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Getränkeanalytik

Determination of alcohol content in wines and fermented mashes

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Technical information and instructions for use

General notes:

The alcohol content in wines and fermented mashes for fruits or grains cannot be determined directly areometrically by means of alcoholometers ("spindles"). The extract substances contained in these liquids (sugar, proteins, tanning agents, etc.) falsify the measured results. Yet the declaration of the alcohol contents of wines has to be indicated with a tolerance of $\pm 0.5\%$ vol A. The precision required by the legislator can indeed be achieved with a thoroughly executed **sample distillation** and subsequent areometrical alcohol measurement of the distillate by using suitable EU alcoholometers.

Normal **wines** may be determined directly by the sample distillation without any problems. Wines rich in sugar or ethanol should be diluted with water according to the table on the reverse page.

Because of their viscous consistency **mashes** represent problems with regard to the determination of the alcohol content. Already when measuring the sample volume to be distilled, minor faults can lead to imprecise results.

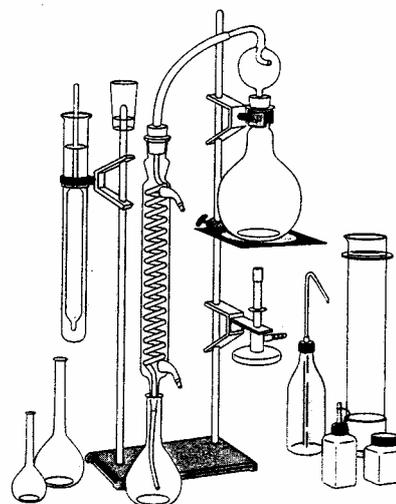
Taking several litres of a representative sample of average composition from a fermentation vessel should be done after thoroughly mixing. This sample must be tempered to 20°C and mixed again before measuring the sample for the sample distillation by use of a measuring cylinder.

The distillation proves to be difficult when diluting the sample insufficiently, since the mash tends to burn at the bottom of the boiling flask. If an insufficient volume is distilled over, the determined alcohol content is too low.

The method developed by Schliessmann for the determination of the alcohol contents in mashes by a sample distillation takes the above-mentioned particularities of mashes into account.

Preparation of the sample distillation equipment:

- Screw aluminium bars onto the plate stand.
- Attach the heating source to the longer aluminium bar (stand heating plate SH 85 or gas burner with ceramic wire netting) and the round clamp with quick opener for the distillation flask.
- Attach the cooler to the shorter aluminium bar by means of the round clamp. The standard ground joint must show upward.
- Connect the cooler with the enclosed hoses and transmission pieces to the water conduit. The water is supplied at the lower connection piece, the water discharge at the upper one.
- Place the distillation attachment with the plug at the hose end onto the cooler.



ill. 1: Sample distillation equipment

Instructions for the determination of alcohol in wines and fermented mashes:

- Fill the 500-ml measuring cylinder up to the 200-ml mark with the sample of mash or to the 300-ml mark with the sample of wine. Wines rich in alcohol or sugar may be measured in the 200-ml measuring flask.
- Pour the sample completely into the distillation flask without leaving any residues. For this please rinse measuring cylinder with distilled water from the quantities given in the table and add it into the distillation flask.
- To avoid burning and forming of foam during distillation, add 8-10 small boiling stones of type A and 2-3 drops of silicone antifoam solution into the distillation flask.
- Fill approx. 5 ml of distilled water into the receiver flask (200 ml measuring flask) and place the flask in such a way underneath the cooler that the silicone hose at the outlet plug of the cooler reaches into the neck of the measuring flask and just touches the water surface.
- To avoid alcohol losses by evaporation it is recommendable to place the receiver flask into a container filled with an ice/water mixture. The receiver flask can be weighted with lead rings to prevent it from tumbling down.
- Connect distillation flask to the distillation attachment. Make sure that the connection is absolutely tight.
- Switch-on water-cooling.
- Switch-on heating source (stand heating plate SH 85 to level 12).
- As soon as the receiver flask is half filled, it has to be placed in such a low position that the silicone hose at the cooler end reaches in the flask only up to the ring mark and the distillate drops freely.
- Remove receiver flask as soon as it is filled up to approx. 2 cm underneath the ring mark (duration approx. 45-60 minutes).
- Switch-off heating source.
- Close receiver flask tightly with a rubber plug and temper it to 20°C (at least 30 minutes in the water bath).
- Refill with distilled water exactly up to the ring mark (compare ill. 2).

- Close flask again, shake it well, adjust the mark for a second times and transfer liquid completely into the dry spindle cylinder 360 x 36 mm.
- Determine alcohol content with alcoholometer of EU class III according to DIN 12803. Read temperature of the sample and implement, if necessary, a temperature correction by means of the official alcohol tables.

The alcohol content of the sample is obtained by multiplying the measured value of the distillate (% vol A) at 20°C with the dilution factor from the table:

alcohol content = measured value of distillate x dilution factor

Example:

For the determination of an apple cider 200ml of distillate have been recovered from a sample of 300ml.

measured value of distillate: 8,2 % vol A (at 20°C)
dilution factor: 0,67

alcohol content:

$$8,2 \% \text{ vol A} \times 0,67 = 5,5 \% \text{ vol A}$$

Analytical conditions and dilution factors:

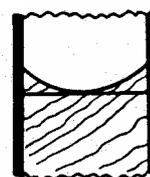
sample material	sample volume	added water volume	dilution factor
liquid mash	200 ml	100 ml	1
viscous mash	200 ml	200 ml	1
wine	300 ml 200 ml	- 100 ml	0,67 1

Special note:

Halving all volumes will reduce the distillation time to the half. Thus 100 ml of distillate are recovered in a 100-ml measuring flask.

The distillate is tested by means of an alcoholometer for 100 ml of distillate in a spindle cylinder 250 mm x 30 mm.

Reading



„Meniscus on mark“

ill. 2: Reading of the meniscus