

Particles & the Mole

↓
atoms (element)
molecules (covalent)
formula units (ionic)

1 mol = 602000000000000000000000 particles

1 mol = 6.02×10^{23} particles
AVOGADRO'S #

Ex) How many molecules are in .760 moles of laughing gas, N_2O ?

$\frac{.760 \text{ mol N}_2\text{O}}{1 \text{ mol}} \times 6.02 \times 10^{23} \text{ molecules}$ = 4.58×10^{23} molecules N_2O

EE
or EXP
 $\times 10^{\square}$

Ex) How many moles are in 3.456×10^{21} formula units of $(\text{NH}_4)_3\text{PO}_4$?

$\frac{3.456 \times 10^{21} \text{ f. units } (\text{NH}_4)_3\text{PO}_4}{6.02 \times 10^{23} \text{ f. units}} \times 1 \text{ mol}$ = .005741 mol $(\text{NH}_4)_3\text{PO}_4$

Ex) How many moles are in 1.806×10^{25} atoms of Pt?

$\frac{1.806 \times 10^{25} \text{ atoms Pt}}{6.02 \times 10^{23} \text{ atoms}} \times 1 \text{ mol}$ = 30.00 mol Pt

Volume \approx Moles

of a gas at standard temperature & pressure (STP)

$$1 \text{ mol} = 22.4 \text{ L}$$

Ex) What is the volume, in L of 0.333 mol of CO_2 at STP?
GIVEN

$$\frac{0.333 \text{ mol CO}_2}{1 \text{ mol}} \times 22.4 \text{ L} = 7.46 \text{ L CO}_2$$

Ex) How many moles are in 200. L of ozone, O_3 , at STP?
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$$\frac{200. \text{ L O}_3}{22.4 \text{ L}} \times 1 \text{ mol} = 8.93 \text{ mol O}_3$$