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Validation Report: Glycerol Assay Kit (cat. no. K-GCROL)

1. Scope

Megazyme's Glycerol Assay Kit (K-GCROL) is an enzymatic method used for the rapid measurement and analysis of glycerol in foodstuffs, beverages and other materials. This method was developed in-house and measures glycerol in g/L. Methods based on this principle have been accepted by OIV and MEBAK.

2. Planning

The purpose of this report is to verify and validate the current method as detailed by Glycerol Assay Kit (K-GCROL).

3. Performance characteristics

The selectivity, working range, limit of detection, limit of quantification, trueness (*bias*) and precision of this kit is detailed in this report.

3.1. Selectivity

This assay is specific for glycerol.

Interfering substances in the sample being analysed can be identified by including an internal standard. Quantitative recovery of this standard would be expected. Losses in sample handling and extraction are identified by performing recovery experiments, i.e. by adding glycerol to the sample in the initial extraction steps.

3.2. Working Range

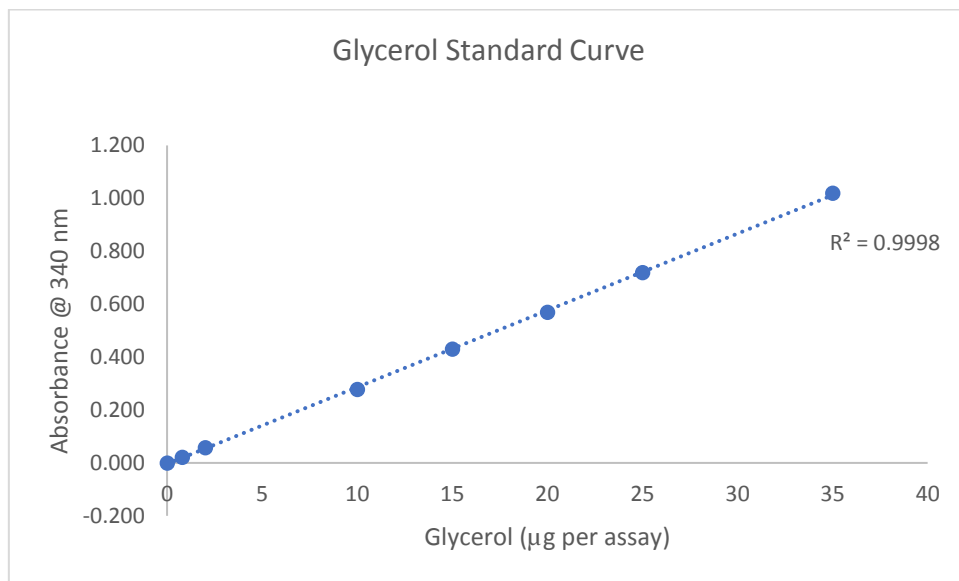
Assay follows the Glycerol Assay Kit (K-GCROL) standard procedure. 0.1 mL of glycerol standard was used as sample, with a range of concentrations (0.008-0.35 g/L glycerol) which corresponds to 0.8-35.0 µg of glycerol per cuvette. Absorbance A₂ was read after 5 min, at 340 nm and at 25°C as recommended in the procedure.



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Glycerol Concentration [$\mu\text{g}/\text{assay}$]	$\Delta A_{340\text{nm}}$
0	0.000
0.8	0.022
2	0.058
10	0.278
15	0.430
20	0.570
25	0.719
35	1.020





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3.3. LOD and LOQ

The **instrument limit of detection**, as per kit booklet, is 0.342 mg/L, which is derived from an absorbance difference of 0.020 and the maximum sample volume of 2.00 mL.

The **calculated limit of detection (LOD)** and the **calculated limit of quantification (LOQ)** for this report purpose is based on the analysis of samples that have been taken through the whole Glycerol Assay Kit (K-GCROL) measurement procedure.

- The LOD is the lowest concentration of the analyte that can be detected by the method. LOD is calculated as $3 \times s'0$; where $s'0$ is the standard deviation of a number of samples A1 reading.
- The LOQ is the lowest level at which the kit's performance is acceptably repeatable. LOQ is calculated as $kQ \times s'0$; where $s'0$ is the standard deviation of a number of samples A1 reading. The IUPAC default value for kQ is 10
- For Glycerol Assay Kit (K-GCROL)

LOD – For 2.0 mL of sample (maximum volume)

Glycerol = 0.035 mg/L

LOQ – For 2.0 mL of sample (maximum volume)

Glycerol = 0.135 mg/L

* **Note:** The above detection limits are for samples as used in the assay, after sample preparations if required (e.g. deproteinisation). The dilution used in pre-treatment must be accounted for while establishing the detection limits for specific samples.



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3.4. Trueness (Bias)

Comparison of the mean of the results (x) achieved with Glycerol Assay Kit (K-GCROL) method with a suitable reference value (x ref). For this report, Relative Bias is calculated in per cent as: $b(\%) = \frac{x - x_{ref}}{x_{ref}} \times 100$. The reference material for this purpose is glycerol supplied with the Glycerol Assay Kit (K-GCROL) at 0.20 g/L.

Relative Bias *b*(%)

	n	Ref Material (g/L)	Mean (g/L)	b (%)
Glycerol	24	0.2	0.2021	1.06

3.5. Precision

This report details the reproducibility of the Glycerol Assay Kit (K-GCROL), it is a measure of the variability in results, on different days and by different analysts, over an extended period of time.

For the purpose of this report different lot numbers of the kit standard is used as the reference material.

Reproducibility

	n	Ref Material (g/L)	Mean (g/L)	Standard Deviation	%CV
Glycerol	24	0.2	0.2021	0.0037	1.81

Repeatability of this kit can be assessed using wine samples. This is a measure of the variability in results by a single analyst, using real samples, using the same equipment and over a short period of time. The use of wine samples shows one of the many applications of this kit.

Repeatability

	n	Mean (g/L)	Standard Deviation	%CV
White Wine	18	5.752	0.2658	4.620
Red Wine	18	8.847	0.4302	4.863



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4. Conclusion

The method outlined in this document is a robust, quick and easy method for the measurement of glycerol in various matrices. It has been used for many years and is fully automatable for high throughput analysis of samples. Data presented in this report verifies and validates that this method is fit for the purpose intended, which is summarised below.

Validation Summary	Glycerol
Working range (μg in cuvette)	0.8-35
LOD (mg/L)	0.035
LOQ (mg/L)	0.135
Relative Bias <i>b</i> (%)	1.06
Reproducibility (%CV using kit standard)	1.81
Repeatability (%CV using white wine)	4.62
Repeatability (%CV using red wine)	4.86