what is it in metres per second? 1 mile = 1609 m. 1 hour = 3600 s

 The velocity is 200 miles per hour

 v = 200 miles/hour = 200 miles (hour)$^{-1}$ = 200 x (1609 m) x (3600 s)$^{-1}$ = 89.4 m s^{-1}].

Units

International System of Units (SI units): The internationally adopted system which defines

Some multiple units have their own name, the three relevant for chemists being:

mass   tonne   t $1\ t = 10^3\ kg = 1\ Mg$
volume   litre   L $1\ L = 10^{-3}\ m^3 = 1\ dm^3 = 10^3\ cm^3$
length   ångström   Å $1\ Å = 10^{-8}\ cm = 10^{-10}\ m = 100\ pm$

Units may be written out in full or the symbol used. A mixture of full word and symbol is not permitted [e.g. kgram is not permitted]. The letter s is never added to the symbol to indicate a plural. A full stop is not written after symbols except at the end of a sentence. Those symbols named after a person have a capital first letter, but when the name of the unit is written out in full a lower case first letter is used [e.g. J, joule].

When two or more symbols are combined to indicate a derived unit, a space is left between them. A space is also left between the number and the symbol for the unit, but no space is left between the prefix indicating powers of ten and the symbol to which it applies. When symbols are combined as a quotient, [e.g. metres per second], either power to the minus one or the solidus may be used [e.g. $m\ s^{-1}$

EXERCISES

Write the equations for the following statements using powers of 10 in place of prefixes.

1. **Example:** The density, ρ is 3 micrograms per cubic millimetre

    Answer: $\rho = 3 \times \mu g\ mm^{-3}$ (replacing micrograms with μg) $= 3 \times 10^{-6}\ g\ (10^{-3}\ m)^{-3}$
    (replacing μ with 10^{-6} and m with 10^{-3}) $= 3 \times 10^{3}\ g\ m^{-3}$

2. The velocity, v, is 50 millimetres per second

3. The pressure, p, is 64 meganewtons per square centimetre

4. The concentration, c, is 2.8 nanograms per microlitre

Express the following numbers under the given heading in a table as a normal equation for the quantity.

5. **Example:** 4.2 under the heading $10^{5}\ m/g$ **Answer:** $10^{5}\ m/g = 4.2\quad m = 4.2 \times 10^{-5}\ g$

6. 23 under the heading $10^{-2}\ t/s$ 7.   7.   8 under the heading $10^{5}\ p/Pa$

Convert the following quantities to coherent SI units.

8. **Example:** $q = 230\ cal$ **Answer:** $q = 230\ (4.184\ J) = 962\ J$

9. $T = 27\ ^{o}C$ 10. $t = 32\ h$ 11. $p = 61\ mmHg\ (mmHg = 133.3\ Pa)$

12. $\rho = 34\ lb\ ft^{-3}\ (lb = 454\ g,\ ft = 12\ in,\ in = 2.54\ cm)$