



## Product Information

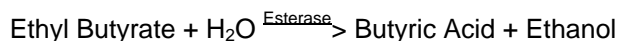
### SIGMA QUALITY CONTROL TEST PROCEDURE

#### Enzymatic Assay of ESTERASE

(EC 3.1.1.1)

Sigma Prod. No. E-2884, E-3019, and E-3128

#### PRINCIPLE:



**CONDITIONS:** T = 25°C, pH = 8.0

**METHOD:** Titrimetric

#### REAGENTS:

- A. 10 mM Borate Buffer, pH 8.0 at 25°C  
(Prepare 500 ml in deionized water using Boric Acid, Sigma Prod. No. B-0252. Adjust to pH 8.0 with 1 M NaOH.)
- B. 0.1% (v/v) Ethyl Butyrate Solution  
(Prepare 200 ml in Reagent A using Butyric Acid Ethyl Ester, Sigma Prod. No. B-2391.)
- C. Ethyl Butyrate  
(Use Butyric Acid Ethyl Ester, Sigma Prod. No. B-2391.)
- D. 10 mM Sodium Hydroxide Solution-Standardized (NaOH)  
(Prepare 50 ml in cold deionized water using Sodium Hydroxide, Pellets, Sigma Prod. No. S-5881. Standardize according to the ACS Reagent Procedure.<sup>1</sup>)
- E. Esterase Enzyme Solution  
(Immediately before use, prepare a solution containing 50 units/ml of Esterase in cold Reagent A.)

#### PROCEDURE:

Using a suitable pH meter in conjunction with a magnetic stirrer, pipette (in milliliters) the following reagents into a suitable titration vessel:

	<u>Test</u>
Reagent B (Ethyl Butyrate Soln)	25.0

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**PROCEDURE:** (continued)

Equilibrate to 25°C. Then add:

	<u>Test</u>
Reagent C (Ethyl Butyrate)	0.025

Adjust the pH to 8.1 using Reagent D (NaOH). Then add:

Reagent E (Enzyme Solution)	0.10
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Start a timer when the pH reaches 8.0. Run the reaction for 1-5 minutes. Maintain the pH of the reaction mix at pH 8.0 by the addition of small volumes (0.050 ml) of Reagent D. Record the volume of Reagent D used to maintain the pH at 8.0 and the time required to consume the added Reagent D.

**CALCULATION:**

$$\text{Units/ml enzyme} = \frac{(\text{Molarity of NaOH})(\text{NaOH})(1000)(\text{df})}{(\text{T})(0.10)}$$

NaOH = Volume (in milliliters) of Reagent D used in the assay

1000 = Conversion factor from millimoles to micromoles (Unit definition)

df = Dilution factor

T = Time required (in minutes) to consume the added Reagent D (NaOH) while maintaining the pH at 8.0

0.1 = Volume (in milliliter) of enzyme used

$$\text{Units/mg protein} = \frac{\text{units/ml enzyme}}{\text{mg protein/ml enzyme}}$$

**UNIT DEFINITION:**

One unit will hydrolyze 1.0  $\mu$ mole of ethyl butyrate to butyric acid and ethanol per minute at pH 8.0 at 25°C.

**INITIAL ASSAY CONCENTRATIONS:**

In a 25.125 ml reaction mix, the initial concentrations are 10 mM borate, 0.2% (v/v) ethyl butyrate and 5 units esterase.

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**REFERENCES:**

(1993) *Reagent Chemicals ACS Specifications*, 8th ed., p 95, American Chemical Society, Washington, DC

Adler, A.J. and Kistiakowsky, G.B. (1962) *Journal of the American Chemicals Society* **84**, 695-703

**NOTES:**

1. Standardization of NaOH is described in the (1993) *Reagent Chemical ACS Specification* reference.
2. This assay is based on the assay procedure described in Adler, A.J. and Kistiakowsky, G.B. (1962).
3. Where Sigma Product or Stock numbers are specified, equivalent reagents may be substituted.

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