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Neutralising Acrylic Acid to make Sodium Acrylate

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Protocol status: Working

We use this protocol and it's working

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Abstract

This protocol outlines the steps required to make sodium acrylate (SA) at 4M/38% for use in expansion microscopy. Making it in house avoids the problems arising from batch to batch variability that has haunted commercially available SA as well as long delivery times. It is also significantly cheaper and does not require significantly more time.

Materials

 Sodium hydroxide Merck MilliporeSigma (Sigma-Aldrich) Catalog #S8045

 Acrylic acid anhydrous Merck MilliporeSigma (Sigma-Aldrich) Catalog #147230

Stirring plate

Magnetic stirrer

Ice bucket

Beaker

Fume hood

Safety warnings

- ! Both Acrylic acid and NaOH are corrosive and harmful. Toxic fumes are produced during the neutralisation. Handle under a fume hood with appropriate PPE.
Neutralisation can be exothermic, be cautious of excessive heat production.
Note: I have not had issues with excessive heat production and the acrylic acid solidifies on ice, reducing stirring. I work on RT but keep ice close-by.



Neutralisation

- 1 Into a beaker add a stir bar and 12.5 mL Acrylic acid



Note

The stock is at ~ 13.87 Molarity (M)

- 2



Note

Either work On ice or keep an ice bucket close by to prevent overheating of the solution. Overheated sodium acrylate will not be useable for expansion microscopy.

Slowly add 10 Molarity (M) NaOH (total roughly 17.5 mL)

- 2.1 Add small volumes of water when the solution becomes too thick, the salt precipitates out and will stick to the



- 3 Once at pH 6.8 carefully continue with 1 Molarity (M) NaOH until at pH 7.5 - pH 8.0



- 4 Add water to a total volume of 42.91 mL

Storage

- 5 Store resulting sodium acrylate [4 Molarity (M) / 38 % volume] at -20 °C for several month. Aliquot to avoid freeze cycles and streamline downstream processes.



Protocol references

<https://elifesciences.org/articles/73775>

<https://www.nature.com/articles/s41592-023-02001-y>

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