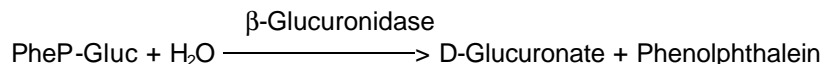


## Enzymatic Assay of $\beta$ -GLUCURONIDASE (EC 3.2.1.31)

### PRINCIPLE:



Abbreviation:

PheP-Gluc = Phenolphthalein Glucuronide

**CONDITIONS:** T = 37°C, pH = 3.8,  $A_{540\text{nm}}$ , Light path = 1 cm

**METHOD:** Spectrophotometric Stop Rate Determination

### REAGENTS:

- A. 100 mM Sodium Acetate Buffer, pH 3.8 at 37°C  
(Prepare 50 ml in deionized water using Sodium Acetate, Trihydrate, Sigma Prod. No. S-8625. Adjust to pH 3.8 at 37°C with 1 M HCl.)
- B. 1.2 mM Phenolphthalein Glucuronide Substrate Solution (PheP-Gluc)  
(Prepare 10 ml in deionized water using Phenolphthalein Glucuronic Acid, Sodium Salt, Sigma Prod. No. P-0376.)
- C. 200 mM Glycine Buffer, pH 10.4.  
(Use Glycine Buffer Solution, Sigma Stock No. 105-2, or prepare 100 ml in deionized water using Glycine Free Base, Sigma Prod. No. G-7126. Adjust to pH 10.4 at 37°C with 1 M NaOH.)
- D. 0.2% (w/v) Sodium Chloride with 0.1% (w/v) Bovine Serum Albumin  
(Prepare 20 ml in deionized water using Sodium Chloride, Sigma Prod. No. S-9625 and Albumin, Bovine Serum, Sigma Prod. No. A-4503.)
- E.  $\beta$ -Glucuronidase Enzyme Solution  
(Immediately before use, prepare a solution containing 300 units/ml of  $\beta$ -Glucuronidase in cold Reagent D.)

## Enzymatic Assay of b-GLUCURONIDASE (EC 3.2.1.31)

### REAGENTS: (continued)

- F. 95% (v/v) Ethanol  
(Prepare 20 ml in deionized water using 200 Proof, USP Ethyl Alcohol, Quantum Chemical Corporation.)
- G. 0.05% (w/v) Phenolphthalein Standard Solution (Std Soln)  
(Prepare 5 ml by dissolving 2.5 mg of Phenolphthalein, Sigma Prod. No. P-9750 in 5 ml of Reagent F.)

### PROCEDURE:

Pipette (in milliliters) the following reagents into suitable containers:

	<u>Test</u>	<u>Blank</u>
Reagent A (Buffer)	0.70	0.70
Reagent B (PheP-Gluc)	0.70	0.70
Reagent C (Glycine Buffer)	-----	0.10

Mix by inversion and equilibrate to 37°C. Then add:

Reagent E (Enzyme Solution)	0.10	-----
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Mix by inversion and incubate at 37°C for exactly 30 minutes. Then add:

Reagent C (Glycine Buffer)	5.00	5.00
Reagent E (Enzyme Solution)	-----	0.10

Immediately mix by inversion. Transfer the solutions to suitable cuvettes and determine the  $A_{540\text{nm}}$  for both the Test and Blank using a suitably thermostatted spectrophotometer.

### COLORIMETRIC ASSAY:

Standard Curve:

Prepare a standard curve by pipetting (in milliliters) the following reagents into suitable containers:

	<u>Std 1</u>	<u>Std 2</u>	<u>Std 3</u>	<u>Std 4</u>	<u>Blank</u>
Reagent A (Buffer)	0.70	0.70	0.70	0.70	0.70
Reagent B (PheP-Gluc)	0.70	0.70	0.70	0.70	0.70
Reagent F (Ethanol)	0.07	0.05	0.03	----	0.10
Reagent G (Std Soln)	0.03	0.05	0.07	0.10	----
Reagent C (Glycine Buffer)	5.00	5.00	5.00	5.00	5.00

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### COLORIMETRIC ASSAY: (continued)

Mix by inversion and transfer the standards to suitable cuvettes. Determine the  $A_{540\text{nm}}$  for each standard using a suitable spectrophotometer.

### CALCULATIONS:

Standard Curve:

$$\Delta A_{540} \text{ Standard} = A_{540} \text{ Standard} - A_{540} \text{ Standard blank}$$

Prepare a standard curve by plotting  $\Delta A_{540}$  Standard vs micrograms of Phenolphthalein.

Sample Determination:

$$\Delta A_{540} \text{ Sample} = A_{540} \text{ Sample} - A_{540} \text{ Sample blank}$$

Determine the total micrograms of phenolphthalein liberated using the Standard curve.

$$\text{Units/ml enzyme} = \frac{(\mu\text{g phenolphthalein liberated}) (2) (df)}{0.1}$$

2 = Time correction of assay (Unit Definition = 1 hour)

df = Dilution factor

0.1 = Volume (in milliliters) of enzyme used

$$\text{Units/g solid} = \frac{\text{units/ml enzyme}}{\text{g solid/ml enzyme}}$$

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

### UNIT DEFINITION:

One Sigma or modified "Fishman" unit will liberate 1.0 microgram of phenolphthalein from phenolphthalein glucuronide per hour at pH 3.8 at 37°C.

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### FINAL ASSAY CONCENTRATION:

In a 1.50 ml reaction mix, the final concentrations are 47 mM sodium acetate, 0.56 mM phenolphthalein glucuronic acid, 30 units  $\beta$ -glucuronidase, 0.01% (w/v) sodium chloride, and 0.007% (w/v) bovine serum albumin.

### NOTES:

Fishman, W.H. and Bernfeld, P. (1955) *Methods in Enzymology*, Volume I, 262-269

Combie, J., Blake, J.W., Nugent, T.E., and Tobin, T. (1982) *Clin. Chem.* **28**, 83-86

Fishman, W.H. (1974) in *Methods of Enzymatic Analysis* (Bergmeyer, H.U. ed) 2nd ed., Volume II, 929-932, Academic Press, New York

### NOTES:

1. This assay is based on the cited references.
2. Where Sigma Product or Stock numbers are specified, equivalent reagents may be substituted.

**This procedure is for informational purposes. For a current copy of Sigma's quality control procedure contact our Technical Service Department.**