

Zeocin™ Powder

Selection antibiotic for the *Sh ble* gene; cell culture tested

Catalog code: ant-zn-1p, ant-zn-5p

<http://www.invivogen.com/zeocin>

For research use only

Version 18C26-MM

PRODUCT INFORMATION

Contents

Zeocin™ is supplied as a blue powder.

- **ant-zn-1p:** 1 x 1 g tube.
- **ant-zn-5p:** 1 x 5 g bottle.

Note: Zeocin™ powder is very hygroscopic. Keep tubes tightly closed after each use.

Storage and stability

- Zeocin™ is shipped at room temperature. Upon receipt it should be stored at 4 °C. The expiry date is specified on the product label.
- Store Zeocin™ solutions at 4 °C or -20 °C. Do not use Zeocin™ solutions after the expiry date on the product label. Avoid repeated freeze-thaw cycles.
- Zeocin™ is sensitive to high concentrations of acids and bases but a short-term exposure to dilute acids can be tolerated.

QUALITY CONTROL

Each lot is tested to ensure the absence of lot-to-lot variation.

- Endotoxin level: < 1 EU/mg
- Physicochemical characterization (including HPLC, pH, appearance)
- Cell culture tested: potency validated in Zeocin™-sensitive and Zeocin™-resistant mammalian cell lines
- Non-cytotoxicity of trace contaminants: absence of long-term effects confirmed in Zeocin™-resistant cells

BACKGROUND

Zeocin™ is a selection antibiotic that acts on both eukaryotic and prokaryotic cells. Resistance to Zeocin™ is conferred by the *Sh ble* gene from *Streptoalloteichus hindustanus*¹⁻³.

Zeocin™ is the commercial name for a special formulation containing Phleomycin, a copper-chelated glycopeptide antibiotic isolated from a mutant strain of *Streptomyces verticillus*. This antibiotic of the bleomycin family exhibits activity against bacteria, eukaryotic microorganisms, plant and animal cells. Although bleomycin antibiotics perturb plasma membranes, their activity is generally believed to be related to their ability to bind and intercalate DNA thus destroying the integrity of the double helix.

CHEMICAL PROPERTIES

Zeocin™ is a mixture of structurally related antibiotics which differ by their terminal amine residues. The antibiotics are in a copper chelated form giving the solution a blue color. Zeocin™ is a labile compound which undergoes irreversible denaturation at high and low pH or in presence of a weak oxidant. Zeocin™ is freely soluble in water (>500 mg/ml) forming a blue solution.

SAFETY CONSIDERATIONS

Zeocin™ is a harmful compound. Refer to safety data sheet for handling instructions.

METHOD

Preparation of Zeocin solution

1. Resuspend Zeocin™ in HEPES buffer (5 g/l, pH 7.2+/- 0.1) at a concentration of 100 mg/ml.
2. Sterile filter the solution using a 0.22 µm sterile filter.
3. Store at 4 °C for 12 months or -20 °C for 18 months.

GENERAL GUIDELINES

Successful transfection is influenced by many factors. The health and viability of the cell line, the quality of the nucleic acid used, the transfection reagent, the duration of transfection, and the presence or absence of serum can all play a part.

CONDITIONS OF SELECTION

Most cells growing aerobically are killed by Zeocin™ in the concentration range of 0.5 to 1000 µg/ml. However, the sensitivity of cells is pH dependent, i.e. the higher the pH of culture medium, the greater the sensitivity. Thus, the concentration of Zeocin™ required for complete growth inhibition of given cells can be reduced by increasing the pH of the medium. In addition, the activity of Zeocin™ is reduced by a factor of two to three in hypertonic media, such as those used for protoplast regeneration. Thus, using low salt media when possible decreases the amount of Zeocin™ needed.

- *Escherichia coli*

The *Sh ble* gene and the hybrid genes in vectors provided by InvivoGen are driven by synthetic *E. coli* promoters (i.e. EM7). The cells of the common *E. coli* recipient strains (i.e. HB101, DH5α, MC1061) transformed by these vectors are resistant to Zeocin™.

Note: Do not use an *E. coli* recipient strain that contains the *Tn5* transposable element (i.e. MC1066). *Tn5* encodes a bleomycin-resistance gene that will confer resistance to Zeocin™.

Zeocin-resistant transformants are selected in Low Salt LB agar medium (yeast extract 5g/l, Tryptone 10g/l, NaCl 5g/l, Agar 15 g/l, pH 7.5) supplemented with 25 µg/ml of Zeocin™. Plates containing Zeocin™ are stable for 1 month when stored at 4°C. For optimum results the use of InvivoGen's FastMedia™ Zeo is recommended.

- Mammalian cells

The working concentration of Zeocin™ for mammalian cell lines varies from 50 to 400 µg/ml, in a few cases can be as low as 20 µg/ml or as high as 1000 µg/ml. In a starting experiment we recommend to determine the optimal concentration of Zeocin™ required to kill your host cell line. The killing and the detachment of dead cells from the plate, especially at high cell density, can require a longer time compared to G418. Foci of Zeocin-resistant stable transfectants are usually individualized after 5 days to 3 weeks incubation, depending on the cell line. Suggested concentrations of Zeocin™ for selection in mammalian cells are listed on the next page.

TECHNICAL SUPPORT

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WORKING CONCENTRATIONS

Zeocin™ is normally used at a concentration of 100 µg/ml, a 1000-fold dilution from the stock solution. However, the optimal concentration needs to be determined for your cells. Suggested concentrations of Zeocin™ for selection in some examples of mammalian cells are listed below.

Cell line	Medium	Zeocin™ conc	References
B16 (Mouse melanocytes)	RPMI	20-250 µg/ml	4-6
CHO (Chinese hamster ovarian cells)	DMEM	100-500 µg/ml	4, 7, 8
COS (Monkey kidney cells)	DMEM	100-400 µg/ml	9, 10
HEK293 (Human embryonic kidney cells)	DMEM	100-400 µg/ml	11, 12
HeLa (Human uterine cells)	DMEM	50-100 µg/ml	13, 14
J558L (Mouse melanocytes)	RPMI	400 µg/ml	15
MCF-7 (Human breast adenocarcinoma cells)	DMEM	100-400 µg/ml	16, 17
MEFs (Mouse embryonic fibroblasts)	DMEM	200-400 µg/ml	18, 19
THP-1 (Human monocytes)	RMPI	200 µg/ml	20

References

1. Drocourt D. *et al.*, 1990. Cassettes of the *Streptoalloteichus hindustanus* ble gene for transformation of lower and higher eukaryotes to phleomycin resistance. *Nucl. Acids. Res.* 18: 4009. 2. Gatignol A. *et al.*, 1988. Bleomycin resistance conferred by a drug-binding protein. *FEBS Letters*, 230: 171-5. 3. Dumas P. *et al.*, 1994. The three dimensional structure of a bleomycin resistance protein. *Embo J.* 242 (5) 595-601. 4. Bouayadi K. *et al.*, 1997. Overexpression of DNA polymerase beta sensitizes mammalian cells to 2',3'-deoxycytidine and 3'-azido-3'-deoxythymidine. *Cancer Res.* 57: 110-116. 5. Hirose Y. *et al.*, 2012. Inhibition of Stabilin-2 elevates circulating hyaluronic acid levels and prevents tumor metastasis. *PNAS*, 109: 4263 - 4268. 6. Fan H. *et al.*, 2012. Intracerebral CpG immunotherapy with carbon nanotubes abrogates growth of subcutaneous melanomas in mice. *Clin Cancer Res.*18(20):5628-38. 7. Li F. *et al.*, 1996. Post-translational modifications of recombinant P-selection glycoprotein ligand-1 required for binding to P- and E- selection. *J. Biol. Chem.* 271: 3255-3264. 8. Ogura T. *et al.*, 2004. Resistance of B16 melanoma cells to CD47-induced negative regulation of motility as a result of aberrant N-glycosylation of SHPS-1. *J Biol Chem.* 279(14):13711-20. 9. Saxena A. *et al.*, 2002. H2, the minor subunit of the human asialoglycoprotein receptor, trafficks intracellularly and forms homo-oligomers, but does not bind asialo-orosomucoid. *J Biol Chem.* 277(38):35297-304. 10. Kanamori A. *et al.*, 2002. Distinct sulfation requirements of selectins disclosed using cells that support rolling mediated by all three selectins under shear flow. L-selectin prefers carbohydrate 6-sulfation to tyrosine sulfation, whereas p-selectin does not. *J Biol Chem.* 277(36):32578-86. 11. Ahmed *et al.*, 2013. TRIF-mediated TLR3 and TLR4 signaling is negatively regulated by ADAM15. *J Immunol.* 190(5):2217-28. 12. Büllsbach EE. & Schwabe C., 2006. The mode of interaction of the relaxin-like factor (RLF) with the leucine-rich repeat G protein-activated receptor 8. *J Biol Chem.* 281(36):26136-43. 13. Mesnil M. *et al.*, 1996. Bystander killing of cancer cells by herpes simplex virus thymidine kinase gene is mediated by connexins. *PNAS* 93(5):1831-5. 14. Maszczak-Senczko D. *et al.*, 2013. UDP-N-acetylglucosamine transporter (SLC35A3) regulates biosynthesis of highly branched N-glycans and keratan sulfate. *J Biol Chem.* 288(30):21850-60. 15. Cedeno-Laurent F. *et al.*, 2010. Development of a nascent galectin-1 chimeric molecule for studying the role of leukocyte galectin-1 ligands and immune disease modulation. *J Immunol.* 185(8):4659-72. 16. Kim HS. *et al.*, 2004. Insulin-like growth factor-binding protein 3 induces caspase-dependent apoptosis through a death receptor-mediated pathway in MCF-7 human breast cancer cells. *Cancer Res.* 64(6):2229-37. 17. List HJ. *et al.*, 2001. Ribozyme targeting demonstrates that the nuclear receptor coactivator AIB1 is a rate-limiting factor for estrogen-dependent growth of human MCF-7 breast cancer cells. *J Biol Chem.* 276(26):23763-8. 18. Waak J. *et al.*, 2009. Oxidizable residues mediating protein stability and cytoprotective interaction of DJ-1 with apoptosis signal-regulating kinase 1. *J Biol Chem.* 284(21):14245-57. 19. MacDonald M. *et al.*, 2007. The zinc finger antiviral protein acts synergistically with an interferon-induced factor for maximal activity against alphaviruses. *J Virol.* 81(24):13509-18. 20. Maue A. *et al.*, 2013. The polysaccharide capsule of *Campylobacter jejuni* modulates the host immune response. *Infect Immun.* 81(3):665-72.

RELATED PRODUCTS

Product	Description	Catalog Code
Other selection antibiotics		
Blasticidin	Selection antibiotic for the <i>bsr</i> or <i>BSD</i> genes	ant-bl-1
G418	Selection antibiotic for the <i>neo</i> gene	ant-gn-1
Hygromycin B Gold	Selection antibiotic for the <i>hph</i> gene	ant-hg-1
Puromycin	Selection antibiotic for the <i>pac</i> gene	ant-pr-1
Fast-Media® Zeo		
Fast-Media® Zeo Agar	Solid agar selection medium containing Zeocin™	fas-zn-s
Fast-Media® Zeo TB	Liquid TB selection medium containing Zeocin™	fas-zn-l
Plasmids encoding the <i>Sh ble</i> gene		
pMOD2-Zeo	Plasmid encoding a synthetic <i>Sh ble</i> gene	pmod2-zeo
pSELECT-zeo-LacZ	LacZ-expression plasmid selectable with Zeocin™	psetz-lacZ
pSELECT-zeo-mcs	Expression plasmid selectable with Zeocin™	psetz-mcs

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