

## ***Can Alcolout really keep you from getting inebriated?***

### **Introduction**

These days, what that one can find most frequently on TV or in magazines / newspapers are the advertisements of various commercial products with almost-magical functions. One good example is Alcolout, which is claimed to be effective in absorbing rapidly the alcohol content in stomach and hence protecting the stomach and liver from alcohol intoxication. As we are curious about its efficacy and our survey results have revealed its popularity, we have carried out an investigation on it.



Our subject of investigation

### **Objective**

To investigate and compare the effectiveness of Alcolout in reducing ethanol content of alcoholic beverages of different types and alcohol percentages

### **Chemical principles**

To find out its efficacy, we can check the extent to which the ethanol content in a sample is reduced by Alcolout. Our experiment is based on the redox reaction between ethanol and acidified potassium dichromate:

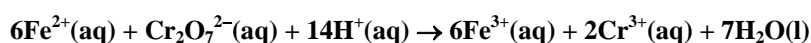


Samples undergoing oxidation



Crystals of ammonium iron(II) sulphate-6-hydrate

An excess of standard potassium dichromate is used so that back-titration with ammonium iron(II) sulphate can be carried out:



Knowing the amount of ammonium iron(II) sulphate needed for titration, the amount of potassium dichromate that remains unreacted after oxidizing ethanol, the amount of potassium dichromate that has reacted with ethanol and hence the ethanol content of the original alcoholic beverage sample can be determined.

### **Summary of experimental procedures**

#### **Part I: Checking the accuracy of the back-titration method**

A known mass of absolute alcohol was dissolved in water and diluted. Samples were withdrawn and oxidized by excess standard potassium dichromate at two different conditions: heating under reflux at 60°C for 30 minutes and leaving to stand at room temperature for 24 hours. Both resulting solutions were then titrated with ammonium iron(II) sulphate solution to determine the mass of absolute alcohol originally present in the sample.

Part II: Preliminary determination of alcohol content of wine samples

Each of the wine samples\* was diluted to a certain extent. Samples were withdrawn and oxidized by excess standard potassium dichromate at room temperature for 24 hours. The resulting solutions were then titrated with ammonium iron(II) sulphate solution to determine the %ethanol originally present in the sample.

\*Wine samples include vodka, rice wine, sake, gin, Er Guo Tou and white wine.

Part III: Study of wine samples with and without treatment of Alcolout in an environment simulating human stomach

1. Each of the wine samples was added to an environment simulating the human stomach and allowed to carry out its functions for two hours.
2. A control of the same composition, however, without Alcolout was set up for comparison.
3. Samples were treated as in Part II.



Semi-solid jelly-like substances formed

Part IV: Blank titrations for eliminating interference to oxidation

Solutions, without wine samples, were treated exactly the same as in Part III. The number of moles of potassium dichromate consumed by chemicals other than ethanol was then determined.

Part V: Study of the SGS test reports claimed to be surpassed by Alcolout

A test report titled 'Study of the prevention and treatment effect for acute ethanol-induced intoxication in mice by the submitted sample said to be Konjac Glucomannan' was studied.



SGS reports

**Results**Part I: Checking the accuracy of the back-titration method

	% ethanol (theoretical)	% ethanol (experimental)
Sample (heated under reflux)	99.7-100	101
Sample (left to stand overnight)	99.7-100	101

Part II: Preliminary determination of alcohol content of wine samples

Sample	% ethanol on label	% ethanol found
Smirnoff Premium Vodka No.21	40	40.5
Pearl River Bridge Kwangtung Mijiu, 珠江橋牌廣東米酒	~29	30.0
Er Guo Tou (北京二鍋頭)	56	56.2
Gordon's London Dry Gin	43	46.3
ChungHa Cold Sake	13	19.4
Vin Du Tonneau White Table Wine	11	15.7

Part III: Study of wine samples with and without treatment of Alcolout in an environment simulating human stomach

Sample	% ethanol without treatment of Alcolout	% ethanol with treatment of Alcolout
Smirnoff Premium Vodka No.21	39.9	28.4 (↓ 11.5)
Pearl River Bridge Kwangtung Mijiu 珠江橋牌廣東米酒	29.3	15.8 (↓ 13.5)
Er Guo Tou (北京二鍋頭)	54.9	43.1 (↓ 11.8)
Gordon's London Dry Gin	43.2	32.0 (↓ 11.2)
ChungHa Cold Sake	19.4	14.5 (↓ 4.9)
Vin Du Tonneau White Table Wine	14.5	9.4 (↓ 5.1)

Part IV: Blank titrations for eliminating interference to oxidation

	H <sub>2</sub> O	HCl	Alcolout	Temperature	% change in amount of K <sub>2</sub> Cr <sub>2</sub> O <sub>7</sub>
Blank 1	100.0	5.0	3 capsules	37°C	-2.62 %
Blank 2	100.0	5.0	×	37°C	-1.00 %
Blank 3	105.0	×	3 capsules	37°C	-1.81 %

Part V: Study of the SGS test reports claimed to be surpassed by Alcolout

At least two typing errors / wrong interpretations were found. Number of mice was found to be inconsistent in each test. Moreover, some results violating the claims in the advertisement of Alcolout were found. (Details would be disclosed in the final round of the competition!)

Conclusion

1. Back-titrating unreacted dichromate with standardized ammonium iron(II) sulphate solution was an accurate method of determining ethanol content of a sample.
2. Almost complete oxidation of ethanol took place in both conditions: heating the mixture under reflux at 60°C and standing overnight.
3. Alcolout was able to greatly reduce ethanol content of vodka, rice wine, Er Gou Tou and gin.
4. The decreases in ethanol content of sake and white wine were less significant.

