Determining the number of particles

Avogadro's Number

6.02 x 10^{23} particles = 1 mole

$\frac{6.02 \times 10^{23} \text{ part.}}{1 \text{ mol}}$ $\frac{1 \text{ mol}}{6.02 \times 10^{23} \text{ part.}}$

Particle Types:

-- atoms Ag, Ca, Au

-- ions Ca^{2+}, Cl^-, NH_4^+, SO_4^{2-}

-- molecules O_2, H_2, CO_2, H_2O (cov.; diatomics)

-- formula units $NaCl$, $CaSO_4$, NH_4NO_3 (ionic)

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Converting to number of representative particles and back to moles

How many formula units are in 3.50 moles of NaCl?

particle type

$3.50 \text{ mol NaCl} \times \frac{6.02 \times 10^{23} \text{ form. u. NaCl}}{1 \text{ mol NaCl}} = 2.107 \times 10^{24} \text{ form. u. NaCl}$

$= 2.11 \times 10^{24}$ form. u. NaCl

3.5 x 6.02 2nd EE 2 23

3.5 x 6.02 E 23

x10

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Converting to number of representative particles and back to moles

How many molecules are in 5.25 moles of water?

$5.25 \text{ mol } H_2O \times \frac{6.02 \times 10^{23} \text{ molec. } H_2O}{1 \text{ mol } H_2O} = 3.16 \times 10^{24} \text{ molec. } H_2O$

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Converting to number of representative particles and back to moles

How many moles are in 4.78 x 10^{22} atoms of Ag?

x10 (44)

$4.78 \times 10^{22} \text{ atoms Ag} \times \frac{1 \text{ mol Ag}}{6.02 \times 10^{23} \text{ atoms Ag}} = .0794 \text{ mol Ag}$

4.78 E 22 / 6.02 E 23

$\frac{10^{22}}{10^{23}} = 10^{-1}$

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Molar Mass

Molar mass: mass of a compound or molecule in grams per mole

- use the periodic table to get the atomic mass/molar mass
- represents the number of grams in 1 mole
- converts from grams to moles

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Molar Mass

Determine the molar mass of the following compounds/molecules.

1. $CaCO_3$
   Ca = 1 x 40 = 40 g/mol
   C = 1 x 12 = 12 g/mol
   O = 3 x 16 = 48 g/mol
   100 g/mol
2. strontium hydroxide $Sr(OH)_2$
   Sr = 1 x 88 = 88 g/mol
   O = 2 x 16 = 32 g/mol
   H = 2 x 1 = 2 g/mol
   122 g/mol
3. chlorine gas Cl_2
   Cl = 2 x 35 = 70 g/mol

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