

The Avoirdupois System

The avoirdupois system is used in commerce to supply bulk chemicals and other items by weight, in ounces or pounds (e.g., epsom salts).

The grain is the same weight in the apothecary and avoirdupois systems. However, the ounce and the pound in the two systems differ in the number of grains per unit. The apothecary ounce contains 480 grains, whereas the avoirdupois ounce contains 437.5 grains. The apothecary pound contains 5,760 grains, whereas the avoirdupois pound contains 7,000 grains. Also, the symbols for the ounce and pound are different in the two systems.

Table of Avoirdupois Measure of Weight

437.5 gr	=	1 oz
16 oz (7,000 gr)	=	1 lb

oz, avoirdupois ounce.

Intersystem Conversion

A pharmacist may convert the weight, volume, or dimensions of length from one system to another with conversion factors. Depending on the circumstances and requirements for accuracy, conversion factors of different exactness may be used. The following is a table of the factors commonly used in prescription practice. They are exact equivalents rounded off for practical application. Exact equivalents, used in the conversion of specific quantities in pharmaceutical formulas, may be found in the USP.

Useful Conversion Equivalents of Weight

1 g	=	15.432 gr
1 kg	=	2.2 lb (avoir)
1 gr	=	0.0648 g or 64.8 or 65 mg
1 ℥	=	31.1 g
1 oz (avoir)	=	28.35 g
1 lb (apoth)	=	373.2 g
1 lb (avoir)	=	453.6 or 454 g

Useful Conversion Equivalents of Volume

1 mL	=	16.23 ℥
1 ℥	=	0.06 mL
1 ℥	=	3.69 mL
1 ℥	=	29.57 mL
1 pt	=	473 mL
1 gal (US)	=	3,785 mL
1 gal (British Imperial)	=	4,546 mL

Useful Conversion Equivalents of Length

1 in	=	2.54 cm
1 m	=	39.37 in

Today, there are very few occasions on which intersystem conversion is needed, owing to the almost exclusive use of the metric system in both product formulation and prescription compounding. However, when conversion is necessary or desired, it is a simple matter of selecting and applying the appropriate intersystem conversion factor.

For example, if one wishes to determine the number of milliliters in 8 ℥, the conversion factor that most directly relates milliliters and fluidounces is selected. That factor is 1 ℥ = 29.57 mL; thus, 8 ℥ = 8 × 29.57 mL, or 236.56 mL.

Another example: How many 30-mL containers may be filled from 10 gal of a formulation? 1 gal is equal to 3,785 mL. Thus, 10 gal = 10 × 3,785 mL, or 37,850 mL. By dividing this total number of milliliters by 30, the number of containers that may be filled is found to be 1,261.

Another example: How many 0.5-gr tablets may be prepared from 1 kg of a drug substance? Since 1 gr = 64.8 mg, 0.5 gr = 32.4 mg. Also, 1 kg = 1,000 g, or 1,000,000 mg. Since 32.4 mg is required for one tablet, 1,000,000 mg divided by 32.4 mg = 30,864 tablets. Hence, 30,864 tablets may be prepared from 1 kg of the drug substance.

A final example: If a transdermal patch measures 30 mm², what is this dimension in inches? The conversion factor, 1 in equals 25.4 mm, may be expressed as 1 in = 25.4 mm. Thus, by dividing 30 mm by 25.4 mm/in, one finds the patch is 1.18 in².