SIRROMET
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Sirromet Wines Pty Ltd
850-938 Mount Cotton Rd
Mount Cotton Queensland
Australia 4165
www.sirromet.com

Courtesy of Jessica Ferguson
Assistant Winemaker & Chemist

Estimation of Alcohol Content – Boiling Method

Chemical Concepts and Techniques:

This method can be used as a simpler, alternative method to the distillation method or to confirm results obtained through the distillation and hydrometry method.
This method follows a similar process to the distillation method, however, uses the difference in specific gravity of the wine sample before and after the alcohol has been removed by boiling. Less specialised glassware is required, therefore it is an easier method to perform in the classroom.

Equipment Required:

Heat source – Hotplate, Bunsen burner or heating mantle
Boiling flask – 500mL capacity, round bottomed (Bunsen burner/heating mantle) or flat bottomed (hot plate)
Vertical Splashhead (optional)
Tripod and **gauze mat** (optional – if using a Bunsen burner)
250mL volumetric flask
Retort stands and **clamps** appropriate to set up equipment as described
250mL hydrometer flask or suitable measuring cylinder
Controlled temperature bath at 20°C (or set air-conditioning to 20°C)
SG hydrometer of appropriate scale – 950-1050 probably appropriate.

Reagent Preparation:
Distilled water

Method:

1. Using a hydrometer of appropriate scale, measure the specific gravity of the wine sample. Correct for temperature if necessary. Record the specific gravity value as $\mathbf{SG_1}$

2. Measure out exactly 250ml of the wine sample in a 250 ml volumetric flask, at 20ºC.

3. Transfer the wine to the boiling flask. Use a couple of distilled water rinses to remove wine residues from the volumetric flask into the boiling flask.

4. Add some boiling granules to the boiling flask to prevent bumping when boiling the contents. Connect the boiling flask to a retort stand, over the heat source. A vertical splash head may be fitted if desired.

5. Apply heat to the bottom of the boiling flask and boil the wine down to approximately 125ml. If the heat from the burner is too local or intense, position a tripod and heat diffuser (gauze), to disperse the applied heat, between the heat source and boiling flask.

6. Allow the wine to cool down and quantitatively transfer the remaining wine into the original 250ml volumetric flask. Rinse out the boiling flask with a few rinses of distilled water and add to the volumetric flask.

7. Dilute the contents of the volumetric flask with distilled water to just under the 250 ml graduation mark. Bring to 20^{o}C in a controlled temperature water bath, then dilute to volume with distilled water. Mix well.

8. Use a small amount the collected, diluted distillate to rinse a clean 250ml measuring cylinder. Then fill a 250ml measuring cylinder with the distillate.

9. Measure the specific gravity of the alcohol depleted wine solution using the specific gravity hydrometer. Correct for temperature if required and record the reading as **SG_2**.

10. Using the equation below to calculate the alcohol concentration of you wine sample and record the result.

$$\textbf{Alcohol (\% v/v)} = (SG_2 - SG_1) / 2.11 * 1000$$

Points to Consider:

- This method gives only a rough estimation of alcohol content.
- Other wine components such as acids, pigments, phenolic and especially sugars contribute to the specific gravity and affect the accuracy of the result.
- Note that the boiling of the wine may cause some degradation, due to heat, of other wine components, meaning that their contribution to the wine SG may be different after boiling than before, therefore introducing further error.

References:

http://www.monashscientific.com.au/AlcoholTopics.htm