

# KEY

$$1. \quad 143 \text{ bananas} \times \frac{1 \text{ mole bananas}}{6.02 \times 10^{23} \text{ bananas}} = 2.38 \times 10^{-22} \text{ moles (of bananas)}$$

$$2. \quad 63 \text{ bicycles} \times \frac{1 \text{ mole bicycles}}{6.02 \times 10^{23} \text{ bicycles}} = 1.0 \times 10^{-22} \text{ moles (of bicycles)}$$

$$3. \quad 2.5 \text{ moles cars} \times \frac{6.02 \times 10^{23} \text{ cars}}{1 \text{ mole cars}} = 1.5 \times 10^{24} \text{ cars}$$

$$4. \quad 2.6 \text{ moles bicycles} \times \frac{6.02 \times 10^{23} \text{ bicycles}}{1 \text{ mole bicycles}} \times \frac{2 \text{ wheels}}{1 \text{ bicycle}} = 3.1 \times 10^{24} \text{ wheels}$$

$$5. \quad 4.5 \text{ moles cars} \times \frac{4 \text{ moles wheels}}{1 \text{ mole cars}} = 18 \text{ moles (of wheels)}$$

$$6. \quad 3.6 \text{ moles molecules} \times \frac{6.02 \times 10^{23} \text{ molecules}}{1 \text{ mole molecules}} = 2.2 \times 10^{24} \text{ molecules}$$

$$7. \quad 4.3 \times 10^{23} \text{ molecules} \times \frac{1 \text{ mole molecules}}{6.02 \times 10^{23} \text{ molecules}} = 0.71 \text{ moles (of molecules)}$$

$$8. \quad 1 \text{ molecule AlBr}_3 \times \frac{4 \text{ atoms}}{1 \text{ molecule AlBr}_3} = 4 \text{ atoms}$$

$$9. \quad 43 \text{ molecules CaSO}_4 \times \frac{6 \text{ atoms}}{1 \text{ molecule CaSO}_4} = 258 \text{ atoms}$$

$$10. \quad 3.8 \text{ moles H}_2\text{O} \times \frac{3 \text{ mole atoms}}{1 \text{ mole H}_2\text{O}} = 11 \text{ moles atoms}$$

$$11. \quad 4.3 \text{ moles H atoms} \times \frac{1 \text{ mole H}_2\text{SO}_4}{2 \text{ moles H atom}} \times \frac{6.02 \times 10^{23} \text{ molecules H}_2\text{SO}_4}{1 \text{ mole H}_2\text{SO}_4}$$

$$= 1.3 \times 10^{24} \text{ molecules H}_2\text{SO}_4$$

$$12. \quad 3.8 \text{ moles H}_2\text{O} \times \frac{2 \text{ mole H atoms}}{1 \text{ mole H}_2\text{O}} \times \frac{6.02 \times 10^{23} \text{ H atoms}}{1 \text{ mole H atoms}}$$

$$= 4.6 \times 10^{24} \text{ H atoms}$$

Note:

You need to figure out the conversion(s) factors for each question

ex How many seconds are in 3.24 days?

Steps (1) Begin with the quantity in the question  $\rightarrow 3.24 \text{ days}$

(2) You now need to get rid of the unit "days" and replace it with seconds or some other unit you know

the conversion for. Since I don't know how many seconds there are in a day, I will convert days into hours

$$3.24 \text{ days} \times \begin{array}{|c|} \hline ? \text{ hours} \\ \hline ? \text{ days} \\ \hline \end{array}$$

introduce the new unit  
place "days" on the bottom

$$3.24 \text{ days} \times \frac{24 \text{ hours}}{1 \text{ day}}$$

"days" will cancel out leaving you with the number of hours in 3.24 days

- ③ Since we need seconds as our unit we now need to get rid off "hours". We do this by multiplying by another conversion factor with "hours" as the denominator and a new unit we can convert to as the numerator

$$3.24 \text{ days} \times \frac{24 \text{ hours}}{1 \text{ day}} \times \frac{60 \text{ min}}{1 \text{ hour}}$$

- ④ Multiply this out gives 4665.6 min → Still not seconds! so we need another conversion factor to get rid of minutes and introduce seconds. (5)

$$3.24 \text{ days} \times \frac{24 \text{ hours}}{1 \text{ day}} \times \frac{60 \text{ min}}{1 \text{ hour}} \times \frac{60 \text{ s}}{1 \text{ min}} = 279936 \text{ s}$$

- ⑤ Now match the number of sig figs with the first quantity (3.24 days)

both sides of the equation are equal

$$280.000 \text{ s} \quad \text{or} \quad \underline{\underline{2.80 \times 10^5 \text{ s}}}$$