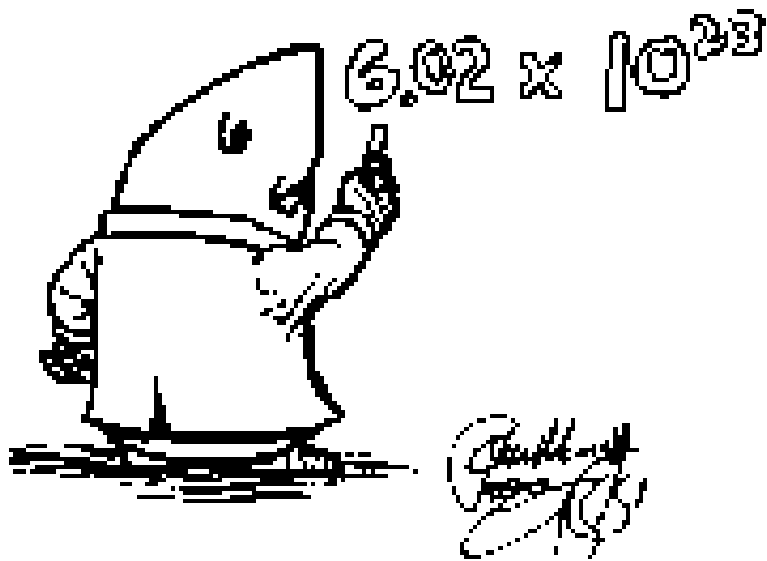


More Mole Conversions!



Moles and Stoichiometry

- The word stoichiometry comes from the Greek words: *stoicheion* (meaning "element") and *metron* (meaning "measure").
- Stoichiometry deals with calculations about the masses or volumes of reactants and products involved in a chemical reaction.
- It is a very mathematical part of chemistry, so be prepared for lots of calculator use.

Recall

- A mole is a convenient unit (like a dozen)
- $1 \text{ mol} = 6.02 \times 10^{23}$ of something
- 602 000 000 000 000 000 000 000
- And that's a lot ... but because particles in chemistry are so small it is a great unit to use for atoms and molecules!

Molar Mass Review

- The mass of one mole is called “molar mass”
- E.g. 1 mol Li = 6.94 g Li
- This is expressed as 6.94 g/mol
- What are the following molar masses?

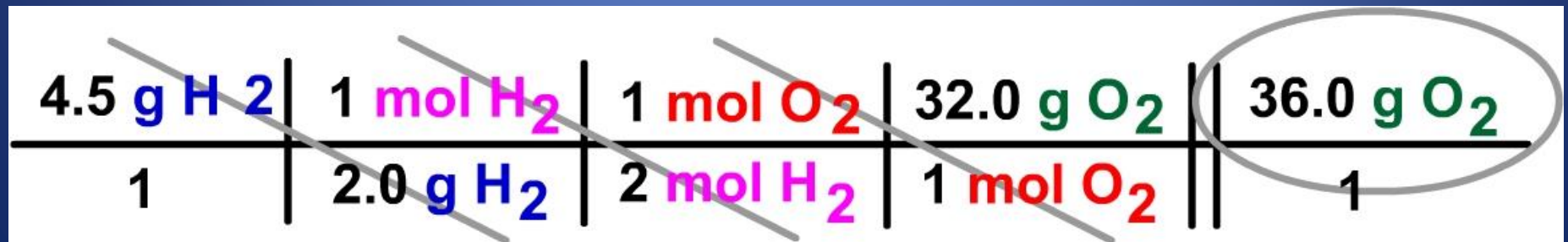
S 32.06 g/mol SO₂ 64.06 g/mol

Why the mole?

- The mole allows us to convert from measurable amounts of a chemical to invisible atoms and molecules.
- A sample of Aluminum has a mass of 143g. How many molecules of Al are there?

Two Step Calculations

- PLEASE MAKE SURE YOU:
 - Show your work
 - Write your units in every step !!!!
 - These are going to get more complicated and students who don't write units often get lost ☹️



– This is just an example ...

A sample of Al has a mass of 143g. How many atoms of Al are there?

- Convert from grams to atoms using the mole
 - Step 1- grams to moles
 - Step 2- moles to atoms
- What is the molar mass of Al?

- 26.98g/mol

$$- 143\text{g} \times \frac{1 \text{ mol Al}}{26.98 \text{ g}} = 5.30 \text{ mol Al}$$

$$- 5.30 \text{ mol Al} \times \frac{6.02 \times 10^{23} \text{ atoms}}{1 \text{ mol Al}} = 3.19 \times 10^{24} \text{ atoms}$$

Hint!!
Always set the
equations up so
the units
CANCEL

Conversions with Compounds

- Compounds are made up of chemically bonded elements
 - NH_4 , H_2O , HCl , NaCl
- 1 mol CO_2 has 6.02×10^{23} molecules of CO_2
- HOWEVER 1 mol CO_2 is composed of:
 - 1 mol C atoms
 - 2 mol O atoms

How many moles of water are required to get 12.50g of hydrogen.

• g of H \rightarrow mol H \rightarrow mol H₂O

• $12.50\text{g} \times \frac{1 \text{ mol H}}{1.01\text{g}}$

• $12.50\text{g} \times \frac{1 \text{ mol H}}{1.01\text{g}} \times \frac{1 \text{ mol H}_2\text{O}}{2\text{mol H}} =$

• $12.50\text{g} \times \frac{1 \text{ mol H}}{1.01\text{g}} \times \frac{1 \text{ mol H}_2\text{O}}{2\text{mol H}} = 6.19 \text{ mol H}_2\text{O}$

Conversion Options

- The Wheel – handout and found in the text
- The railroad tracks – handout
- In groups (at your tables) you will have 5 minutes to try each method. Complete p. 126, 128
- Then p. 130- 131 # 1-6, 11-19