

## PROPYLENE GLYCOL (PG) IN ALCOHOLIC BEVERAGES

Propylene Glycol (PG) can be used as a food additive and is widely accepted as safe for human consumption at low levels. The WHO (World Health Organisation) have set the maximum permissible daily intake of propylene glycol as a food additive at 25 mg/kg bodyweight. PG comes in several grades with Food Grade PG, often used in the external chilling systems of breweries, as well as ice-cream production, amongst others. The brewing industry standard requires that PG used within the chilling system must be food grade at a concentration no less than 25% by volume. This mix of PG and water enables the brewer to achieving cooling temperatures between -2.7 and -3.3°C (25-27°F). Contamination of beer can occur due to a damaged vessel wall or pipework, resulting in PG from the coolant jacket entering the beer stream. In Europe, authorities are very cautious about acceptable uses of PG within the cosmetics and food industry and is limited to mostly non-food applications. Those that are permitted are very limited and it is not currently approved for the addition to beer. There is, however, an EU 1 g/kg limit in food (additive number E1520).

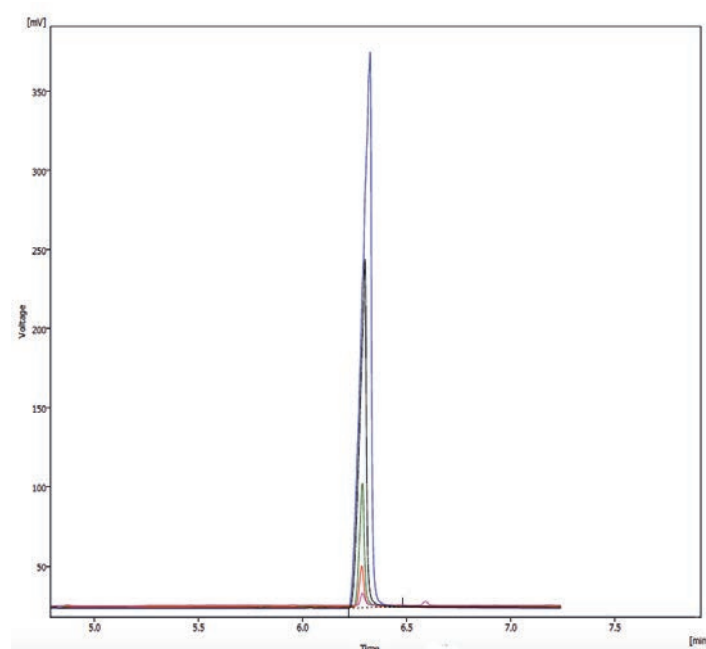


Figure 1. A chromatogram of a 0.5 µl injection of 700 ppm solution of Propylene Glycol in a generic lager, with a retention time of approximately 6.7 minutes. This chromatogram shows good peak shapes and indicates little interference from the matrix components.

GC Condition	
Injector Temperature	230°C
Carrier Gas Type	Hydrogen
Split Flow	30 ml min <sup>-1</sup>
Column Flow	3.0 ml min <sup>-1</sup>
Injection Volume	0.5 µl
Column Type	EL-WAX 15 m x 0.25 mm x 0.25 µm
Temperature Program	
Initial Temperature	50°C/ 0 min Hold Time
Temperature Ramp	10°C min <sup>-1</sup>
Final Column Temperature	200°C/ 0 min Hold Time
Detector Type	FID
Detector Temperature	240°C

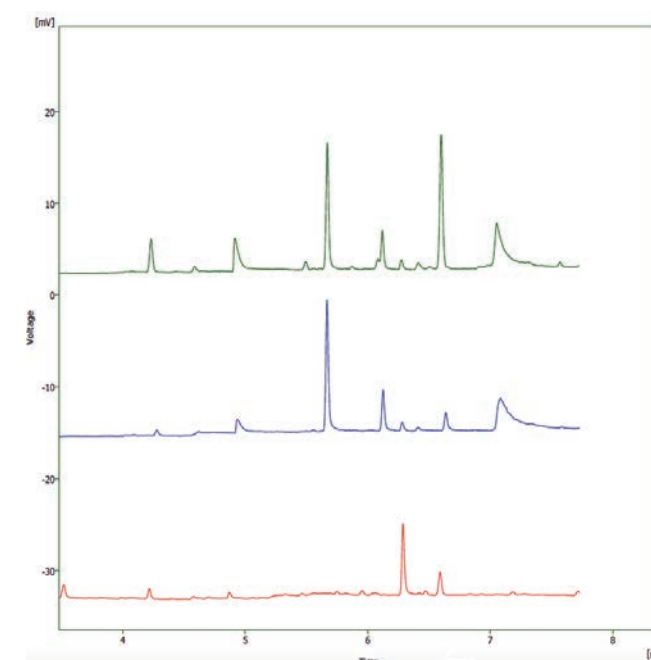


Figure 2. Calibration set 250 ppm – 10,000 ppm Propylene Glycol in 5% Ethanol solution, R<sup>2</sup> = 0.996. Good linearity and correlation is observed.

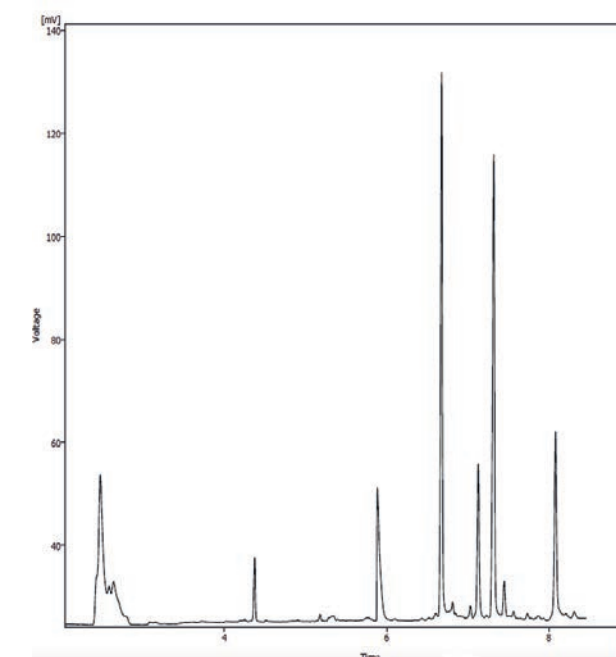


Figure 3. Comparison of two shop purchased lagers with a 250 ppm PG in 5 % Ethanol solution. Sample 1 – Green, Sample 2 – Blue and 250 ppm PG in 5% Ethanol solution – Red. From the peak areas of each sample, the concentration of PG has been calculated and is shown in the inserted table.

Analysis of Propylene Glycol content in lager, can be achieved utilising an Ellutia 200 GC FID. Initial testing has indicated that there are low PG concentrations in commercially available lagers. Sources of PG found in these samples cannot be established off site and any unintentional contamination of these samples would need to be investigated. Intentional PG content should be monitored and levels should be kept within permissible levels. As daily exposure levels are subjective to an individual's bodyweight and average consumption of lager, and other potential food sources of PG, it would seem prudent to reduce the levels of PG that an individual could be exposed to.

### Equipment used Main Instruments

#### 200 Series GC with FID

Part no. 20500130

#### Ellution Software

Part no. 23001001

#### Colibrick

Part no. 23001022

#### EL-WAX15 m x 0.25 mm x

0.25 µm column

Part no. 51100296

#### 1µl Syringe

Part no. 20511204

### Headspace Autosampler Liquid Autosampler

#### Ellutia EL3000A - Automatic Liquid

Sampler - 121 position

Part no. 30500010

#### GC Mounting Kit for 200 GC

Autosampler

Part no. 30500018

#### Autosampler Control Module

Part no. 23001012

### Accessories

#### 2ml Short-cap Screw Thread Vials

Part no. 20511101

#### Pre-assembled Short Blue Screw Vial

Closures

Part no. 20511102

#### 7000 GC Series Flowmeter

Part no. 21007000

#### 1µl Syringe

Part no. 20511204

For more information on this application, equipment used or ordering, please visit: [www.ellutia.com](http://www.ellutia.com) or email: [info@ellutia.com](mailto:info@ellutia.com).