

KEY

Name: \_\_\_\_\_ Block: \_\_\_\_\_ Date: \_\_\_\_\_

### Chemistry 11 Metric Conversions

Do the following exercises using the unit conversion method. Ensure that you **show your units** at all times! All answers should also obey the rule of 1000.

1. Convert 50 mL into litres.

$$(50\text{mL})\left(\frac{10^{-3}\text{L}}{1\text{mL}}\right) = 5.0 \times 10^{-2}\text{L}$$

2. Convert 2 L into microlitres.

$$(2\text{L})\left(\frac{1\mu\text{L}}{10^{-6}\text{L}}\right) = 2 \times 10^6\mu\text{L}$$

3. Convert 25 kg into grams

$$(25\text{kg})\left(\frac{10^3\text{g}}{1\text{kg}}\right) = 2.5 \times 10^4\text{g}$$

4. Convert 3 Mm into metres.

$$(3\text{Mm})\left(\frac{10^6\text{m}}{1\text{Mm}}\right) = 3 \times 10^6\text{m}$$

5. Convert 2 L into decilitres.

$$(2\text{L})\left(\frac{1\text{dL}}{10^{-1}\text{L}}\right) = 2 \times 10^1\text{dL}$$

6. Convert 7 μs into milliseconds.

$$(7\mu\text{s})\left(\frac{10^{-6}\text{s}}{1\mu\text{s}}\right)\left(\frac{1\text{ms}}{10^{-3}\text{s}}\right) = 7 \times 10^{-3}\text{ms}$$

7. Convert 51 kg into milligrams.

$$(51\text{kg})\left(\frac{10^3\text{g}}{1\text{kg}}\right)\left(\frac{1\text{mg}}{10^{-3}\text{g}}\right) = 5.1 \times 10^7\text{mg}$$

8. Convert 3125 μL into kilolitres.

$$(3125\mu\text{L})\left(\frac{10^6\text{L}}{1\mu\text{L}}\right)\left(\frac{1\text{kL}}{10^3\text{L}}\right) = 3.125 \times 10^{-6}\text{kL}$$

9. Convert 1.7 μg into centigrams

$$(1.7\mu\text{g})\left(\frac{10^6\text{g}}{1\mu\text{g}}\right)\left(\frac{1\text{cg}}{10^2\text{g}}\right) = 1.7 \times 10^{-4}\text{cg}$$

10. Convert 1 year into seconds.

$$(1\text{y})\left(\frac{365\text{d}}{1\text{y}}\right)\left(\frac{24\text{h}}{1\text{d}}\right)\left(\frac{60\text{min}}{1\text{h}}\right)\left(\frac{60\text{s}}{1\text{min}}\right) = 3.1536 \times 10^7\text{s}$$

11. Convert 1 mg/dL into grams per litre.

$$\left(\frac{1\text{mg}}{1\text{dL}}\right)\left(\frac{10^{-3}\text{g}}{1\text{mg}}\right)\left(\frac{1\text{dL}}{10^{-1}\text{L}}\right) = 1 \times 10^{-2}\frac{\text{g}}{\text{L}}$$

12. Convert 1 cm/μs into kilometres per second.

$$\left(\frac{1\text{cm}}{1\mu\text{s}}\right)\left(\frac{10^{-2}\text{m}}{1\text{cm}}\right)\left(\frac{1\text{km}}{10^3\text{m}}\right)\left(\frac{1\mu\text{s}}{10^{-6}\text{s}}\right) = 1 \times 10^{+1}\frac{\text{km}}{\text{s}}$$

13. Convert 1 cg/mL into decigrams per litre.

$$\left(\frac{1\text{cg}}{1\text{mL}}\right)\left(\frac{10^{-2}\text{g}}{1\text{cg}}\right)\left(\frac{1\text{dg}}{10^{-1}\text{g}}\right)\left(\frac{1\text{mL}}{10^{-3}\text{L}}\right) = 1 \times 10^2\frac{\text{dg}}{\text{L}}$$

14. A hippopotamus has a mass of 1500 kg. An eagle comes and lands on his back. The eagle weighs 2000 g. How much do the hippo and the bird weigh together?

$$m_{\text{hippo}} = 1500 \text{ kg}$$

$$m_{\text{TOTAL}} = 1502 \text{ kg}$$

$$m_{\text{eagle}} = (2000 \text{ g}) \left( \frac{1 \text{ kg}}{10^3 \text{ g}} \right) = 2 \text{ kg}$$

15. John ran 10000 cm. Sarah skied 0.1 km. Who travelled farther?

$$d_{\text{John}} = (10000 \text{ cm}) \left( \frac{10^2 \text{ m}}{1 \text{ cm}} \right) \left( \frac{1 \text{ km}}{10^3 \text{ m}} \right) = 0.1 \text{ km}$$

⇒ same distance

16. A mosquito sucks 0.1 mL of blood out of human. A bat sucks 0.1 dL out of a cow. How many times more blood does the bat drink than the mosquito?

$$V_{\text{bat}} = (0.1 \text{ dL}) \left( \frac{10^1 \text{ L}}{1 \text{ dL}} \right) \left( \frac{1 \text{ mL}}{10^3 \text{ L}} \right) = 10 \text{ mL}$$

$$(0.1 \text{ mL}) x = 10 \text{ mL}$$

$$x = \frac{10 \text{ mL}}{0.1 \text{ mL}}$$

x = 100x more

17. An elevator has a weight capacity of 800 kg. There are 10 people in the elevator, each weighing 65000 g. This brings the total weight in the elevator to a whopping 650000 g! Why doesn't the elevator plummet to the earth?

$$m = 65000 \text{ g} \times 10 = (650000 \text{ g}) \left( \frac{\text{kg}}{10^3 \text{ g}} \right) = 650 \text{ kg} < 800 \text{ kg}$$

max

18. Joe lives by the ocean. He keeps his pool partway full with 37 hL of water. One day a tsunami comes and crashes right into his pool filling it to the top. The pool now contains 10 kL of water. How much water did the tsunami dump into the pool?

$$(37 \text{ hL}) \left( \frac{10^2 \text{ L}}{1 \text{ hL}} \right) = 3700 \text{ L}$$

pool

$$(10 \text{ kL}) \left( \frac{10^3 \text{ L}}{1 \text{ kL}} \right) = 10000 \text{ L}$$

$$\begin{array}{r} 10000 \\ - 3700 \\ \hline 6300 \text{ L} \end{array} = 6.3 \text{ kL}$$

19. A silver bar has a mass of 1 kg. If 1 troy ounce has a mass of 31.1 g and silver sells for \$7.50 per troy ounce, how much is the silver bar worth?

$$(1 \text{ kg}) \left( \frac{10^3 \text{ g}}{1 \text{ kg}} \right) \left( \frac{1 \text{ troy ounce}}{31.1 \text{ g}} \right) \left( \frac{\$7.50}{\text{oz}} \right) = \$241.16$$

20. A sorcerer sells love potions in 5 dram containers. If 1 dram has a volume of 60 minims and 1 mL has a volume of 16.2 minims, what is the volume of the love potion, expressed in millilitres?

$$(5 \text{ dram}) \left( \frac{60 \text{ mini}}{1 \text{ dram}} \right) \left( \frac{1 \text{ mL}}{16.2 \text{ mini}} \right) = 18.5 \text{ mL}$$

21. If a block of uranium has a density of 18.95 kg/L, how many centigrams of uranium are in 50 mL?

$$\left( \frac{18.95 \text{ kg}}{\text{L}} \right) \left( \frac{10^3 \text{ g}}{1 \text{ kg}} \right) \left( \frac{1 \text{ cg}}{10^2 \text{ g}} \right) \left( \frac{10^3 \text{ L}}{1 \text{ mL}} \right) (50 \text{ mL}) = 94750 \text{ cg}$$

$$= 9.475 \times 10^4 \text{ cg}$$

Give the name of the metric unit of mass, volume or distance that is:

- a) equal to 1000 milligrams 1g
- b) 10 times smaller than a centigram mg
- c) equal to 10 hectometres km
- d) equal to 100 centimetres 1m
- e) 10 times smaller than a decilitre cl