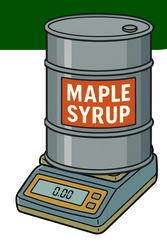
ARE YOU ABLE TO ACCURATELY ESTIMATE YOUR SYRUP VOLUMES BASED ON THE MASS OF A BARREL?

To calculate the volume of syrup in your barrels, you can weigh the barrel before and after filling. Simple, you say? Yes, as long as you understand and follow certain basic principles...

1. SOME DEFINITIONS TO KNOW



1. MASS

Mass is the amount of matter, measured using a balance. It can be expressed in grams (g), kilograms (kg), pounds (lbs).

2. VOLUME

Volume is the space occupied by matter. It can be measured with a graduated container, such as a measuring cup. It can be expressed in liters (L), imperial gallons (imp gal), and US gallons (US gal).

3. RELATIVE SPECIFIC WEIGHT (DENSITY) OF A LIQUID

Ratio of the mass of a volume of solution to the mass of an equal volume of pure water.

- ✔ Water has a specific weight of 1 kg/L or 10 lbs/imp gal
- ✔ The more sugar a solution contains (sap, concentrate, Maple Syrup), the higher its specific gravity
- ✔ This data is readily available using the Maple Converter. Further information on the calculation method can also be found in the dedicated fact sheet on the subject: Calculating Specific Weight *(in French Only)*

2. HOW DO YOU CALCULATE A VOLUME FROM A MASS?

The following formulas can be used to calculate the volume of syrup in a barrel from its mass. Be careful to use the correct units!

$$\text{Volume (L)} = \frac{\text{Mass of syrup (kg)}}{\left(\text{Specific weight of water } \left(1 \frac{\text{kg}}{\text{L}}\right) \times \text{Density of syrup (adjusted to its °Brix)}\right)}$$

$$\text{Volume (gal imp)} = \frac{\text{Mass of syrup (lb)}}{\left(\text{Specific weight of water } \left(10 \frac{\text{lb}}{\text{gal imp}}\right) \times \text{Density of syrup (adjusted to its °Brix)}\right)}$$

3. EXAMPLE – COMPARISON OF 3 CASES

We have a barrel with an empty mass of 22 kg (48 lb), but filled with syrup it weighs 182 kg (400 lb). The mass of the syrup in the barrel is: **Mass of syrup = 182 kg - 22 kg = 160 kg (or 352 lb)**. We will use the same barrel, with the same mass, but with three different Brix values.

CASE 1 – The Brix of the syrup is 64.5 (density = 1.3157)

Volume (L) = 160 kg / (1 kg/L × 1.3157) = **121.6 L of syrup**

Volume (gal imp)= 352 lb /(10 lb/gal imp × 1.3157) = 26.8 gal imp de sirop

CASE 2 – The Brix of the syrup is 66.0 (density = 1.3248)

Volume (L) = 160 kg / (1 kg/L × 1.3248) = **120.8 L of syrup**

Volume (gal imp)= 352 lb /(10 lb/gal imp × 1..3248) = 26.6 gal imp de sirop

CASE 3 – The Brix of the syrup is 67.5 (density = 1.3340)

Volume (L) = 160 kg / (1 kg/L × 1.3340) = **119.9 L** of syrup

Volume (gal imp)= 352 lb / (10 lb/gal imp × 1.3340) = 26.4 gal imp de sirop

REMEMBER THIS!

For the same mass of syrup, the higher the Brix value, the lower the corresponding volume.

4. PRECAUTIONS!

This calculation provides a good estimate of the volume, but certain things can cause the actual volume to vary.

A deformed or dented barrel, either due to the effect of heat during filling, or due to a break in the structure, can affect the volume of syrup inside.

Microbial degradation of syrup can change its density. For example, a stringy or viscous syrup is denser, which affects the measurement of mass and specific weight.