Measurement Systems*

In addition to the metric system, two other measurement systems are used in pharmacology: the household measurement system and the apothecary system. The use of these other two measurement systems is limited. The household measurement system is not precise and the apothecary system is obsolete, so you'll only encounter these systems in rare or unique circumstances. (For example, should you be providing nursing care in a private home, the household measurement system might be in use.)

safeMedicate covers the most common conversions you'll have in a clinical setting: those involving the metric measurement system.

Though you'll rarely come across the other systems, you should be aware of them, and rely on a conversion table to help you make the mathematical computations necessary to deliver an accurate dose.

The Metric Measurement System

The Household Measurement System

The Apothecary Measurement System

Converting from One Measurement System to Another

The Metric Measurement System

The metric measurement system has volume measurements including liters (L), cubic milliliters (ml) and cubic centimeter (cc); its units of weight are (kg), grams (g), milligrams (mg) and micrograms (mcg).

Below is a table displaying the metric volume and weight measurements and their equivalents:

VOLUME	EQUIVALENT		WEIGHT	EQUIVALENT
1 milliliter (mL)	0.001 liter		1 milligram (mg)	0.001 gram (g)
1 centiliter (cl)	0.01 liter		1 centigram (cg)	0.001 gram(g)
1 deciliter (dl)	0.1 liter		1 decigram (dm)	0.1 gram (g)
1 kiloliter (kl)	1000 liters		1 kilogram (kg)	1000 grams (g)
1000 milliliters (mL)	1 liter		1 kilogram (kg)	2.2 pounds (lbs)
1 milliliter (mL)	cubic centimeter (cc)		1 pound (lb)	43,592 milligrams (kg)
10 milliliters (mL)	1 centiliter (cl)		1 pound (lb)	45,359.237 centigrams (cm)
10 centiliters (cl)	1 deciliter (dl)		1 pound (lb)	4,535.9237 decigrams (dg)
10,000 deciliters (dc)	1 kiloliter (kl)			

*Our thanks to RegisteredNursing.Org for the conversions and a discussion of their use

The Household Measurement System

The household measurement system is typically only used for patients who are in the home and not in a hospital or another healthcare facility. It is the least precise of all the measurement systems. Measurements used in the household measurement system include teaspoons, tablespoons, drops, ounces, cups, pints, quart, gallons, and pounds:

UNIT OF MEASUREMENT	APPROXIMATE EQUIVALENT(S)
1 teaspoon	1 teaspoon = 60 drops (gtt) 1 teaspoon = 5 mL
1 tablespoon	1 tablespoon = 3 teaspoons 1 tablespoon = 15 mL
1 fluid ounce	1 fluid ounce = 2 tablespoons 1 fluid ounce = 30 mL
1 ounce (weight)	16 ounces = 1 pound 1 ounce 30 g
1 cup	1 cup = 8 ounces 1 cup = 16 tablespoons 1 cup = 240 mL
1 pint	1 pint = 2 cups 1 pint = 480 mL
1 quart	1 quart = 2 pints 1 quart = 4 cups
1 gallon	1 gallon = 4 quarts 1 gallon = 8 pints 1 gallon = 3,785 mL
1 pound	1 pound = 16 ounces 1 pound = 480 g

The Apothecary Measurement System

In North America, this system has been largely discontinued. The United States abolished this system in the 1970s.

However, some drugs labels still have some of these units printed on their labels, and occasionally you may work with a doctor who still writes some drug orders in this system, especially for particular drugs (for example, certain desiccated thyroid medications and aspirin have both traditionally been measured in grains). Because of this, it is important that you are aware of this system so that you can identify if a drug order has the potential to be misinterpreted.

If you see a drug order written using the apothecary system, it would be reasonable to question it to be sure that you are interpreting it correctly.

The apothecary measurement system has weight measurements like grain (the basic measurement), dram, ounce, scruple, and pound. The volume units of measurement in the apothecary measurement system are a minim (the basic measurement), fluid ounce, a pint, a fluid dram, a quart and a gallon.

Lower case Roman numerals are used in this system of measurement and these Roman numerals follow the unit of measurement. For example, 4 grains is written as gr iv.

Below is a table showing the weight and volume apothecary system measures and their approximate equivalents:

WEIGHT	APPROXIMATE EQUIVALENT (S)		VOLUME	APPROXIMATE EQUIVALENT (S)
1 grain (gr)	Weight of a grain of wheat 60 mg		1 minim	Quantity of water in a drop 1 grain
1 scruple	20 grains (gr xx)		1 fluid dram	60 minims
1 dram	3 scruples		1 fluid ounce	8 fluid drams
1 ounce	8 drams		1 pint	16 fluid ounces
1 pound	12 ounces		1 quart	2 pints
			1 gallon	4 quarts

Converting from One Measurement System to Another

Converting one system of measurement to another system of measurement requires that you know, or you are able to look up, the equivalent unit of measurement for the different systems of measurement.

METRIC	APOTHECARY	HOUSEHOLD
1 milliliter	15-16 minims	15-16 drops
4-5 milliliters	1 fluid dram	1 teaspoon or 60 drops
15-16 milliliters	4 fluid drams	1 tablespoon or 3-4 teaspoons
30 milliliters	8 fluid drams or 1 fluid ounce	2 tablespoons
240-250 milliliters	8 fluid ounces or 1/2 pint	1 glass or cup
500 milliliters	1 pint	2 glasses or 2 cups
1 liter	32 fluid ounces or 1 quart	4 glasses, 4 cups or 1 quart
1 milligram	1/60 grain	
60 milligrams	1 grain	
300-325 milligrams	5 grains	
1 gram	15-16 grains	
1 kilogram		2.2 pounds