

Pharmacy Technician Reference Pharmacy Conversions



Rx TECHEXAM

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The “Easy Way” to convert between units

Pharmacy Calculations rely on specific systems of measure and the pharmacy technician’s ability of quickly and accurately converting between them. There is a simple equation that can be used to convert between any two types of units.

For example, let’s assume you’re tasked with converting 7.5mL to units. First, you will need to know how many units there are in 1mL. There are 100u in 1mL.

Next, you’ll use the “Easy Way” to convert between units...

If I know there are 100u in 1mL how many units are in 7.5mL?

100 units is to 1mL as X units is to 7.5mL

100 units : 1mL = X units : 7.5mL

$$\frac{100\text{units}}{1\text{mL}} = \frac{X\text{ units}}{7.5\text{mL}}$$

To solve the conversion equation that you’ve set up, all you need to do is to

Cross-Multiply and Divide.

$$7.5\text{mL} \times 100\text{units} = 750$$

$$750 / 1\text{mL} = 750\text{ units}$$

By utilizing this simple way to set up conversions, you’ll have greater success in solving them. Once again, this equation can be adapted to solve most of the conversions you’ll be expected to know for the Pharmacy Technician Certification Exam® and while practicing in a Pharmacy.

Many students struggle mightily when trying to grasp the **Metric System**. Honestly, it is not as hard as you might think. Within the scope of Pharmacy Calculations, we are not concerned with distance. We will, however, need to be able to convert between units of volume and weight.

Volume is defined as the amount of space that a substance occupies. When we refer to volume, we are referring to liquid measure (example: 5mL).

In the Metric System, Volume has two units:

milliliters (mL) and liters (L)

There are 1000mL in every 1L

Weight is defined as the heaviness of matter of a substance.

When we refer to weight, we are referring to solid measure (example 5g).

In the Metric System, Weight has four units:

kilogram (kg), gram (g), milligram (mg), and microgram (mcg or μg)

There are 1000mcg in 1mg, 1000mg in 1g, and 1000g in 1kg

The easiest way to convert between units in the Metric System is to *move the decimal point*. When we go from a larger unit to a smaller unit we will move the decimal 3 units to the right (LSR – Larger to Smaller, move Right). When we move from a smaller unit to a larger unit we will move the decimal point 3 units to the left (SLL – Smaller to Larger move Left). Let's take a look at a couple of examples:

$$4.48357\text{L} = ?\text{mL}$$

Larger to Smaller move Right (LSR)

$$4.483\text{L} \longrightarrow 4483.57\text{mL}$$

$$25.754\mu\text{g} = ?\text{g}$$

Smaller to Larger move Left (SLL)

$$23.75\mu\text{g} \longrightarrow 0.00002375\text{g}$$

We moved 6 places, μg to mg to g

The **Apothecary System** originates from a Greek system of measure. Much like the Metric System, it concerns itself with both weight and volume. That said, many of the units in the Apothecary System have been phased out.

There is a very small unit of weight known as a grain (gr).

Be sure to note that a **gr** \neq **g** | (grain \neq gram)

1 grain (gr) = 64.8mg

You might be familiar with 5gr Tylenol[®] (325mg) or 10gr Tylenol[®] (650mg).

In respect to volume, there are two units – the fluid dram and the fluid ounce.

1 fluid dram \approx 5mL and can be represented in the following ways: $\overline{\text{ss}}$ i or 1fl dr.

1 fluid ounce \approx 30mL can be shown as follows: $\overline{\text{ss}}$ i or 1 fl oz.

The number of drams or fluid ounces is reflected by the Roman numeral to the right of the appropriate symbol. 1 dram is shown as: $\overline{\text{ss}}$ i | 5 drams is shown as: $\overline{\text{ss}}$ v

The **Avoirdupois System** originates from France and is commonly used today in the United States to describe units of weight. This system, unlike the Metric System and Apothecary System, does not have any units of volume.

There is only one conversion factor that you'll need to know for the Avoirdupois System:

1 pound (lb) = 16 ounces (oz)

Remember that an oz \neq fl oz (solid vs liquid)

Common Household Measurements include measures used in both cooking and everyday life. This system only concerns volume (liquid measure).

- Common Household Measurements -		
Unit	Abbreviation(s)	Conversion Factor
Teaspoonful	t or tsp	1t = 5mL
Tablespoonful	T or Tbsp	1T = 15mL
Fluid Ounce	fl oz.	1fl oz. = 29.57mL \approx 30mL
Pint	pt	1pt = 473mL \approx 480mL
Quart	qt	1qt = 2pt
Gallon	gal	1gal = 4qt

There are two systems of measure used to describe **Temperature: Celsius and Fahrenheit**. **Celsius** (centigrade) has been adopted in most countries and is based on the freezing point (0°C) and boiling point of water (100°C). **Fahrenheit** isn't as easily scaled, but for perspective, the freezing point of water is 32°F and the boiling point of water is 212°F.

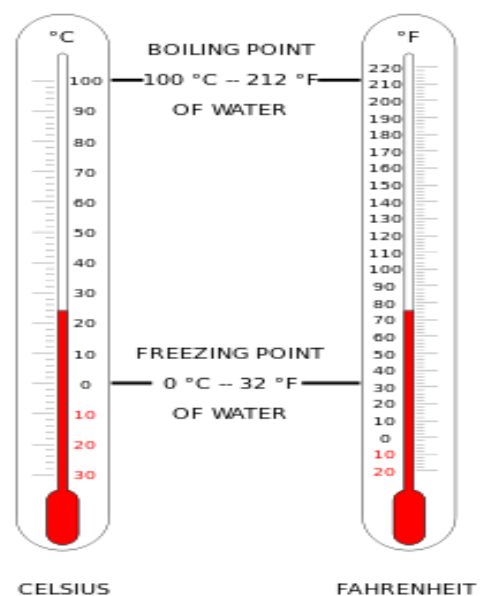
In order to convert between the two systems:

$$^{\circ}\text{F} = (^{\circ}\text{C} \times 9/5) + 32$$

$$^{\circ}\text{C} = (^{\circ}\text{F} - 32) \times (5/9)$$

If you prefer to only remember one equation:

$$9 \times ^{\circ}\text{C} = 5 \times ^{\circ}\text{F} - 160$$





Pharmacy Conversion Factors

Exact Liquid Measure

100units = 1mL

20gtts = 1mL

1cc or 1cm³ = 1mL

1 tsp = 5mL

1 Tbsp = 15mL

Ȓi = 5mL

1 fl oz = 29.57ml

Ȓi = 29.57mL

1pt = 473mL

1qt = 946mL

1qt = 2pt

1L = 1000mL

1gal = 3784mL

1gal = 4qt

Approximate Liquid Measure (if applicable)

-

-

-

-

-

-

1fl oz ≈ 30mL

Ȓi ≈ 30mL

1fl oz ≈ 480mL

-

-

-

1gal ≈ 4000mL

-

Exact Solid Measure

1000mcg or 1000Ȓg = 1mg

64.8mg = 1gr

1000mg = 1g

28.35g = 1oz

454.54g = 1lb

1000g = 1kg

2.2lbs = 1kg

Approximate Solid Measure (if applicable)

-

65mg ≈ 1gr

-

30g ≈ 1oz

480g ≈ 1lb

-

-

Do NOT use approximate measure when calculating a dose!

The ability to **convert between each of the systems** listed in this guide is critical!

Humalog Insulin
 10u sc am x30
 Q.S

Example A: if a prescriber writes:

You'll be tasked with dispensing the correct package size. While the patient and doctor measure insulin in units, pharmacy personnel dispense it in milliliters. Referring to the conversion table on the previous page,

1. You'll find that there are 100 units in every 1 mL

This can be rewritten 100 units : 1 mL

2. We want to know how many mL there are in 10u (per the prescription).

That can be rewritten 10 units : X mL

3. Combine #1 and #2

100 units : 1mL :: 10 units : X mL

(100 units is to 1mL as 10 units is to X mL

4. Now let's translate that into something we can solve:

$$\frac{100\text{units}}{1\text{mL}} = \frac{10\text{units}}{X\text{mL}}$$

5. Cross-Multiply and Divide

$$1\text{mL} \times 10\text{units} = 10 / 100\text{units} = 0.1\text{mL}$$

6. We've determined there are 0.1mL for every 100units

7. So now we know that the patient will administer 0.1mL daily for 30 days (3.0mL)

Example B:

? gtts = 8mL

1. Set up our conversion factor.

2. Set up our conversion.

3. Cross Multiply and Solve

$$20\text{gtts} \times 8\text{mL} = (160 / 1\text{mL}) = 160\text{gtts}$$

$$\frac{20\text{gtts}}{1\text{mL}} = \frac{X \text{gtts}}{8 \text{mL}}$$

Example C:

? lbs = 24kg

$$\frac{1\text{kg}}{2.2\text{lbs}} = \frac{24\text{kg}}{X \text{ lbs}}$$

1. Set up our conversion factor.

2. Set up our conversion.

3. Cross Multiply and Solve

$$2.2\text{lbs} \times 24\text{kg} = (52.8 / 1\text{kg}) = 52.8\text{lbs}$$

Example D:

? mL = 2pt

$$\frac{1\text{pt}}{473\text{mL}} = \frac{2\text{pt}}{X \text{ mL}}$$

1. Set up our conversion factor.

2. Set up our conversion.

3. Cross Multiply and Solve

$$473\text{mL} \times 2\text{pt} = (976 / 1\text{pt}) = 976\text{mL}$$

Example E:

? mg = 1.5gr

$$\frac{1\text{gr}}{64.8\text{mg}} = \frac{1.5\text{gr}}{X \text{ mg}}$$

1. Set up our conversion factor.

2. Set up our conversion.

3. Cross Multiply and Solve

$$64.8\text{mg} \times 1.5\text{gr} = (97.2\text{mg} / 1\text{gr}) = 97.2\text{mg}$$

Keys to remember when setting up conversions:

- Put the conversion factor on the left
- Notice how the units line up, same units on top, same units on the bottom
- Cross Multiply the only two numbers that are across from one another
- Divide that answer by the last number remaining
- Your answer will be the same unit as your variable (X).

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