

# Formulation of Re-dispersible Freeze-dried Emulsions

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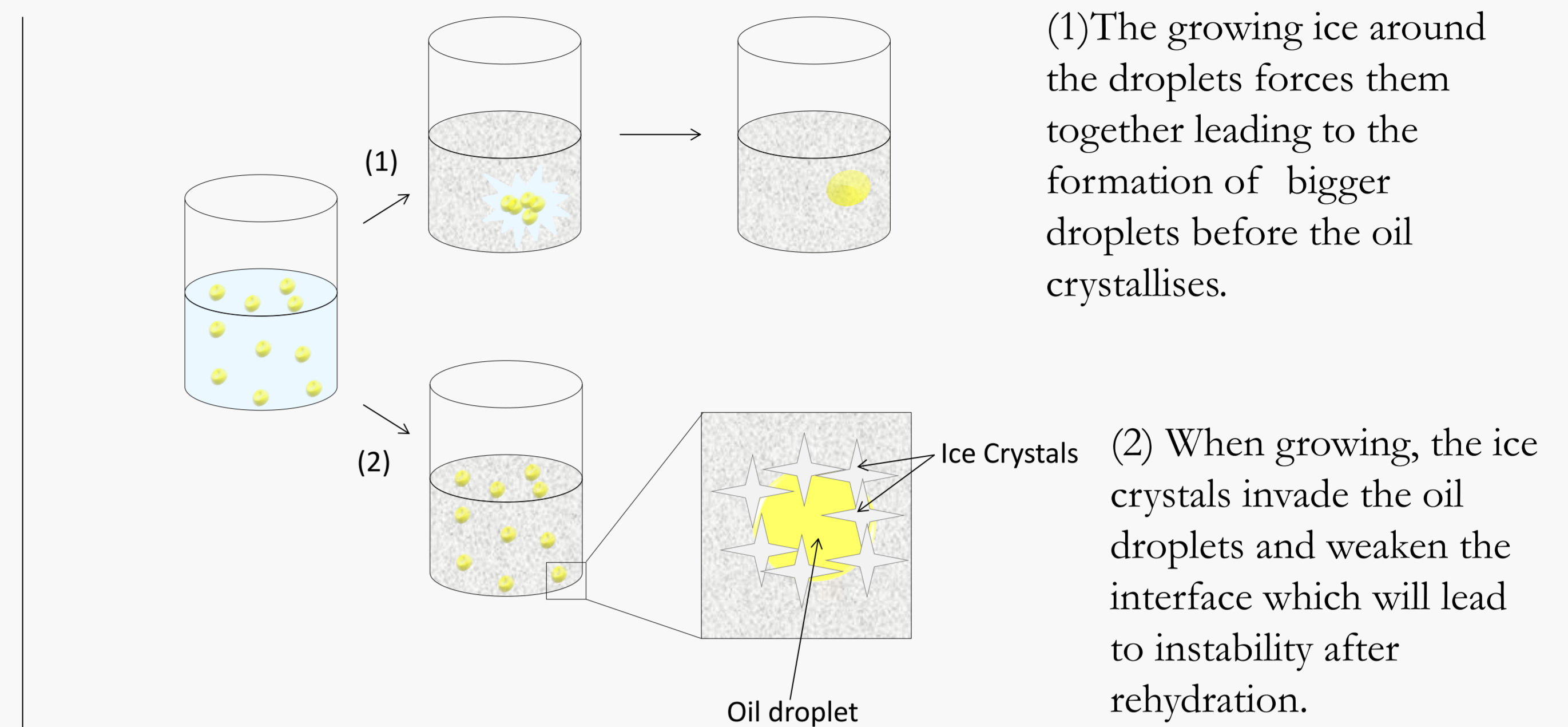
## Introduction

Redispersible dry emulsions can be obtained using freeze-drying. This technique allows previously frozen products to be dried under vacuum.

When it comes to emulsions this freezing step can lead to a major destabilisation of the rehydrated emulsions.

The use of a cryoprotectant can make this step less traumatising for the emulsion.

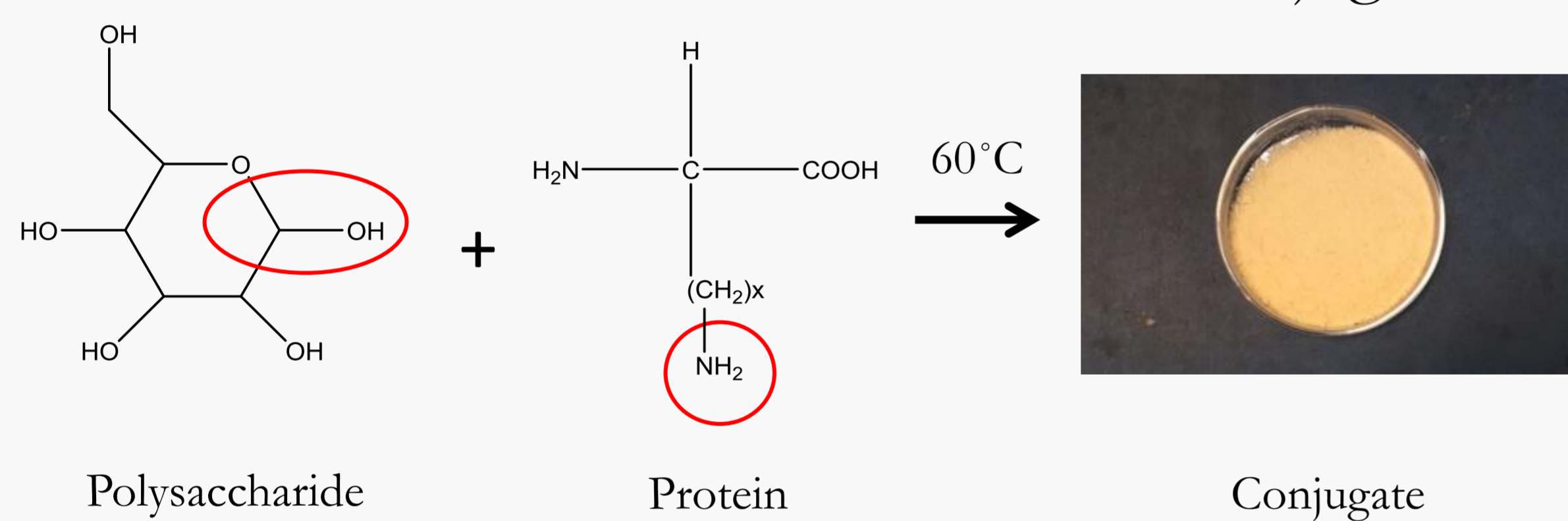
The effect of the addition of sucrose as a cryoprotectant in emulsions to be freeze-dried was studied.



## Material and Methods

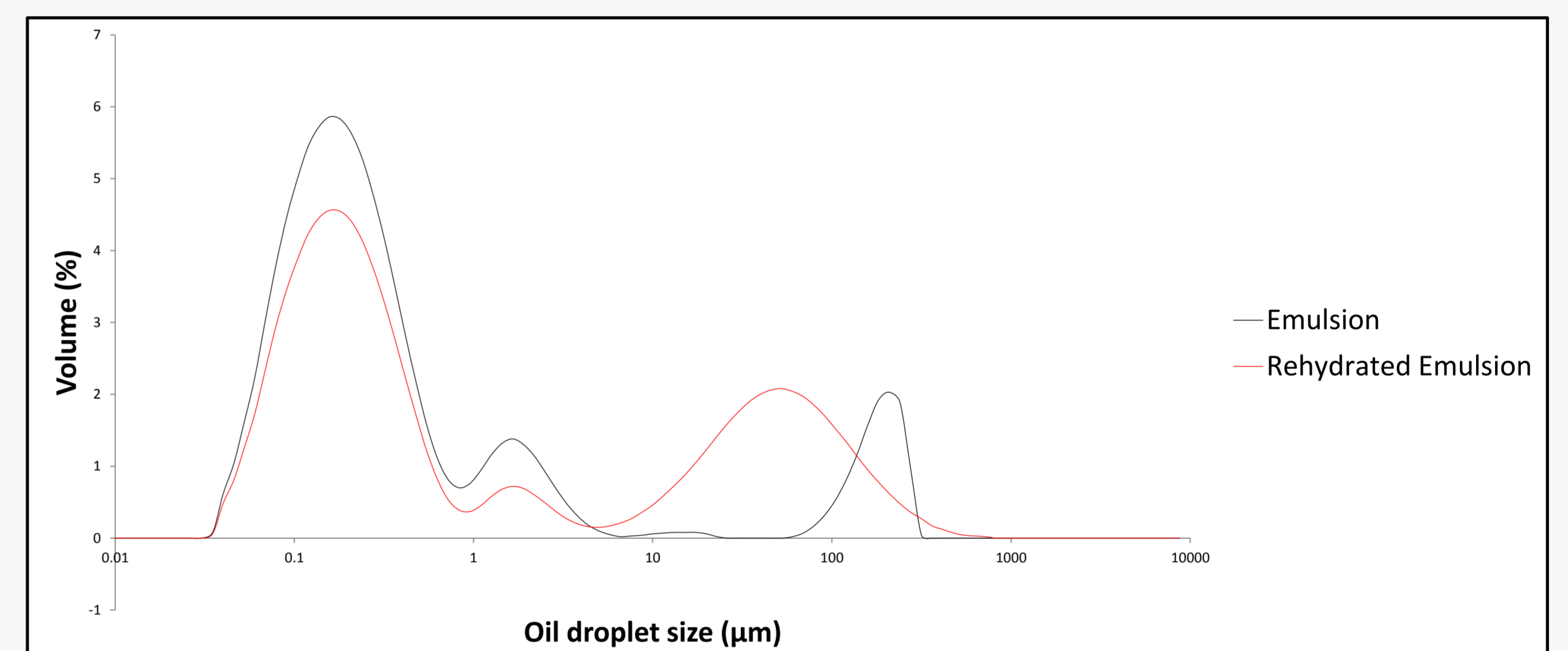
**Oil and water ratios:** The emulsions were made with 20% wt. water and 80% wt. oil.

**Emulsifier:** Caseinate/Maltodextrin Conjugate 7.5% wt.



**Cryoprotectant:** Sucrose 30% wt.

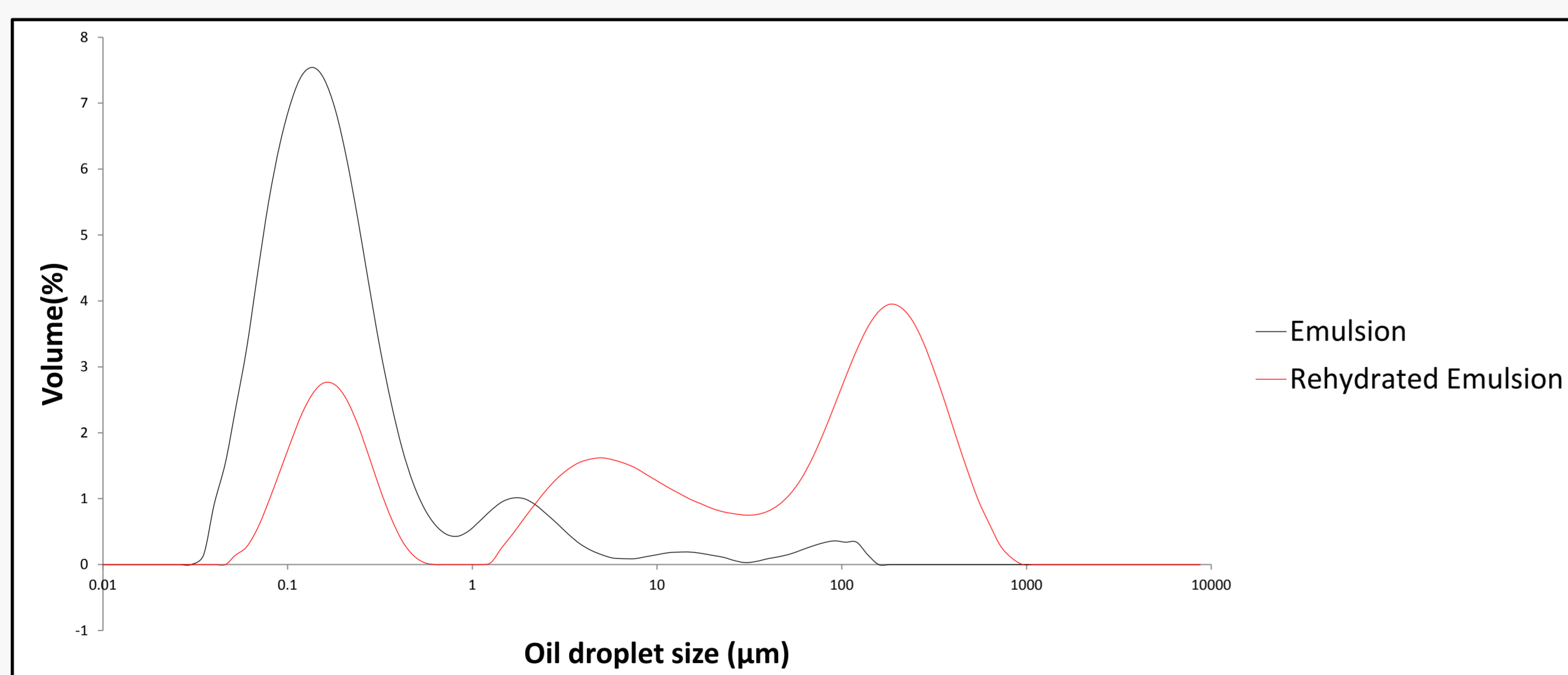
With sucrose, the droplet size was preserved after freeze-drying, from 23 $\mu\text{m}$  to 27 $\mu\text{m}$ .



Droplet size distribution of the emulsions before and after rehydration with cryoprotectant

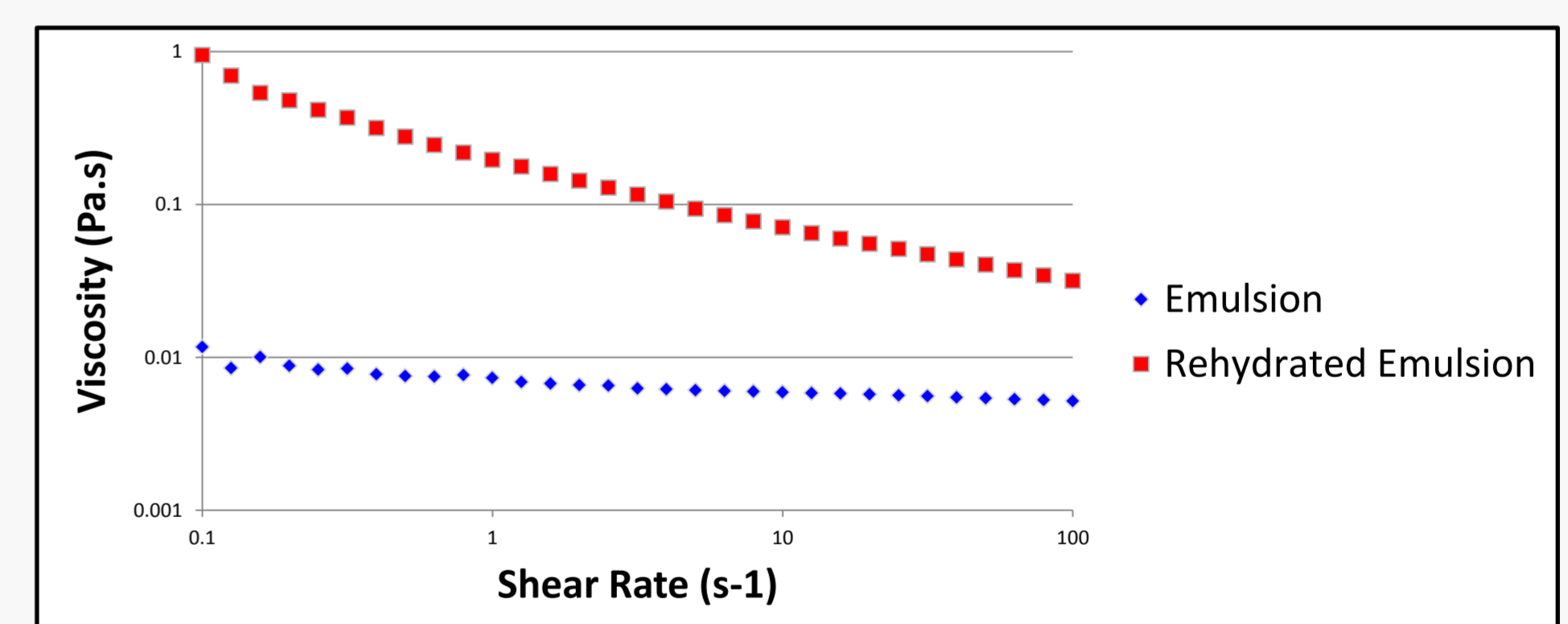
## Results

Without sucrose the droplet size of the rehydrated emulsion drastically increased compared with the initial emulsion. The initial emulsion had a mean droplet size of 3 $\mu\text{m}$ . This value increased to 114 $\mu\text{m}$  in the rehydrated emulsion.



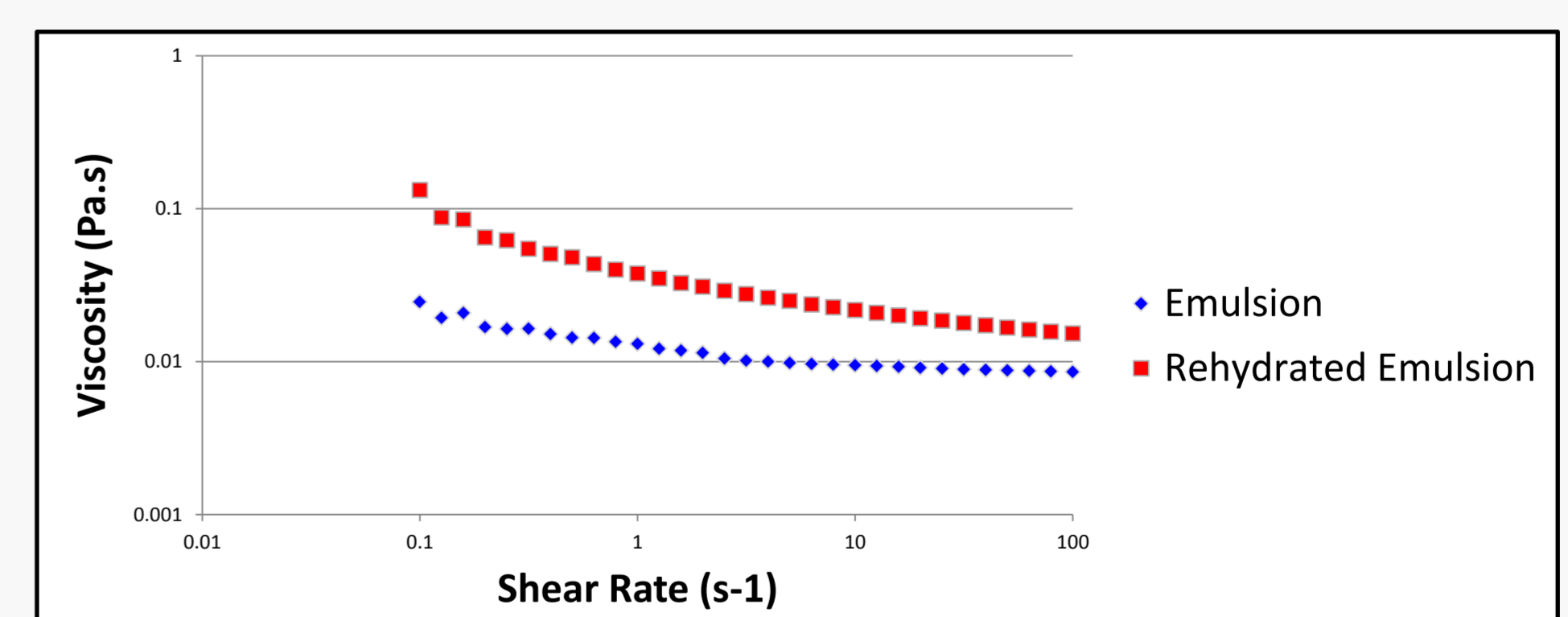
Droplet size distribution of the emulsions before and after rehydration without cryoprotectant

In both cases the viscosity increased when the emulsion was reconstituted.



Viscosity of the emulsions before and after rehydration, without cryoprotectant

However with a cryoprotectant this increase was limited.



Viscosity of the emulsions before and after rehydration, with cryoprotectant

## Conclusion

The conjugate is a potential emulsifier that can stabilise freeze-dried emulsions. Adding a cryoprotectant can help the reconstitution of the emulsion.



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