

MATTER MEASUREMENT & PROBLEM SOLVING

8/27/19

Ch. 1

Chemistry

the study of the structure, properties, and transformations. Usually made up of matter

- solid
- liquid
- gas
- plasma

Significant figures -
(sig. fig.)

Give scientists an idea of how precise the values are based on the equipment used

Sig. Fig Rules

- all non zero digits are sig figs.

74 → 2 s.f.
1392 → 4 s.f.

- all leading zeros before non zeros are NOT sig. figs.

.001 → 1 s.f.

- all zeros between non zeros are sig. figs. (sandwiched zeros)

10004 → 5 s.f.

- trailing zeros w/o decimal point is NOT sig fig

5600 → 2 s.f.

- trailing zeros w/ decimal point is sig fig

5600. \rightarrow 4 s.f.

- sig fig for \times/\div is least amount of sig fig

$$\begin{array}{c} 5 \\ \textcircled{3} \end{array} \frac{79.901 \text{ g}}{12.2 \text{ ml}} = 6.54926 \rightarrow 6.55 \text{ g/ml}$$

- sig fig for $+/-$ is the least amount of decimals

$$\begin{array}{c} 2 \\ \textcircled{2} \end{array} \frac{12.45 + 0.2578}{4} = 12.7078 \rightarrow 12.71$$

Scientific Notation - A simpler, systematic way of representing a very large or small number

• positive exponent
moving left

$$\begin{array}{c} 6223000.00 \\ \text{~~~~~} \\ 6.223 \times 10^6 \end{array}$$

• negative exponent
moving right

$$\begin{array}{c} 0.00001 \\ \text{~~~~~} \\ 1.0 \times 10^{-5} \end{array}$$

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Conversions

Common Prefixes used with SI Units			
Prefix	Symbol	Meaning	Order of Magnitude
<i>giga-</i>	G	1 000 000 000	10^9
<i>mega-</i>	M	1 000 000	10^6
<i>kilo-</i>	k	1 000	10^3
<i>hecto-</i>	h	100	10^2
<i>deka-</i>	da	10	10^1
	base unit	1	10^0
<i>deci-</i>	d	0.1	10^{-1}
<i>centi-</i>	c	0.01	10^{-2}
<i>milli-</i>	m	0.001	10^{-3}
<i>micro-</i>	μ	0.000 001	10^{-6}
<i>nano-</i>	n	0.000 000 001	10^{-9}

281 mg into g?

$$\frac{231 \cancel{\text{mg}}}{1} \times \frac{0.001 \text{g}}{1 \cancel{\text{mg}}} = 0.231 \text{g}$$

789 cg into kg? $1 \text{cg} = 0.01 \text{g}$ $1 \text{kg} = 1000 \text{g}$

$$\frac{789 \text{cg}}{1} \times \frac{0.01 \text{g}}{1 \text{cg}} \times \frac{1 \text{kg}}{1000 \text{g}} = 0.00789 \rightarrow 8 \times 10^{-3}$$

How many km^2 are in 30cm^2 ? $1 \text{cm} = 0.01 \text{m}$
 $1 \text{km} = 1000 \text{m}$

$$\frac{30 \text{cm}^2}{1} \times \frac{0.01^2 \text{m}^2}{1^2 \text{cm}^2} \times \frac{1^2 \text{km}^2}{1000^2 \text{m}^2} = 0.000000003 \rightarrow 3 \times 10^{-9}$$

Density $d = \frac{m}{V}$

Mass per unit volume (always same density no matter the volume)

A solid weighs 2.99g and has a volume of 4.94 mL. What is the density?

$$d = \frac{2.99 \text{g}}{4.94 \text{mL}} = 0.605 \frac{\text{g}}{\text{mL}}$$