KEY

Unit Conversions Refresher

Name - _____

1.) Solve the following using the method of unit conversions.

a.) If one mole of a gas has a volume of $22.4\ L$, how many moles are there in $2.50\ L$?

Answer - $2.50\ L \times \frac{1\ mol}{22.4\ L} = 0.112\ mol$

b.) How many seconds must an electrical current of $35\ \frac{coulombs}{second}$ flow in order to deliver $200.0\ coulombs$?

Answer - $200.0\ C \times \frac{1\ s}{35\ C} = 5.7\ s$

c.) A quiet sound exerts a pressure of $4 \times 10^{-8}\ kPa$ (kPa is kilopascals, a unit of pressure). What is the pressure in atmospheres if 1 atmosphere is $101.325\ kPa$?

Answer - $4 \times 10^{-8} kPa \times \frac{1\ atm}{101.325\ kPa} = 3.95 \times 10^{-10}\ atm$ $4.\times 10^{-10}\ atm$

d.) If concentrated hydrochloric acid has a concentration of $11.7\ \frac{mol}{L}$, what volume of hydrochloric acid is required in order to have $0.0358\ mol$ of hydrochloric acid?

Answer - $0.0358\ mol\ HCl \times \frac{1\ L}{11.7\ mol\ HCl} = 3.06 \times 10^{-3}\ L$

2.) It requires $334\ kJ$ of heat to melt $1\ kg$ of ice.

a.) The largest known iceberg had a volume of about $3.1 \times 10^{13}\ m^3$. How much heat was required to melt the iceberg if $1\ m^3$ of ice has a mass of $971\ kg$?

Answer - $3.1 \times 10^{13}\ m^3 \times \frac{971\ kg}{1\ m^3} \times \frac{334 kJ}{1\ kg} = 1.0 \times 10^{19}\ kJ$

b.) The explosive T.N.T. releases $1.51 \times 10^4\ kJ$ of energy for every kilogram of T.N.T which explodes. Provided that all of the energy of an explosion is converted into heat energy to melt the ices, how many kilograms of T.N.T. would be needed to melt the iceberg in part a.) of this question?

Answer - $1.00 \times 10^{19}\ kJ \times \frac{1\ kg}{1.51 \times 10^4\ kJ} = 6.66 \times 10^{14}\ kg$ $= 6.7 \times 10^{14}\ kg$

3.) Sugar costs $\frac{\$0.98}{kg}$. $1\ tonne\ =\ 1000\ kg$. How many tonnes (t) of sugar can you buy for $\$350$?

Answer - $\$350 \times \frac{1\ kg}{\$0.98} \times \frac{1\ t}{1000\ kg} = 0.357\ t$

4a.) How many kilometres will a car travelling at $120\ \frac{km}{h}$ go in $0.25\ hours$? $0.25\ hr \times \frac{120\ km}{1\ hr} = 30\ km$

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b.) How far in 12 min?

Answer - $12\ min \times \frac{1\ hr}{60\ min} \times \frac{120\ km}{1\ hr} = 24\ km$

5.) Write conversion statements for the following. Ex. - $1\ ms\ =\ 10-3\ s$

a.) kg and g

$10^{-3}\ kg = 1\ g$

b.) Mm and m

$10^{-6}\ Mm = 1\ m$

c.) µL and L

$10^{6}\mu L = 1\ L$

d.) mmol and mol

$10^{3}\ mmol = 1\ mol$

6a.) If $1\ mg\ =\ 10^{-3}\ g$ and $1\ Mg\ =\ 10^{6}\ g$, how many milligrams are there in $0.25\ Mg$?

Answer - $0.25\ Mg \times \frac{10^{6}\ g}{1\ Mg} \times \frac{1000\ mg}{1\ g} =\ 2.5 \times 10^{8}\ mg$

b.) If $1\ \mu s\ =\ 10^{-6}\ s$ and $1\ cs\ =\ 10^{-2}\ s$ how many centiseconds are there in $10\ \mu s$?

Answer - $10\ \mu s \times \frac{10^{-6}\ s}{1\ \mu s} \times \frac{1\ cs}{10^{-2}\ s} =\ 1 \times 10^{-3}\ cs$

c.) If $1\ mm\ =\ 10^{-3}\ m$ and $1\ cm\ =\ 10^{-2}\ m$ how many millimetres are there in $15.8\ cm$?

Answer - $15.8\ cm \times \frac{10^{-2}\ m}{1\ cm} \times \frac{1\ cm}{10^{-3}m} =\ 1.58 \times 10^{2}\ mm$

7.) Convert the following.

a.) $3\ s$ into milliseconds

$3\ s \times \frac{1000\ ms}{1\ s} = 3000\ ms$

b.) $3\ Mm$ into metres

$3\ Mm \times \frac{1000000\ m}{1\ Mm} =$

$3 \times 10^{6}\ m$

c.) $2\ L$ into decilitres

$2\ L \times \frac{10\ dL}{1\ L} = 20\ dl$

d.) $1.7\ \mu g$ into centigrams

$1.7\ \mu g \times \frac{1\ g}{1.0 \times 10^{6}\ \mu g} \times \frac{100\ cg}{1\ g}$

$= 1.7 \times 10^{-4}\ cg$

e.) $1\ \frac{mg}{dL}$ into $\frac{grams}{litre}$

$\frac{1\ mg}{1\ dL} \times \frac{1\ g}{1000\ mg} \times \frac{10\ dL}{1\ L} = \frac{1\ g}{100\ L}$

f.) $1\ \frac{cm}{\mu s}$ into $\frac{km}{s}$

$\frac{1\ cm}{1\ \mu s} \times \frac{1\ m}{100\ cm} \times \frac{1\ km}{1000\ m}$

$\times \frac{1000\ 000\mu s}{1\ s} = \frac{10\ km}{1\ s}$

8.) Light travels at $3.00 \times 10^{8}\ \frac{m}{s}$. It takes light $8.3\ minutes$ to travel from the surface of the sun to the earth. What is the distance of the earth from the sun?

Answer - $8.3\ min \times \frac{60\ s}{1\ min} \times \frac{3.00 \times 10^{8}\ m}{1\ s} = 1.49 \times 10^{11}\ m$ $1.5 \times 10^{11}\ m$

9.) A measurement is given as $9.0\ \frac{lb}{in^3}$. If $1\ kg\ =\ 2.2\ lb$, and $1\ m\ =\ 39\ in$, convert the measurement into $\frac{kg}{m^3}$.

Answer - $\frac{9.0\ lb}{1\ in^3} \times \frac{1\ kg}{2.2\ lb} \times \frac{59319\ in^3}{1\ m^3} =\ 2.42668 \times 10^{5}\ \frac{kg}{m^3}$ $2.4 \times 10^{5}\ \frac{kg}{m^3}$