

Luciferin and Caged Luciferin

Table 1. Contents and storage information.

Material	Amount	Storage	Stability
D-luciferin free acid, sodium salt, or potassium salt	25 mg, lyophilized solid	<ul style="list-style-type: none"> • ≤-20°C • Desiccate • Protect from light 	When stored as directed, products are stable for at least 6 months.
DMNPE-caged luciferin	5 mg, lyophilized solid		

Introduction

Firefly luciferase (*Photinus*-luciferin:oxygen 4-oxidoreductase or luciferin 4-monooxygenase, EC 1.13.12.7) produces light by the ATP-dependent oxidation of luciferin. The 560 nm chemiluminescence from this reaction peaks within seconds, with light output that is proportional to luciferase concentration when substrates are present in excess.¹ The *luc* gene, which encodes the 62,000-dalton firefly luciferase, is a popular reporter gene for plants,²⁻⁷ bacteria,^{8,9} and mammalian cells,^{10,11} and for monitoring baculovirus gene expression in insects.^{12,13} Chemiluminescent techniques are virtually background-free, making the *luc* reporter gene ideal for detecting low-level gene expression.¹⁴ As little as 0.02 pg of luciferase can be reliably measured in a standard scintillation counter.¹⁵ In addition to its role as a reporter of gene expression, luciferase is commonly used in an extremely sensitive assay for ATP.¹⁶⁻¹⁸ Researchers have also determined that certain amphipathic and hydrophobic substances, including anesthetics and hormones, compete with luciferin for the hydrophobic site on the luciferase molecule, providing a convenient assay for these substances.¹⁹

The luciferase substrate, luciferin (D-(-)-2-(6'-hydroxy-2'-benzothiazolyl)thiazoline-4-carboxylic acid), was first isolated from fireflies by Bitler and McElroy.²⁰ Highly purified synthetic luciferin from Molecular Probes exhibits physical properties identical to those of natural luciferin. We offer the luciferin free acid (L2911), as well as its water-soluble sodium and potassium salts (L2912, L2916).

Our DMNPE-caged D-luciferin (L7085) offers an efficient way to deliver luciferin into intact cells and can be used to supply a continuous source of active luciferin. DMNPE-caged luciferin readily crosses cell membranes.²¹ Once inside the cell, a pulse of luciferin can be released by UV photolysis, or a continuous supply of active luciferin can be slowly formed by the action of intracellular esterases found in most eukaryotic cells.

Guidelines for Use

Preparing the Luciferin Stock Solutions

The sodium and potassium salts are readily soluble in aqueous buffers. The free acid must be neutralized with an appropriate base to solubilize. Aqueous stock solutions of luciferin should be stored frozen and protected from light in buffer with a pH between 6.1 and 6.5. At a higher pH, luciferin undergoes a base-catalyzed formation of dehydroluciferin, as well as racemization to the L-isomer. A stock solution of DMNPE-caged luciferin may be made in dimethylformamide (DMF) or dimethylsulfoxide (DMSO) and stored frozen and protected from light.

References

1. Mol Cell Biol 7, 725 (1987); 2. Methods Cell Biol 50, 425 (1995); 3. Methods Mol Biol 55, 147 (1995); 4. J Biolumin Chemilumin 8, 267 (1993); 5. Methods Enzymol 216, 397 (1992); 6. Dev Genet 11, 224 (1990); 7. J Biolumin Chemilumin 5, 141 (1990); 8. J Gen Microbiol 138, 1289 (1992); 9. Methods Mol Cell Biol 1, 107 (1989); 10. Methods Mol Biol 7, 237 (1991); 11. Biotechniques 7, 1116 (1989); 12. FEBS Lett 274, 23 (1990); 13. Gene 91, 135 (1990); 14. Anal Biochem 176, 28 (1989); 15. Anal Biochem 171, 404 (1988); 16. Lett Appl Microbiol 1, 208 (1990); 17. Anal Biochem 29, 381 (1969); 18. J Appl Biochem 3, 473 (1981); 19. Anal Biochem 190, 304 (1990); 20. Arch Biochem Biophys 72, 358 (1957); 21. Biotechniques 15, 848 (1993).

Product List

Current prices may be obtained from our website or from our Customer Service Department.

Cat #	Product Name	Unit Size
L7085	D-luciferin, 1-(4,5-dimethoxy-2-nitrophenyl)ethyl ester (DMNPE-caged luciferin)	5 mg
L2911	D-luciferin, free acid	25 mg
L2916	D-luciferin, potassium salt	25 mg
L2912	D-luciferin, sodium salt	25 mg

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