

IPTG

(Isopropyl- β -D-thiogalactopyranoside)

Expression of the three genes in the *lac* operon of *Escherichia coli* is under the negative control of a repressor protein consisting of four identical 38.6 kDa subunits.¹ IPTG, a free-flowing, non-hygroscopic carbohydrate, induces expression of the *lac* operon by allosterically interacting with the repressor molecule and causing a 300-fold reduction in the repressor's affinity for the operator sequence.^{1,2,3} The action of IPTG leads to the production of the *lac* operon gene products which allow *E. coli* to utilize lactose as an energy source.¹

As a *lac* operon inducer, IPTG has been successfully used to increase the production of recombinant proteins produced in *E. coli*, such as somatostatin and the human insulin B chain.^{4,5} The IPTG inducible *lac* operator/repressor system may also be used to produce regulated expression of transiently and stably transfected reporter genes.⁶ Recently, the regulatory elements of the *lac* operon have been used to isolate conditional lethal mutants of poxviruses. These mutants are dependent on the presence of IPTG to produce infectious viruses.³

Cited References

1. Beyreuther, K. 1980. in *The Operon* (Miller, J.H., and Reznikoff, W.Z., eds) pp. 123-154, Cold Spring Harbor, New York.
2. Barkely, M.D. and Bourgeois, S. 1980. in *The Operon* (Miller, J.H., and Reznikoff, W.Z., eds) pp. 177-220, Cold Spring Harbor, New York.
3. Zhang, Y., and Moss, B. 1991. *Proc. Natl. Acad. Sci. USA* **88**, 1511.
4. Itakura, K., et al. 1977. *Science* **198**, 1056.
5. Goeddel, D.V., et al. 1979. *Proc. Natl. Acad. Sci. USA* **76**, 106.
6. Figge, J., et al. 1988. *Cell* **52**, 713.

BIOLOGICAL APPLICATIONS

- ◆ IPTG is used in the production of recombinant proteins in *E. coli*.
- ◆ IPTG can be used to regulate the expression of *lac* operator/reporter genes which have been stably integrated into a mammalian chromosome.
- ◆ Recombinant viruses can be constructed such that the expression of specific target genes will be transcriptionally repressed unless IPTG is present.
- ◆ IPTG is an inducer of β -D-Galactosidase.
- ◆ IPTG is used as an inducer of spontaneous lactose-utilizing mutants of *Vibrio vulnificus* and *Vibrio pelagius*.

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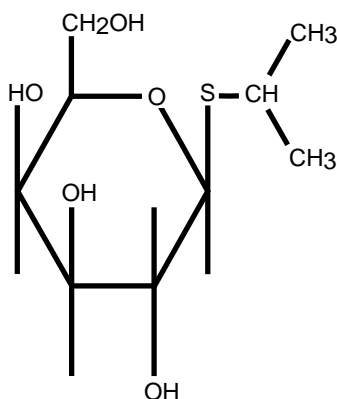
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IPTG

Product	Cat. No.	M.W.	Formula	Description
IPTG, Hemidioxane Adduct, Technical Grade	420290-Y	282.4	$C_9H_{18}O_5S \cdot \frac{1}{2}C_4H_8O_2$	Useful for bacterial systems. Contains dioxane, a known carcinogen.
IPTG, Hemidioxane Adduct, High Purity	420299-Y	282.4	$C_9H_{18}O_5S \cdot \frac{1}{2}C_4H_8O_2$	Recommended for use in tissue culture. Contains dioxane.
IPTG, Dioxane Free, Technical Grade	420325-Y	238.3	$C_9H_{18}O_5S$	Similar to Cat. No. 420290, but the dioxane has been removed.
IPTG, Dioxane Free, High Purity	420322-Y	238.3	$C_9H_{18}O_5S$	Used in cell systems in which dioxane would disrupt normal cell function.

Structure:



If you are using β -galactosidase as a reporter gene, consider using one of the following substrates.

Product	Cat. No.	Description
5-Bromo-4-chloro-3-indolyl- β -D-galactopyranoside (X-Gal)	203782-Y	Produces a blue insoluble end product that can be read visually.
4-Methylumbelliferyl- β -D-galactopyranoside	474424-Y	Substrate for fluorometric assay of β -D-galactosidase.
o-Nitrophenyl- β -D-galactopyranoside	48712-Y	Produces a yellow soluble end product which can be monitored by A_{405} . Useful in ELISA.

Please call our Technical Service Department or your local sales office for more information on these products.

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