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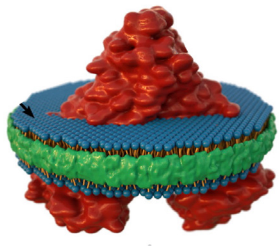
# Fact Sheet
## SMA-EA

# NEW STYRENE-MALEIC ANHYDRIDE (SMA) POLYMERS

Detergent-free system for structural and functional studies of membrane proteins

## What is it?

- Polymer-forming planar lipid bilayer nanodiscs for membrane protein reconstitution
- Direct, detergent-free reconstitution of membranes
- Stable in a broad pH range and in proximity to divalent cations
- Good for structural and functional studies of membrane proteins
- Easy nanodisc size control — adjust by changing polymer:lipid ratio
- Capable of reconstituting MPs with large, charged, soluble domains

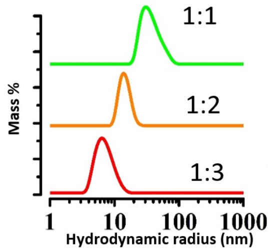


Protein in SMA nanodisc, adapted from [4].

## Why Use it?

- Part of Anatrace's new SMA portfolio
- Stable at higher pH
- Can successfully reconstitute well-folded Cytochrome b5, a protein with a large, negatively charged domain [1]
- Increased stability towards divalent cations: up to 21mM $Ca^{2+}$ and 30 mM $Mg^{2+}$ [2]
- Nanodiscs of diameter 10 to 60 nm can be produced by changing polymer:lipid ratio [3]

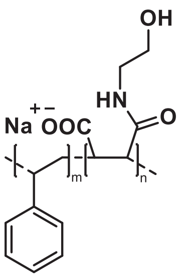

pH stability of SMA-EA, adapted from [2]. Stabilizing pH range shown in green




Nanodisc size control, adjusted by changing SMA-EA:lipid concentrations [2].

## Background

- Styrene:Maleic anhydride 1:1
- Molecular Weight ~7.8 kDa
- Solubility (Water) ≤20%
- pH (1% in water) ND




Structure of SMA-EA, with ethanol amine functionalization

## Applications

- Studies of membrane proteins in native lipid environments
- Structural studies of large membrane proteins and complexes
- Studies of protein:lipid interactions
- Work with proteins unstable in detergents
- Solubilization of membrane proteins with large, negatively charged domains

## Ordering Information

| Item # | Description | UOFM | UOM 2021 |
|---|---|---|---|
| SMA-EA 1 G | SMA-EA | EA | $365 |
| SMA-EA 500 MG | SMA-EA | EA | $205 |
| SMA-EA 250 MG | SMA-EA | EA | $125 |

Supporting Documentation: SDS • CoA

## References

[1] Ravula, T. et al. Effect of polymer charge on functional reconstitution of membrane proteins in polymer nanodiscs. Chem Commun 54, 9615–9618 (2018).
[2] Ravula, T., Hardin, Nathaniel. Z., Mauro, G. M. D. & Ramamoorthy, A. Styrene maleic acid derivates to enhance the applications of bio-inspired polymer based lipid-nanodiscs. Eur Polym J 108, 597–602 (2018).
[3] Ravula, T., Hardin, N. Z. & Ramamoorthy, A. Polymer nanodiscs: Advantages and limitations. Chem Phys Lipids 219, 45–49 (2019).
[4] Chen, A., Majdinasab, E. J., Fiori, M. C., Liang, H. & Altenberg, G. A. Polymer-Encased Nanodiscs and Polymer Nanodiscs: New Platforms for Membrane Protein Research and Applications. Frontiers Bioeng Biotechnology 8, 598450 (2020).

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