

Sugar-based surfactants: chemoenzymatic synthesis and interfacial properties evaluation

Sara SANGIORGIO^{1#}, Riccardo SEMPROLI^{2#}, Teodora BAVARO², Giuseppe CAPPELLETTI¹, Giorgio MARRUBINI², Sara NASSERIAN¹, Marco RABUFFETTI¹, Marina S. ROBESCU², Daniela UBIALI², Giovanna SPERANZA¹

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¹Department of Chemistry, Via Golgi 19, Milano (Italy)
²Department of Drug Sciences, Viale Taramelli 12, Pavia (Italy)
#Equal contribution

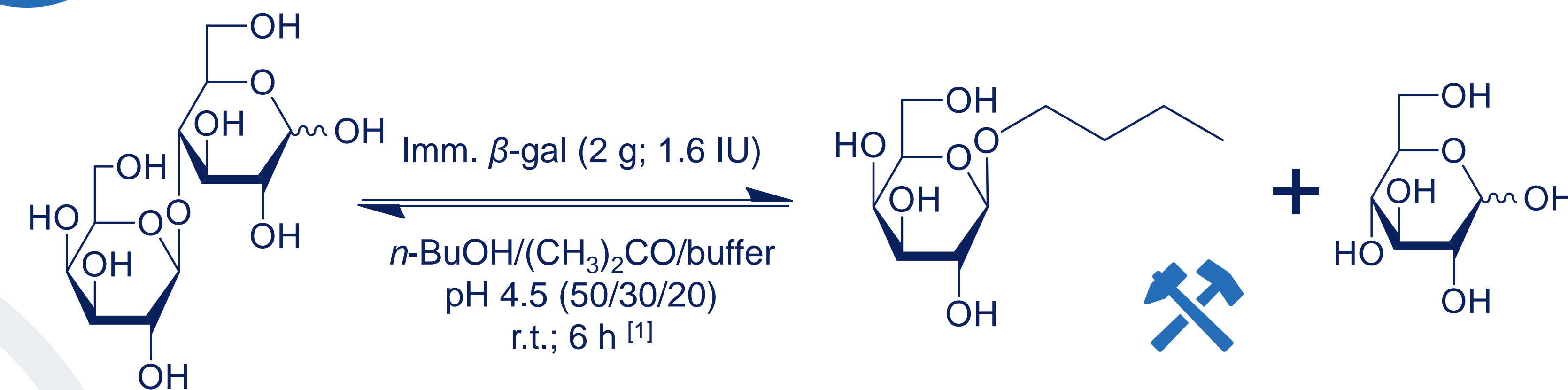
sara.sangiorgio@unimi.it



1 Exploitation of Lactose from Dairy Industry Waste

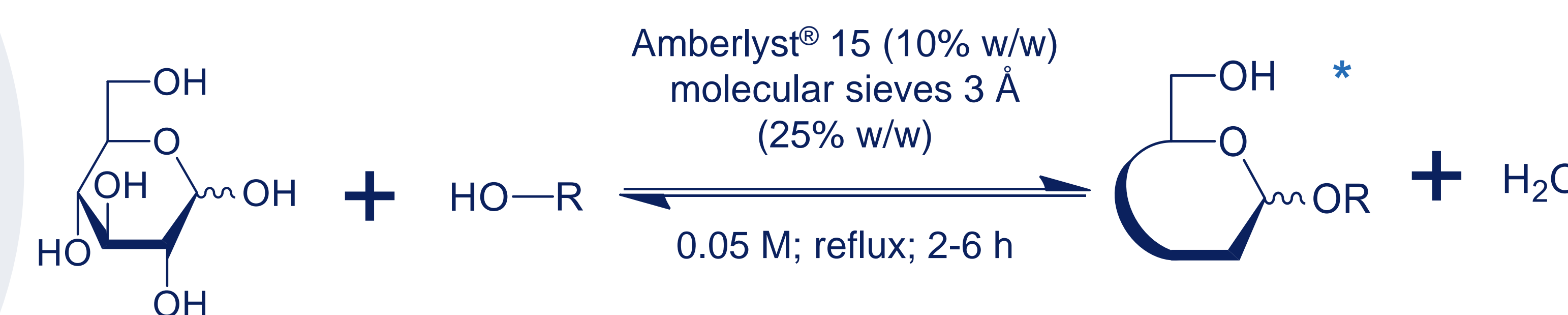
Cheese Whey Permeate Valorization

2 Enzymatic Transglycosylation of Lactose in a Ternary System and Synthesis of Alkyl-O-Glucosides Isomeric Mixtures* with Naturally Occurring Alcohols



Immobilization Yields (%)	
Immobilized activity ¹	94
Activity recovery ²	38

β-gal from *A. oryzae* was immobilized on glyoxyl Sepabeads in 50 mM NaHCO₃ pH 10, 1% w/v galactose; 4° C; 6 h. ¹Activity assay; ²(expressed activity/starting activity)x100.



R-OH	Yield (%)	R-OH	Yield (%)
EtOH	65	2-BuOH	87
1-PrOH	82	2-Me-1-BuOH	70
2-PrOH	65	3-Me-1-BuOH	91
1-BuOH	90	1-HexOH	37

* Mixture of alkyl-O-glucosides (α -, β -glucopyranosides and α -, β -glucofuranosides) have been observed by TLC and NMR analysis.

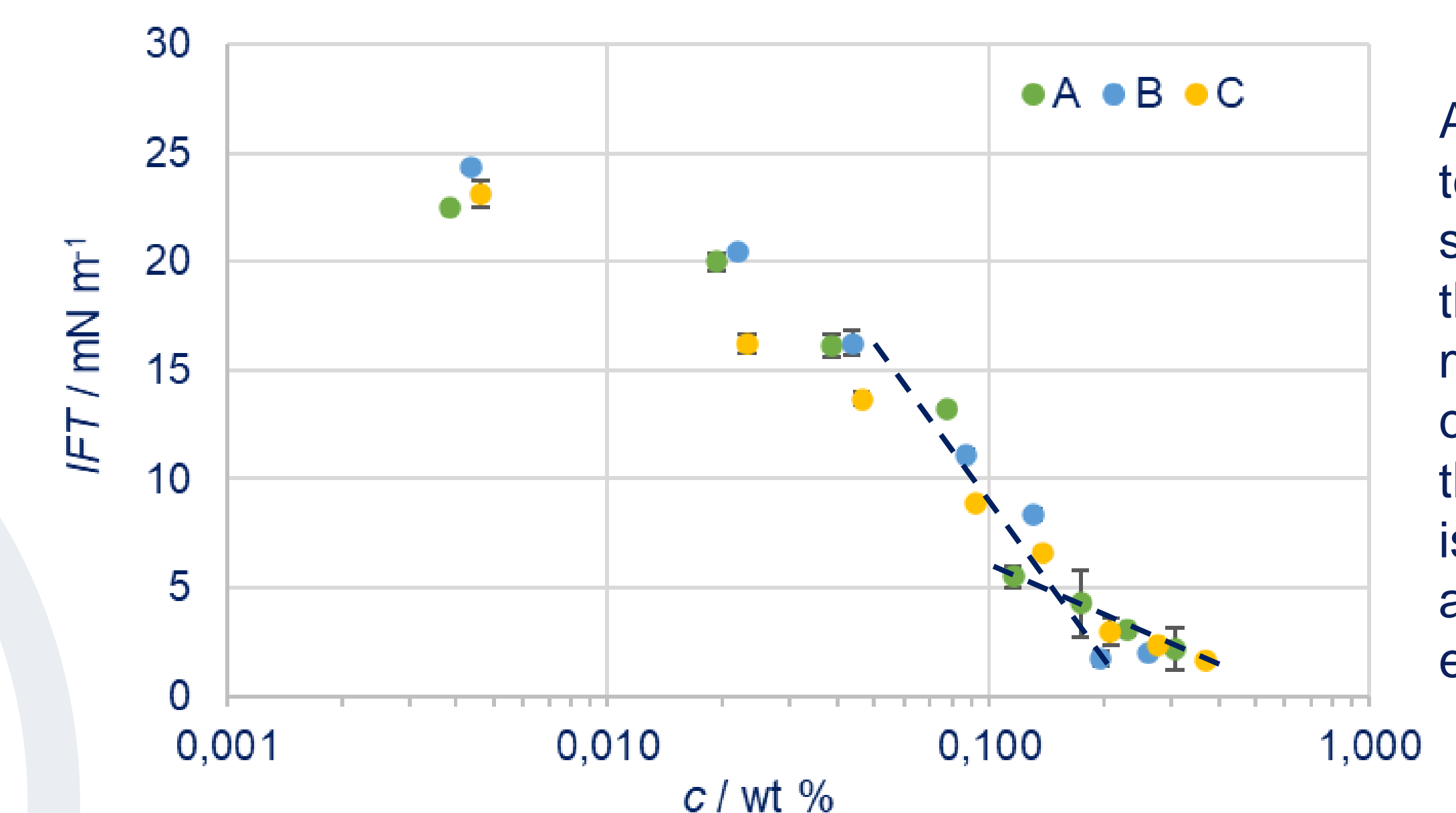
3 Enzymatic Synthesis of 1-O-Butyl Glucoside Fatty Acid Esters Isomeric Mixtures

Chemo-Enzymatic Sugar Derivatization

Enzymatic Synthesis of Sugar-based Surfactants

4 Sunflower Oil / Water Interfacial Tension (IFT) Evaluation of the Prepared Sugar-based Surfactants

By varying the amount of the 6-O-lauryl (A), 6-O-palmityl (B) and 6-O-stearyl-1-O-butyl glucosides (C), the sunflower oil / water interfacial tension (IFT) values were measured by a Gibertini tensiometer exploiting the Du Noüy ring method. [2,3]

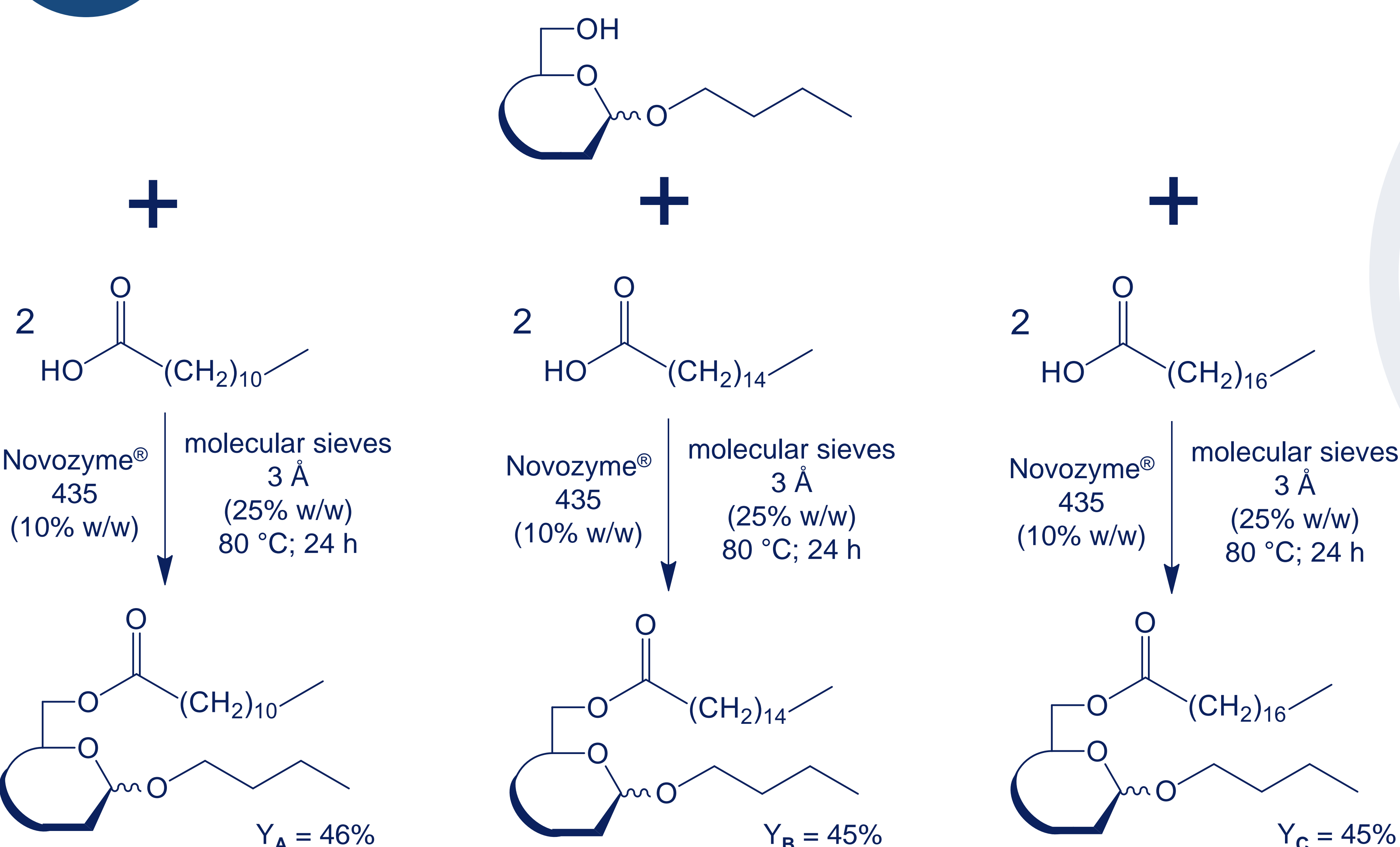


All the three tensides significantly reduce the IFT down to 2-3 mN m⁻¹ at a concentration higher than 0,13 wt %. This is a key factor affecting the emulsion formation.

References

- [1] D. Ahumada, F. Arenas, F. Martinez-Gómez, C. Guerrero, A. Illanes, C. Vera, *Front. Bioeng. Biotechnol.*, **2020**, 8, 859.
- [2] L. Bai, W. Xiang, S. Huan, O.J. Rojas, *Biomacromolecules*, **2018**, 19, 5, 1674-1685.
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Interfacial Properties Evaluation



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