10/5/15 Dimensional Analysis

given × (label needed / label given) =

1. Convert 14mm to m.
given: 14mm need: ?m

$14\,mm \times \frac{1\ m}{1000\ mm} = 0.014\,m$

2. Convert 36kg to g.
given: 36kg need: ?g

$36\,kg \times \frac{1000\ g}{1\ kg} = 36000\,g$

3. Convert 57ml to L
given: 57ml need: ?L

$57\,ml \times \frac{1\ L}{1000\ ml} = 0.057\,L$

4. Convert 88 m/s to cm/s.
given: 88 m/s need: ? cm/s

$\frac{88\,m}{1\,s} \times \frac{100\ cm}{1\ m} = \frac{8800\ cm}{1\,s}$

5. Convert 9.45g/L to g/ml.
given: 9.45g/1L need: ? g/ml

$\frac{9.45\,g}{1\,L} \times \frac{1\ L}{1000\ ml} = \frac{0.00945\,g}{1\ ml} \rightarrow 0.00945\ g/ml$

6. The density of a metal is 13.6g/ml (conversion factor). What is the mass of 3.55ml of the metal?

$D = \frac{m}{V}$ $m = D \cdot V$

13.6g = 1 ml $\frac{13.6\,g}{1\,ml} = \frac{1\,ml}{13.6\,g}$

given: 3.55ml needs: ?g

$3.55\,ml \times \frac{13.6\,g}{1\,ml} = 48.3\,g$

7. The density of lead is 11.3g/ml (conversion factor). What is the mass of 45ml of the metal?

given: 45ml need: ?g

$45\,ml \times \frac{11.3\,g}{1\,ml} = 508 \rightarrow 510\,g$

8. 216g

1 mole = 6.022×10^{23} atoms or molecules = 22.4L (gas only) = molar mass in grams (periodic table)

9. given: ESS need: ? km
ans = 83km

10. 3.16×10^{23} atoms

11. 168g

12. 0.123g

given: 50.0ml need: ?g
conversion factor 0.00245g = 1ml
$50.0\,ml \times \frac{0.00245\,g}{1\,ml} =$

Level 2 (requires 2 or more conversion factors)

1. given: 15.9mm need: ?km:
mm → m → km

$15.9\,mm \times \frac{1\ m}{1000\ mm} \times \frac{1\ km}{1000\ m} = 0.0000159\ km = 1.59 \times 10^{-5}\ km$ same

11. a soln. $Ba(NO_3)_2$ 61.2g per liter (conversion factor). How many grams of $Ba(NO_3)_2$ are contained in 2.75L of soln?
given: 2.75L need: ?g 61.2g = 1L

$2.75\,L \times \frac{61.2\,g}{1\,L} = 168\,g$

1 mole = 6.022×10^{23} atoms or molecules = 22.4L (gas only) = molar mass in grams (from P.T.)

10. A mole of copper contains 6.02×10^{23} atoms. How many atoms are in 0.525 moles?
given: 0.525 moles need: ? atoms 1 mole = 6.02×10^{23} atoms

$0.525\,moles \times \frac{6.02 \times 10^{23}\ atoms}{1\ mole} = 3.16 \times 10^{23}\ atoms$

Dimension Analysis Level 2 (need 2 or more conversion factors)

Practice: 30.0 sec (→ min) = ? hrs. given: 30.0 sec need ? hrs

conversion factors
60 sec = 1 min
60 min = 1 hr.

$$\frac{30.0\ \text{sec}}{1} \times \frac{1\ \text{min}}{60\ \text{sec}} \times \frac{1\ \text{hrs.}}{60\ \text{min}} = \boxed{0.00833\ \text{hrs.}}$$

$$\frac{30.0 \times 1 \times 1}{60 \times 60} =$$

6.2 in (→ cm) = ? m

1 in = 2.54 cm | 100 cm = 1 m

$$6.2\ \text{in} \times \frac{2.54\ \text{cm}}{1\ \text{in}} \times \frac{1\ \text{m}}{100\ \text{cm}} = \boxed{0.16\ \text{m}}$$

0.003 Km (→ m) = ? cm

$$0.003\ \text{Km} \times \frac{1000\ \text{m}}{1\ \text{Km}} \times \frac{100\ \text{cm}}{1\ \text{m}} = \boxed{300\ \text{cm}}$$

4.3 moles H_2O = ? g

1 mole H_2O = 18.02 g

H_2O: 2H = 2.02, O = 16.00, 18.02 (from P.T.)

$$4.3\ \text{moles} \times \frac{18.02\ \text{g}}{1\ \text{mole}} = \boxed{77\ \text{g}}$$

1 mole = 6.022×10^{23} atoms -or- molecules = 22.4 L (gas only) = molar mass in grams (from Periodic Table)

How many liters would 4.55×10^{23} atoms fill?

given: 4.55×10^{23} atoms need: ? L

conversion factor: 6.022×10^{23} atoms = 22.4 L

$$4.55 \times 10^{23}\ \text{atoms} \times \frac{22.4\ \text{L}}{6.022 \times 10^{23}\ \text{atoms}} = \boxed{16.9\ \text{L}}$$

If there is 8.73 g of helium present, how many liters are there?

given: 8.73 g need: ? L

4.00 g = 22.4 L

$$8.73\ \text{g} \times \frac{22.4\ \text{L}}{4.00\ \text{g}} = \boxed{48.9\ \text{L}}$$

$$55.0\ \frac{\text{Km}}{\text{hr}} = ?\ \frac{\text{cm}}{\text{s}}$$

10/5/15

Dimensional Analysis: Level 2 (2 or more conversion factors)

Practice: min

$30.0\ \text{sec} = ?\ \text{hrs}$

$$30.0\ \text{sec} \times \frac{1\ \text{min}}{60\ \text{sec}} \times \frac{1\ \text{hrs}}{60\ \text{min}} = \boxed{0.00833\ \text{hrs.}} \text{ or } \boxed{8.33 \times 10^{-3}\ \text{hrs}} \text{ Same}$$

$$(30 \times 1 \times 1) \div (60 \times 60) =$$

m

$0.003\ \text{km} = ?\ \text{cm}$

$$0.003\ \text{km} \times \frac{1000\ \text{m}}{1\ \text{km}} \times \frac{100\ \text{cm}}{1\ \text{m}} = \boxed{300\ \text{cm}}$$

H_2O

2×1.01

$+ \quad 16.00$

$18.02\ \text{g}$

$1\ \text{mole} = 18.02\ \text{g}\ H_2O$

How moles of water are in 4.3 grams?

$$4.3\ \text{g} \times \frac{1\ \text{moles}}{18.02\ \text{g}} = \boxed{0.24\ \text{moles}}$$