

EXPRESSION OF EXTRACT OF DISTILLING MALTS ON A PERCENTAGE BASIS: CHANGES IN RELATIONAL FACTORS FOLLOWING THE 1979 REVISION OF THE JOB METHOD OF EXTRACT DETERMINATION

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Submitted on behalf of the Analysis Committee

The derivation of the factor linking excess gravity with % soluble extract and also the factor relating the expression of hot water extract by either % soluble extract or litre degrees/kg is described. The effect of the 1979 revision to the temperature of the specific gravity determination on these factors is highlighted and a modified value for each is advanced.

Key Words: *Malt, malt analysis result, malt extract, computation.*

Following metrication the brewing industry adopted litre degrees/kilogram as the unit for expression of the hot water extract of malt¹. Conversely, a large part of the distilling industry chose to define extract as a percentage of malt. This generated a need to interrelate extracts expressed by the two methods. Experimentally, the solution divisor for the conversion of litre degrees/kg to % soluble extract (% SE) was determined at 3.87 degrees of excess gravity (G) per gram of extract in 100 ml of wort².

Using this solution divisor it was possible to determine the factor relating excess gravity and % soluble extract given that the solution volume is 506.5 ml for 50 g malt as follows:

$$\begin{aligned}\% \text{ soluble extract} &= \frac{G}{3.87} \times \frac{506.5}{100} \times \frac{100}{50} \\ &= G \times 2.618\end{aligned}$$

Subsequently, in 1979, the Analysis Committee changed the temperature of measurement from 60°F to 20°C³. This had the effect of reducing the excess gravity of malt extract solutions by 0.16 degrees (20/20) with a consequential effect on the magnitude of the solution divisor. This is illustrated by the following example:

Excess gravity of 30.00 at 60°F is equivalent to an excess gravity of (30.00–0.16) = 29.84 at 20°C

$$\therefore \text{solution divisor recalculates to } \frac{29.84}{30.00} \times 3.87 = 3.849$$

This recalculated value of the solution divisor is correct to two places of decimals over an excess gravity range of 24.46

to 38.86 measured at 20°C (extracts of 248 to 393 litre degrees/kg).

The factor relating excess gravity to % soluble extract to be recalculated:

$$\begin{aligned}\% \text{ soluble extract} &= \frac{G}{3.85} \times \frac{506.5}{100} \times \frac{100}{50} \\ &= G \times 2.631\end{aligned}$$

CONCLUSIONS

1. The hot water extract (HWE) of a 515 ml mash, expressed as % soluble extract, may be calculated from the formula

$$\begin{aligned}\text{HWE "as is" (\%SE)} &= G \times 2.63 \\ \text{where } G &\text{ is measured at } 20^\circ\text{C}.\end{aligned}$$

2. Hot water extract (litre degrees/kg) determined by specific gravity measurement at 20°C may be expressed as hot water extract (%SE) from the formula

$$\text{HWE (\%SE)} = \frac{\text{HWE (litre degrees/kg)}}{3.85}$$

REFERENCES

1. Institute of Brewing, Recommended Methods of Analysis, 1977, Method 2.3 p. 11.
2. Dewar, E. T., "Expression of Extract of Malt as a Percentage of Total Malt" in Pentlands Scotch Whisky Research Technical Report No. 8052, 1978, Section A, p. 28.
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