# Converting between micrograms, mg, g and kg

## Units and sizes:

### Units:
- microgram (or microg)
- mg = milligram
- g = gram
- kg = kilogram

### Sizes:
- 1000 microgram = 1 mg
- 1 microgram = 0.001 mg
- 1000 mg = 1 g
- 1 mg = 0.001 g
- 1000 g = 1 kg
- 1 g = 0.001 kg

### Scale:
Order of sizes (from the smallest on the left to the largest on the right):
- microgram, mg, g and kg

(Each unit is 1000 times larger than the one immediately to its left)
Rules for converting between units of micrograms, mg, g and kg:

- If you are changing from a smaller unit to the next larger unit (immediately to its right on the scale above) divide by 1000.

- If you are changing from a larger unit to the next smaller unit (immediately to its left on the scale above) multiply by 1000.

Some Worked Examples

For simplicity in the examples below the cancelling of units demonstrating how the final unit is arrived at has not been shown. If you wish to learn how to cancel units please refer to the included video lectures.

Example

Change 2.8 g to mg

1. Since you are changing a larger unit (g) to a smaller unit (mg) you must multiply by 1000:

   \[ \text{2.8 g} = 2.8 \times 1000 \text{ mg} \]

Using a calculator:

To solve this using a calculator enter:

\[ 2.8 \times 1000 = \]

which gives an answer of 2800.

\[ 2.8 \text{ g} = 2800 \text{ mg} \]
Without using a calculator:

2.8 x 1000

Since 1000 has 3 zeros move the decimal point 3 places to the right.

The first jump moves the decimal point from between the 2 and the 8 to immediately after the 8:

28.

The remaining 2 jumps to the right can be achieved by adding two zeros on to the end of the number ‘28’ giving:

2800

2.8 g = 2800 mg

Example

Change 1100 mg to g

1. Since you are changing a smaller unit (mg) to a larger unit (g) you must divide by 1000:

1100 mg = 1100 ÷ 1000 g
  = 1.1 g

Checking your answer:
- You know that 1000 mg = 1 g
- Your starting quantity of 1100 mg is slightly more than 1000 mg and therefore your final answer should be slightly more than 1 g
Example

Change 125 mg to g

1. Since you are changing a smaller unit (mg) to a larger unit (g) you must divide by 1000:

\[
125 \text{ mg} = \frac{125}{1000} \text{ g} = 0.125 \text{ g}
\]

Checking your answer:
- You know that 1000 mg = 1 g
- Your starting quantity of 125 mg is less than 1000 mg and therefore your final answer should be less than 1 g

Example

Change 0.36 kg to g

1. Since you are changing a larger unit (kg) to a smaller unit (g) you must multiply by 1000:

\[
0.36 \text{ kg} = 0.36 \times 1000 \text{ g} = 360 \text{ g}
\]

Checking your answer:
- You know that 1 kg = 1000 g
- Your starting quantity of 0.36 kg is less than 1 kg and therefore your final answer should be less than 1000 g

Example

Change 3250 microgram to mg

1. Since you are changing a smaller unit (microgram) to a larger unit (mg) you must divide by 1000:

\[
3250 \text{ microgram} = \frac{3250}{1000} \text{ mg} = 3.25 \text{ mg}
\]
3250 microgram = 3250 ÷ 1000 mg
   = 3.25 mg

Checking your answer:
- You know that 3000 microgram = 3 mg
- You also know that 4000 microgram = 4 mg
- Your starting quantity of 3250 micrograms is between 3000 micrograms and 4000 micrograms
- You therefore expect an answer between 3 mg and 4 mg

Example

Convert 0.125 mg to microgram

1. Since you are changing a larger unit (mg) to a smaller unit (microgram) you must multiply by 1000:

   0.125 mg = 0.125 × 1000 microgram
   = 125 microgram

Checking your answer:
- You know that 1 mg = 1000 microgram
- Your starting quantity of 0.125 mg is less than 1 mg and therefore your final answer should be less than 1000 micrograms

Example

Change 750 g to kg

1. Since you are changing a smaller unit (g) to a larger unit (kg) you must divide by 1000:

   750 g = 750 ÷ 1000 kg
   = 0.75 kg

Checking your answer:
- You know that 1000 g = 1 kg
Your starting quantity of 750 g is less than 1000 g and therefore your final answer should be less than 1 kg