



**Megazyme,**  
Bray Business Park,  
Bray, Co. Wicklow,  
A98 YV29,  
Ireland.  
Tel: + 353 1 286 1220  
Fax: + 353 1 286 1264

## **Validation Report: Acetic Acid Assay Kit, (Acetate Kinase Manual Format) (cat. no. K-ACETRM)**

### **1. Scope**

Megazyme's Acetic Acid Assay Kit (K-ACETRM) is an enzymatic method used for the rapid measurement and analysis of acetic acid in foodstuffs, beverages and other materials. This improved acetic acid method was developed in-house and measures acetic in g/L.

### **2. Planning**

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

### **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 acetic acid.

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 acetic acid to the sample in the initial extraction steps.

#### **3.2. Working Range**

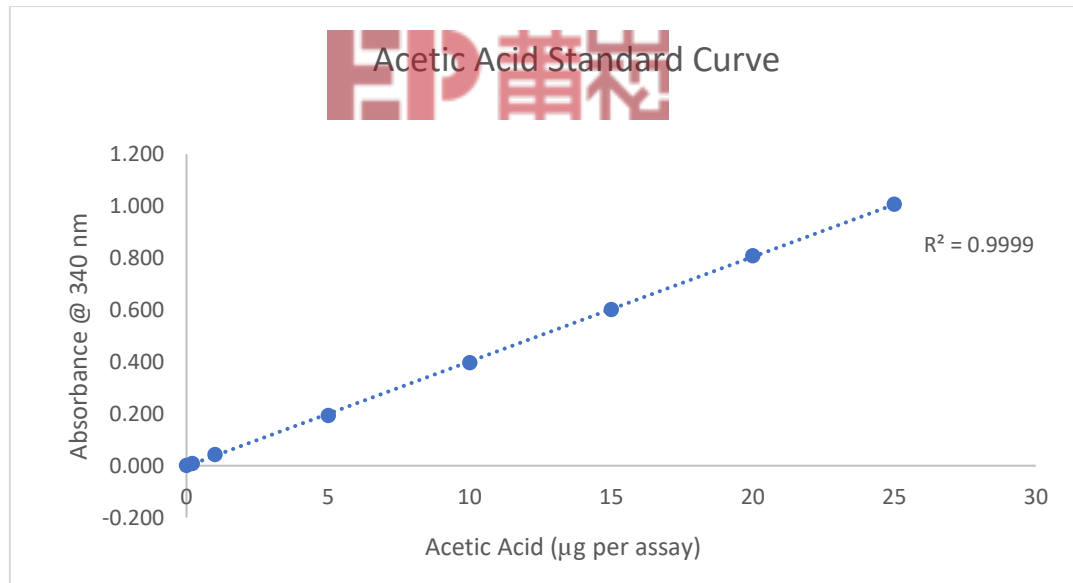
Assay follows the Acetic Acid Assay Kit (K-ACETRM) standard procedure. 0.1 mL of acetic acid standard was used as sample, with a range of concentrations (0.003-0.25 g/L acetic acid) which corresponds to 0.3-25 µg of acetic acid per cuvette. Absorbance A<sub>2</sub> was read after 4 min, at 340 nm and at 25°C as recommended in the procedure.



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Acetic Acid Concentration [ $\mu\text{g}/\text{assay}$ ]	$\Delta A_{340\text{nm}}$
0	0.000
0.2	0.008
1	0.043
5	0.193
10	0.397
15	0.601
20	0.808
25	1.007





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### 3.3. LOD and LOQ

The **instrument limit of detection**, as per kit booklet, is 0.254 mg/L, which is derived from an absorbance difference of 0.020 with 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 Acetic Acid Assay Kit (K-ACETRM) 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 Acetic Acid Assay Kit (K-ACETRM)

**LOD – For 2.0 mL of sample (maximum volume)**

Acetic Acid = 0.25 mg/L

**LOQ – For 2.0 mL of sample (maximum volume)**

Acetic Acid = 0.800 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 Acetic Acid Assay Kit (K-ACETRM) 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 acetic acid supplied with the Acetic Acid Assay Kit (K-ACETRM) at 0.1 g/L.

**Relative Bias *b*(%)**

	n	Ref Material (g/L)	Mean (g/L)	<i>b</i> (%)
Acetic Acid	15	0.1	0.1006	0.58

**3.5. Precision**

This report details the reproducibility of the Acetic Acid Assay Kit (K-ACETRM), 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
Acetic Acid	15	0.1	0.1006	0.58	1.67

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	6	0.39	0.01	1.57
Red Wine	6	0.61	0.005	0.76



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**4. Conclusion**

The method outlined in this document is a robust, quick and easy method for the measurement of acetic acid 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	Acetic Acid
Working range ( $\mu\text{g}$ in cuvette)	0.3-25
LOD (mg/L)	0.25
LOQ (mg/L)	0.8
Relative Bias <i>b</i> (%)	0.58
Reproducibility (%CV using kit standard)	1.67
Repeatability (%CV using white wine)	2.42
Repeatability (%CV using red wine)	1.76

