Small Molecules

4-Octyl Itaconate

Activates nuclear factor erythroid 2-related factor 2 (Nrf2) protein

Catalog #	74192	50 mg
	74194	250 mg

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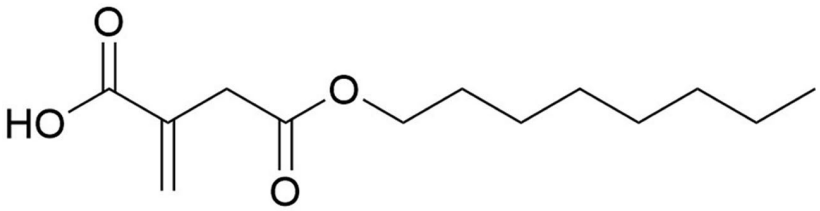
Product Description

4-Octyl Itaconate is a cell-permeable derivative of itaconate, a metabolite produced during the Krebs cycle. It is a potent activator of nuclear factor erythroid 2-related factor 2 (Nrf2) via alkylation of the inhibitor of Nrf2 (Keap1), thereby promoting Nrf2-mediated transcriptional activation and downstream anti-oxidant and anti-inflammatory properties (Mills et al.; Tang et al.).

Molecular Name:	4-Octyl Itaconate
Alternative Names:	2-methylene-butanedioic acid; 4-octyl ester
CAS Number:	3133-16-2
Chemical Formula:	$C_{13}H_{22}O_4$
Molecular Weight:	242.3 g/mol
Purity:	≥ 98%
Chemical Name:	2-methylene-butanedioic acid, 4-octyl ester
Structure:	

Properties

Physical Appearance:	A crystalline solid
Storage:	Product stable at -20°C as supplied. Protect product from prolonged exposure to light. For long-term storage, store with a desiccant. Stable as supplied for 12 months from date of receipt.
Solubility:	· DMSO ≤ 120 mM · Absolute ethanol ≤ 120 mM For example, to prepare a 10 mM stock solution in DMSO, resuspend 10 mg in 4.13 mL of DMSO. Prepare stock solution fresh before use. Information regarding stability of small molecules in solution has rarely been reported, however, as a general guide we recommend storage in DMSO at -20°C. Aliquot into working volumes to avoid repeated freeze-thaw cycles. The effect of storage of stock solution on compound performance should be tested for each application. Compound has low solubility in aqueous media. For use as a cell culture supplement, stock solution should be diluted into culture medium immediately before use. Avoid final DMSO concentration above 0.1% due to potential cell toxicity.

Published Applications

IMMUNOLOGY
· The itaconate pathway (IRG1-itaconate-SDH) plays a pivotal role in up-regulating tolerance and inhibiting the induction of trained immunity (Domínguez-Andrés et al.).
· Counteracts the proinflammatory signals of succinate by inhibiting succinate dehydrogenase (SDH) and activating Nrf2 to limit inflammation in mouse and human macrophages (Lampropoulou et al.; Mills et al.).
· Activates Nrf2 signaling in human macrophages, which has been shown to inhibit the production of pro-inflammatory cytokines including TNF-α, IL-1β, and IL-6 (Tang et al.).

References

Domínguez-Andrés J et al. (2019) The itaconate pathway is a central regulatory node linking innate immune tolerance and trained immunity. Cell Metab 29(1): 211–20.e5.
Lampropoulou V et al. (2016) Itaconate links inhibition of succinate dehydrogenase with macrophage metabolic remodeling and regulation of inflammation. Cell Metab 24(1): 158–66.
Mills EL et al. (2018) Itaconate is an anti-inflammatory metabolite that activates Nrf2 via alkylation of KEAP1. Nature 556(7699): 113–7.
Tang C et al. (2018) 4-octyl itaconate activates Nrf2 signaling to inhibit pro-inflammatory cytokine production in peripheral blood mononuclear cells of systemic lupus erythematosus patients. Cell Physiol Biochem 51(2): 979–90.

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