

Chemistry 11: SI Units, Powers of 10 and Significant Figures

Key.

1. SI Units

A. Write the SI prefix for each of the following; ie., 10^{-2} means "centi".

$$10^{-12} = \text{pico}$$

$$0.1 = \text{deci}$$

$$0.01 = \text{centi}$$

$$0.000\ 001 = \text{micro}$$

$$0.001 = \text{milli}$$

$$10^{-9} = \text{nano}$$

$$10^1 = \text{deka}$$

$$1\ 000\ 000 = \text{mega}$$

$$10^{-6} = \text{micro}$$

$$0.000\ 000\ 001 = \text{nano}$$

B. List the basic SI unit and abbreviation for each of the following:

QUANTITY	SI UNIT	ABBREVIATION
Length	metre	m
Mass	kilogram	kg
Volume	Cubic metre	m^3
Area	Square metre	m^2
Density	kilogram / cubic metre	kg/m^3
Time	second	s
Energy	joule	J
Temperature	Kelvin	K
Electric current	ampere	A

C. Carry out the following SI conversions:

$$165\ \text{g} = \underline{0.165} \text{ kg}$$

$$360\ \text{mm} = \underline{\cancel{3.60} 36.0} \text{ cm}$$

$$9\ \text{kg} = \underline{9 \times 10^3 \text{ or } 9000} \text{ g}$$

$$5.8\ \text{cm} = \underline{0.058} \text{ m}$$

$$0.007\ \text{g} = \underline{7} \text{ mg}$$

$$546\ \text{cm} = \underline{0.00546} \text{ km}$$

2. Powers of 10

A. Convert these numbers which are written in exponential notation into expanded notation.

$$10^2 = 100$$

$$10^6 = 1\ 000\ 000$$

$$10^{-1} = 0.1$$

$$10^{-2} = 0.01$$

$$10^3 = 1\ 000$$

$$10^{-5} = 0.00001$$

$$10^5 = 100\ 000$$

$$10^{-6} = 0.000\ 001$$

$$10^{-3} = 0.001$$

$$10^9 = 1\ 000\ 000\ 000$$

$$10^{12} = 1\ 000\ 000\ 000\ 000$$

$$10^{-9} = 0.000\ 000\ 001$$

Key

B. Convert the following numbers into exponential (scientific) notation.

$0.01 = 10^{-2}$	$100 = 10^2$
$1\ 000\ 000 = 10^6$	$0.1 = 10^{-1}$
$0.000\ 000\ 000\ 001 = 10^{-12}$	$10\ 000 = 10^4$
$1\ 000\ 000\ 000 = 10^9$	$10 = 10^1$
$0.000\ 01 = 10^{-5}$	$1\ 000\ 000 = 10^6$
$1 = 10^0$	$0.001 = 10^{-3}$

C. Express the following in scientific notation.

295	2.95×10^2	0.000 40	4.0×10^{-4}
55 169 203	5.5169203×10^7	4140.0	4.1400×10^3
414.0092	4.140092×10^2		

3. Significant Figures

A. Add the following, WATCH THE SIGNIFICANT FIGURES!

$\begin{array}{r} 6.3 \\ 2.81 \\ \hline 9.1 \end{array}$	$\begin{array}{r} 49.04 \\ 27.591 \\ \hline 76.63 \end{array}$	$\begin{array}{r} 1635.00 \\ 22.2 \\ \hline 1657.2 \end{array}$	$\begin{array}{r} 11.4 \\ 2.50 \\ \hline 13.9 \end{array}$	$\begin{array}{r} 6.118 \\ 0.010 \\ \hline 6.128 \end{array}$
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B. Subtract the following, WATCH THE SIGNIFICANT FIGURES

$\begin{array}{r} 13.8 \\ 7.1 \\ \hline 6.7 \end{array}$	$\begin{array}{r} 295.5 \\ 88 \\ \hline 208 \end{array}$	$\begin{array}{r} 562\ 135 \\ 400\ 999 \\ \hline 161\ 136 \end{array}$	$\begin{array}{r} 390.26 \\ 5.70 \\ \hline 384.56 \end{array}$	$\begin{array}{r} 11.4912 \\ 9.21 \\ \hline 2.28 \end{array}$
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C. Multiply the following.

$\begin{array}{r} 213 \\ 8.0 \\ \hline 1.7 \times 10^3 \end{array}$	$\begin{array}{r} 13.5 \\ 15 \\ \hline 2.0 \times 10^2 \end{array}$	$\begin{array}{r} 1005.2 \\ 1.7 \\ \hline 1.7 \times 10^3 \end{array}$	$\begin{array}{r} 2.01 \\ 4.2 \\ \hline 8.4 \end{array}$	$\begin{array}{r} 31.2 \\ 1.65 \\ \hline 51.5 \end{array}$
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D. Divide the following.

$15.3 / 7 = 2$	$13.05 / 15.0 = 0.870$
$1005 / 19.1 = 52.6$	$31.2 / 1.65 = 18.9$