Alcoholic Strength in Cream liqueur

Reference: **COMMISSION REGULATION (EC) N° 2870/2000**

Tested with **VELP Scientifica UDK 129 Automatic Kjeldahl Distillation Unit** (Code F30200120)

Introduction

A cream liqueur is a liqueur that includes dairy cream and a generally flavorful liquor among its ingredients. Probably the most famous cream liqueur is the Irish Cream. Irish Cream is a spirit drink with a minimum alcohol by volume of 15% v/v. Irish Cream Liqueur consists of a mixture of fresh Irish dairy cream, alcohol, together with sugar and/or honey or other sweetening agent (carbohydrates, flavorings and other ingredients) and contains Irish Whiskey. The levels and percentage of each ingredient present may vary, thus contributing to brand individuality.

Alcoholic Determination in Cream liqueur

Steam distillation is a method to determine the alcoholic strength in cream liqueur: the distillate obtained is an ethanol-water mixture and, using a measurement of density by a pycnometer and expressing the results through the official tables, the alcoholic strength can be calculated.

Sample

Irish Cream
Alcoholic strength by volume (labeled value): 17.0% vol

Sample Preparation

In order to homogenise the Irish Cream, stir gently the sample (1000 ml in a 2000 ml flask) with a VELP magnetic stirrer: i.e. AREX-6 Digital PRO (code A00000285).

Chemicals and Equipment

- Alcoholic strength kit (code A00000285) composed by:
    - Tweezer for closing the NaOH tube
    - Kjeldahl balloon 500 ml for the distillation of sample (Code A00000082)
- Pycnometer (volume 100 ml or 50 ml)
- 200 ml volumetric flasks with stopper
- KjTabs VS Antifoam - 1000 pcs/box (code A00000283)
- Analytical balance (0.1 mg sensibility)
- Cooled Incubator (VELP Scientifica FOC Series i.e. code F10400325)

Procedure

Measure out 200 ml of Irish Cream using a graduated flask and thermostat it at 20°C.
Let the sample adjust to temperature, this will take about 15 minutes.
Bring down the volume of the sample exactly 200 ml by taking away excess sample by a small pipette.
Transfer the liquids to the 500 ml test tube with one KjTabs VS Antifoam.
Rinse the volumetric flask with distilled water (3 x 10ml) in order to collect all the mixture residues and transfer it into the 500ml test tube.
Add 10 ml of distilled water as receiving solution in the same volumetric flask and place it in a beaker filled with cold water and ice.
Insert the distillate outlet tube (it must be put in contact with the receiving solution) and fix it well using Parafilm.

Distillation

Collect the distillate in the 200 ml graduated flask used to measure the sample quantity.
Preheat the UDK 129 performing a wash down (about 7 minutes).
Start the distillation according to the parameters below:
· NaOH: 0 ml**
· Sample volume: 200 ml
· Sample tube: 500 ml
· Distillation time: 7-9 minutes

** Close the NaOH tube using the tweezer received inside the Alcoholic strength kit.
In UDK 129 settings, set a distillation time to obtain a maximum of 200 ml of distillate. After the distillation, position the receiving flask in the thermostat for about 15 min and finally bring up to volume (200 ml) using distilled water at 20 °C.

Density of the Distillate

Measure the density of the distillate through a pycnometer:
1. Weigh the empty pycnometer, clean and dry, with all parts in place (M_{pyc} in g)
2. Weigh the pycnometer filled with the distillate at 20 °C (M_{dist} in g)
3. Calculate the density of the distillate at 20 °C ($D_{dist\ 20°C}$) following the formula:

$$D_{dist}\ 20°C = (M_{dist} - M_{pyc}) / (V_{pyc} \times 1000)$$

V_{pyc} (m^3) is the volume of the empty pycnometer and is calculated as follows:

$$V_{pyc} = (M_{pyc,\ H2O} - M_{pyc}) / (\rho_{H2O,20°C} \times 1000)$$

Where:

$M_{pyc,\ H2O}$ = pycnometer weight filled with water at 20 °C (g) $\rho_{H2O,20°C}$ = density of the water at 20 °C (0.99823 g/ml)

4. Use the density table to express the results
5. Among measurements rinse the pycnometer with the next alcoholic solution.
6. During the entire procedure take care to avoid fat from fingertips, temperature changes when holding the pycnometer and air bubbles in it.

Typical Results of Irish Cream

Sample quantity (ml)	Alcohol strength (% vol) **
200	17.57
200	17.45
200	17.55
200	17.48
200	17.50
Average ± SD%	**17.51 ± 0.04**
RSD% *	**0.25**

* RSD% = (Standard Deviation x 100) / Average
** The tables in the official standard method (Recommendation n°22 of the International Legal Metrology Organization suggested by Reg. EC 2870/2000) have been used

For the verification of the distillation apparatus, the Reg. EC 2870/2000 specifies that, distilling 200 ml of an ethanol water mixture with an alcoholic strength of 50% vol., the loss of alcohol must be smaller than 0,1% vol.
The UDK 129 satisfies completely the Reg. EC 2870/2000.

Conclusion

The obtained results are reliable and reproducible in accordance with the expected values, with a low relative standard deviation (RSD < 1%), that means high repeatability of the results.

Benefits of UDK 129 are:
- High level of precision and reproducibility
- High productivity
- Worldwide official method
- Reliable and easy method
- Time saving
- Affordable equipment cost
- Moderate running costs