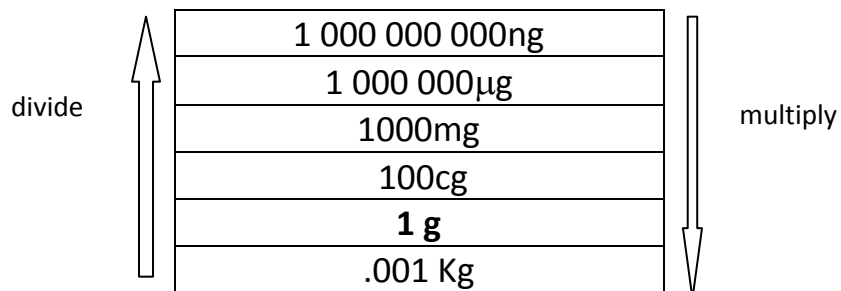


Basic Math Principles

Metric Conversion



These are the common units you will see in Chemistry. Grams (g) can be replaced with litres (L) or metres (m).

** See attached Practice

Scientific Notation

Many values in chemistry are incredibly large or small. Eg. 62 000 000 000 or 0.000 000 000 001 234

To eliminate writing repeated amounts of zeros or digits, scientific notation is used.

Rules:

1. Must be only a single digit (not zero!) in front of the decimal place.
2. The number is multiplied by a factor of ten raised to the power of the number of positions the decimal has moved.

Eg. 62 000 000 000 is rewritten as 6.2×10^{10} as the decimal must move 10 places right to show the entire number

Eg. 0.000 000 000 001 234 is rewritten as 1.234×10^{-12} as the decimal must move 10 places to the left

Laws of Exponents

1) Multiplying

$$a^b \cdot a^c = a^{b+c}$$

Eg. $6^2 \cdot 6^3 = 6^5$

$$y^2 \cdot y^6 = y^8$$

*** $a^0 = 1$ ALWAYS!!!**

2) Dividing

$$a^b / a^c = a^{b-c}$$

Eg. $6^3 / 6^2 = 6^1$

$$y^2 / y^6 = y^{-4}$$

subtract exponents if base value is the same!

3) Powers of Exponents

$$(a^b)^c = a^{b \cdot c}$$

eg. $(x^2)^3 = x^6$

multiply exponents outside the brackets (don't forget to do the number too!)

Putting it all together!

$$\text{Eg. } 3x(2x^2) = (3 \cdot 2)(x^1 \cdot x^2) = 6x^3$$

$$(2x)^2 = 4x^2$$

Solving Equations

Rules:

1) Try to get unknowns on one side of equal sign, and knowns on the other side.

2) To change sides, you must change the operation it is performing.

Eg. If it is multiplying on the left side of equation, you must divide it on the right, and vice versa!

Eg. If it is adding on the left side of the equation, you must subtract it on the right!

3) You must do adding/subtracting before you can multiply/divide.

4) If it is square on one side then it is square root on the other. If it is cubed on one side, then it is cubed root on the other, etc.

Eg. $4x - 1 = 19$

$$4x = 19 + 1$$

$$4x = 20$$

$$x = 20/4$$

$$x = 5$$

$0.5x^2 + 15 = 33$

$$0.5x^2 = 33 - 15$$

$$0.5x^2 = 18$$

$$x^2 = 18/0.5$$

$$x^2 = 36$$

$$x = \sqrt{36}$$

$$x = 6$$

$$\frac{x^3}{2} + 3 = 35$$

$$\frac{x^3}{2} = 35 - 3$$

$$\frac{x^3}{2} = 32$$

$$x^3 = 32 \times 2$$

$$x^3 = 64$$

$$x = \sqrt[3]{64}$$

$$x = 4$$

Cross-Multiplication

If you have two ratios, you can cross-multiply and divide to solve for the unknown value.

$$\frac{x}{14} = \frac{20}{5}$$