DOZEN = 12

MOLE = 6.02×10^{23} AVOGADRO'S NUMBER

10 million in 1 second

$$6.02\times10^{23} \times \frac{1\ \text{sec}}{10{,}000{,}000} \times \frac{1\ \text{min}}{60\ \text{sec}} \times \frac{1\ \text{hr}}{60\ \text{min}} \times \frac{1\ \text{day}}{24\ \text{hr}} \times \frac{1\ \text{yrs}}{365\ \text{days}}$$

$= 1908929477 \Rightarrow 1.9$ billion years

How many molecules of NO_2 are in a 1.23 mole sample of NO_2?

$$1.23\ \text{mol} \times \frac{6.02\times10^{23}\ \text{molecules}}{1\ \text{mol}} = 7.40\times10^{23}\ \text{molecules } NO_2$$

How many moles of CO_2 are in a 1.75×10^{26} molecule sample?

$$1.75\times10^{26}\ \text{molecules} \times \frac{1\ \text{mol}}{6.02\times10^{23}\ \text{molecules}} = 290.70\ \text{mol}$$

Counting atoms

H_2O
H:2
O:1

$Mg_3(PO_4)_2$
Mg:3
P:2
O:8

$Al_2(CO_3)_3$
Al:2
C:3
O:9

hydrate
formula • $\#H_2O$

$CuSO_4 \cdot 5H_2O$ copper(II) sulfate pentahydrate
Cu:1
S:1
O:9
H:10

DOZEN = 12

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10 million in 1 second

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Cu : 1
S : 1
O : 9
H : 10

formula mass

NH_4Cl

N: $1 \times 14.01 = 14.01$

H: $4 \times 1.01 = 4.04$

Cl: $1 \times 35.45 = 35.45$

53.50 amu

$Ca_3(PO_4)_2$

Ca: $3 \times 40.08 = 120.24$

P: $2 \times 30.97 = 61.94$

O: $8 \times 16.00 = 128.00$

310.18 amu

MOLAR MASS → the mass of one mole of a substance

* EXACTLY the same number as the formula mass, but the unit is grams

H_2O

H: $2 \times 1.01 = 2.02$

O: $1 \times 16.00 = 16.00$

18.02 g = 1 mol

18.02 g/mol

What is the mass of 7.14 moles of H_2O?

$$7.14 \text{ moles} \times \frac{18.02 \text{ g}}{1 \text{ mol}} = 128.66 \text{ g } H_2O$$