

moles  $\rightarrow$  molecules

① How many molecules are in 5 moles?

$$\frac{5 \text{ mol} \mid 6.02 \times 10^{23} \text{ molec.}}{1 \text{ mol}} = \boxed{3.01 \times 10^{24} \text{ molec.}}$$

② 7.43 moles  $\rightarrow$  ? molec.

$$\frac{7.43 \text{ moles} \mid 6.02 \times 10^{23} \text{ molec.}}{1 \text{ mol}} = \boxed{4.47 \times 10^{24} \text{ molec.}}$$

③  $9.23 \times 10^{-15}$  moles  $\rightarrow$  ? molec.

$$\frac{9.23 \times 10^{-15} \text{ mol} \mid 6.02 \times 10^{23} \text{ molec.}}{1 \text{ mol}} = \boxed{5.56 \times 10^9 \text{ molec.}}$$

molecules  $\rightarrow$  moles

①  $4.9 \times 10^{17}$  molec.  $\rightarrow$  ? moles

$$\frac{4.9 \times 10^{17} \text{ molec.} \mid 1 \text{ mol}}{6.02 \times 10^{23} \text{ molec.}} = \boxed{8.14 \times 10^{-7} \text{ mol}}$$

②  $3.17 \times 10^{43}$  molec.  $\rightarrow$  ? moles

$$\frac{3.17 \times 10^{43} \text{ molec.} \mid 1 \text{ mol}}{6.02 \times 10^{23} \text{ molec.}} = \boxed{5.27 \times 10^{19} \text{ mol}}$$

③ 100 molec.  $\rightarrow$  ? moles

$$\frac{100 \text{ molec.} \mid 1 \text{ mol}}{6.02 \times 10^{23} \text{ molec.}} = \boxed{1.66 \times 10^{-22} \text{ mol}}$$

# Moles and Molecules

• convert between moles and molec.

USE  
DIMENSIONAL  
ANALYSIS!

use ↙  
conversion  
factors

ex:  $\frac{12 \text{ in}}{1 \text{ ft}}$  ,  $\frac{1000 \text{ g}}{1 \text{ kg}}$   
 $\frac{1 \text{ ft}}{12 \text{ in}}$

$1 \text{ mol} = 6.02 \times 10^{23} \text{ molec.}$

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

generic:  
 $\frac{6.02 \times 10^{23} \text{ particles}}{1 \text{ mol}}$

specific:  
 $\frac{\text{molec.}}{\text{mol}}$      $\frac{\text{compounds}}{\text{mol}}$      $\frac{\text{atoms}}{\text{mol}}$      $\frac{\text{ions}}{\text{mol}}$