

**Enzymatic Assay of GLUTATHIONE-S-TRANSFERASE
(EC 2.5.1.18)
1-Chloro-2,4-Dinitrobenzene as Substrate**

PRINCIPLE:

G-SH + CDNB Glutathione-S-Transferase > G-SDNB Conjugate + HCl

Abbreviations:

G-SH = Glutathione, Reduced Form

CDNB = 1-Chloro-2,4-Dinitrobenzene

G-SDNB Conjugate = Glutathione-2,4-Dinitrobenzene

CONDITIONS: T = 25°C, pH = 6.5, A_{340nm}, Light path = 1 cm

METHOD: Continuous Spectrophotometric Rate Determination

REAGENTS:

- A. 100 mM Potassium Phosphate Buffer with 1.0 mM Ethylenediaminetetraacetic Acid, pH 6.5 at 25°C (Prepare 100 ml in deionized water using Potassium Phosphate, Monobasic, Anhydrous, Sigma Prod. No. P-5379, and Ethylenediaminetetraacetic Acid, Tetrasodium Salt: Hydrate, Sigma Stock No. ED4S. Adjust to pH 6.5 at 25°C with 1 M KOH.)
- B. 75 mM Glutathione, Reduced Solution (G-SH) (Prepare 10 ml in Reagent A using Glutathione, Free Acid, Reduced Form, Sigma Prod. No. G-4251. **PREPARE FRESH.**)
- C. 30 mM 1-Chloro-2,4-Dinitrobenzene Solution (CDNB) (Prepare 1 ml in Reagent D using 1-Chloro-2,4-Dinitrobenzene, Sigma Prod. No. C-6396. **PREPARE FRESH.**)
- D. 95% Ethanol (Nondenatured)
- E. Glutathione-S-Transferase Enzyme Solution (Immediately before use, prepare a solution containing 0.075 - 0.15 unit/ml of Glutathione-S-Transferase in cold Reagent A.)

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PROCEDURE:

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

	<u>Test</u>	<u>Blank</u>
Reagent A (Buffer)	2.70	2.80
Reagent B (G-SH)	0.10	0.10
Reagent C (CDNB)	0.10	0.10

Equilibrate to 25°C. Monitor the $A_{340\text{nm}}$ until constant, using a suitably thermostatted spectrophotometer. Then add:

Reagent E (Enzyme Solution)	0.10	-----
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Immediately mix by inversion and record the increase in $A_{340\text{nm}}$ for approximately 5 minutes. Obtain the $r A_{340\text{nm}}$ /minute using the maximum linear rate for both the Test and Blank.

CALCULATIONS:

$$\text{Units/ml enzyme} = \frac{(r A_{340\text{nm}}/\text{min Test} - r A_{340\text{nm}}/\text{min Blank})(3.0)(\text{df})}{(9.6)(0.10)}$$

3.0 = Total volume (in milliliters) of assay

df = Dilution factor

9.6 = Millimolar extinction coefficient of
Glutathione-1-Chloro-2,4-Dinitrobenzene conjugate at
340 nm

0.10 = Volume (in milliliter) of enzyme used

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

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

UNIT DEFINITION:

One unit will conjugate 1.0 μmole of 1-chloro-2,4-dinitrobenzene with reduced glutathione per minute at pH 6.5 at 25°C.

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FINAL ASSAY CONCENTRATION:

In a 3.00 ml reaction mix, the final concentrations are
97 mM potassium phosphate, 0.97 mM
ethylenediaminetetraacetic acid, 2.5 mM glutathione,
reduced, 1.0 mM 1-chloro-2,4-dinitrobenzene, 3.2% (v/v)
ethanol and 0.0075 - 0.015 unit glutathione-S-transferase.

REFERENCES:

Habig, W.H., Pabst, M.J., and Jakoby, W.B. (1974) *J. Biol. Chem.* **249**, 7130-7139

Simons, P.C., and Vander Jagt, D.L. (1977) *Anal. Biochem.* **82**, 334-341

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.