

CHEM 1200 + 1251 Basic

Conversions + Dimensional Analysis using Prefixes

Base units

grams (g)

meter (m)

liter (L)

Prefixes

giga (G) - 10^9

mega (M) - 10^6

kilo (k) - 10^3

deci (d) - 10^{-1}

centi (c) - 10^{-2}

milli (m) - 10^{-3}

micro (μ) - 10^{-6}

nano (n) - 10^{-9}

pico (p) - 10^{-12}

Rules w/ Dimensional Analysis

1) always place a 1 with the prefix

2) Place 10^x next to the base (g, m, L)

Example Worked Out

1. 15 cg to g

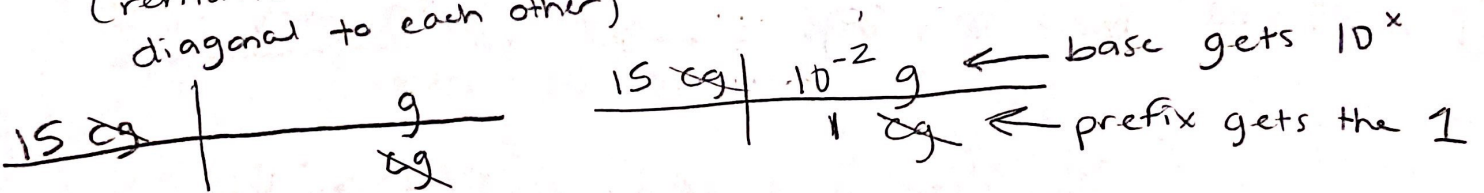
Step 1: set up a T-chart



Step 2: Start with the value and unit given



Step 3: Set up the conversion of cg to g using prefix values (remember in order to cancel unwanted units out they have to be diagonal to each other)



Step 4: Solve, remembering significant figures.

$$\frac{15 \text{ g}}{1 \text{ cg}} \times \frac{10^{-2} \text{ g}}{1 \text{ cg}} = 0.15 \text{ g} \leftarrow \text{end with 2 sig figs (zeros before decimal do NOT count)}$$

Start with 2 sig figs

Remember to keep
in mind sig figs

Examples On Your Own:

2 235.7 m to nm

3 34×10^{-3} g to μ g

4 188 mL to L

5 79.2 μ m to cm

6 400,002 pg to dg

7 900 mL to kL

8 21.1 km to mm

9 2.4×10^{12} mg to cg

10 82,564 cL to ML

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Conversions + Dimensional Analysis Using Prefixes Key

$$2) \frac{235.7 \text{ m} \left| \frac{1 \text{ nm}}{10^{-9} \text{ m}} \right.}{10^{-9} \text{ m}} = 2.357 \times 10^{11} \text{ nm}$$

$$3) \frac{34 \times 10^{-3} \text{ g} \left| \frac{1 \mu\text{g}}{10^{-6} \text{ g}} \right.}{10^{-6} \text{ g}} = 3.4 \times 10^4 \mu\text{g}$$

$$4) \frac{188 \text{ mL} \left| \frac{10^{-3} \text{ L}}{1 \text{ mL}} \right.}{1 \text{ mL}} = 0.188 \text{ L}$$

$$5) \frac{79.2 \mu\text{m} \left| \frac{10^{-6} \text{ m}}{1 \mu\text{m}} \right| \frac{1 \text{ cm}}{10^{-2} \text{ m}}}{1 \mu\text{m} \left| 10^{-2} \text{ m} \right.} = 0.00792 \text{ cm} = 7.92 \times 10^{-3} \text{ cm}$$

$$6) \frac{400,002 \text{ pg} \left| \frac{10^{-12} \text{ g}}{1 \text{ pg}} \right| \frac{1 \text{ dg}}{10^{-1} \text{ g}}}{1 \text{ pg} \left| 10^{-1} \text{ g} \right.} = 4.00002 \times 10^{-6}$$

$$7) \frac{900 \text{ mL} \left| \frac{10^{-3} \text{ L}}{1 \text{ mL}} \right| \frac{1 \text{ kL}}{10^3 \text{ L}}}{1 \text{ mL} \left| 10^3 \text{ L} \right.} = 9 \times 10^{-4} \text{ kL}$$

$$8) \frac{21.1 \text{ km} \left| \frac{10^3 \text{ m}}{1 \text{ km}} \right| \frac{1 \text{ mm}}{10^{-3} \text{ m}}}{1 \text{ km} \left| 10^{-3} \text{ m} \right.} = 2.11 \times 10^7 \text{ mm}$$

$$9) \frac{2.4 \times 10^{12} \text{ mg} \left| \frac{10^{-3} \text{ g}}{1 \text{ mg}} \right| \frac{1 \text{ cg}}{10^{-2} \text{ g}}}{1 \text{ mg} \left| 10^{-2} \text{ g} \right.} = 2.4 \times 10^{11} \text{ cg}$$

$$10) \frac{82.564 \text{ dL} \left| \frac{10^{-2} \text{ L}}{1 \text{ dL}} \right| \frac{1 \text{ ML}}{10^6 \text{ L}}}{1 \text{ dL} \left| 10^6 \text{ L} \right.} = 8.2564 \times 10^{-7} \text{ ML}$$