

Percents:

Practice: Give it a try. I want you to try to identify the “part” and the “whole sample” in each of the following.

- a) **Selenium** makes up 28.17% of the compound **barium selenate**. **Selenium is PART of barium selenate**
- b) **Water is** 11.2% **hydrogen**. **Hydrogen is PART of water**
- c) A certain **solution** is 95% **isopropyl alcohol**. **Isopropyl alcohol is PART of a solution**
- d) The other 5% of the above **solution** is **water**. **Water is PART of a solution**
- e) **Seawater** is about 3.5% **sodium chloride**. **Sodium chloride is PART of seawater**
- f) **Silicon** makes up about 25.7% of the **Earth's mass**. **Silicon is PART of the Earth**
- g) The **average human body** is $2.9 \times 10^{-4} \%$ **gold**. **Gold is PART of the human body**

Percents as conversion factors:

Practice: Write the 2 possible conversion factors for each of the following. Be sure to include proper units.

- a) Selenium makes up 28.17% of the compound barium selenate. $\frac{28.17 \text{ g selenium}}{100 \text{ g barium selenate}}$ OR $\frac{100 \text{ g barium selenate}}{28.17 \text{ g selenium}}$
- b) Water is 11.2% hydrogen $\frac{11.2 \text{ kg hydrogen}}{100 \text{ kg water}}$ OR $\frac{100 \text{ kg water}}{11.2 \text{ kg hydrogen}}$
- c) A certain solution is 95% isopropyl alcohol $\frac{95 \text{ mL isopropyl alcohol}}{100 \text{ mL solution}}$ OR $\frac{100 \text{ mL solution}}{95 \text{ mL isopropyl alcohol}}$
- d) The other 5% of the above solution is water $\frac{5 \text{ mL water}}{100 \text{ mL solution}}$ OR $\frac{100 \text{ mL solution}}{5 \text{ mL water}}$
- e) Seawater is about 3.5% sodium chloride $\frac{3.5 \text{ m}^3 \text{ sodium chloride}}{100 \text{ m}^3 \text{ seawater}}$ OR $\frac{100 \text{ m}^3 \text{ seawater}}{3.5 \text{ m}^3 \text{ sodium chloride}}$
- f) Silicon makes up about 25.7% of the Earth's mass $\frac{25.7 \text{ kg silicon}}{100 \text{ kg Earth}}$ OR $\frac{100 \text{ kg Earth}}{25.7 \text{ kg silicon}}$
- g) The average human body is $2.9 \times 10^{-4} \%$ gold $\frac{2.9 \times 10^{-4} \text{ troy-oz gold}}{100 \text{ troy-oz human body}}$ OR $\frac{100 \text{ troy-oz human body}}{2.9 \times 10^{-4} \text{ troy-oz gold}}$

Practice: Solve each of the following:

- a) A sample of barium selenate weighs 56.113 grams. If selenium makes up 28.17% of the compound barium selenate, how many grams of selenium are in the sample?

$$56.113 \text{ g barium selenate} \times \frac{28.17 \text{ g selenium}}{100 \text{ g barium selenate}} = 15.81 \text{ g selenium}$$

- b) Water is 11.2% hydrogen. If a bowl of water contains 1.44 kg of hydrogen, how many kg of water are there?

$$1.44 \text{ kg hydrogen} \times \frac{100 \text{ kg water}}{11.2 \text{ kg hydrogen}} = 12.9 \text{ kg water}$$

- c) 750 mL of a certain solution is 95% isopropyl alcohol. How many mL of isopropyl alcohol does the solution contain?

$$750 \text{ mL solution} \times \frac{95 \text{ mL isopropyl alcohol}}{100 \text{ mL solution}} = 710 \text{ mL isopropyl alcohol}$$

d) Seawater is about 3.5% sodium chloride. How many m³ of seawater contains 500.0 m³ of sodium chloride?

$$500.0 \text{ m}^3 \text{ sodium chloride} \times \frac{100 \text{ m}^3 \text{ seawater}}{3.5 \text{ m}^3 \text{ sodium chloride}} = 1.4 \times 10^4 \text{ m}^3 \text{ seawater}$$

e) Silicon makes up about 25.7% of the Earth's mass. If the Earth weighs about 5.9752x10²⁴ kg, what is the mass of silicon available for making stuff?

$$5.9752 \times 10^{24} \text{ kg Earth} \times \frac{25.7 \text{ kg silicon}}{100 \text{ kg Earth}} = 1.54 \times 10^{24} \text{ kg silicon}$$

f) The average human body is 2.9x10⁻⁴% gold. If the average human weighs 2250 troy-ounces, how many troy-ounces of gold are in the human body? If the price of gold is \$1257 per troy-ounce, how much is that gold worth?

$$2250 \text{ troy-oz human body} \times \frac{2.9 \times 10^{-4} \text{ troy-oz gold}}{100 \text{ troy-oz human body}} \times \frac{\$1257}{1 \text{ troy-oz gold}} = \$8.2$$