

Producing Polymers from Soybean Oil for Drug Delivery

Introduction

- ❖ We are working on making polymers out of renewable resources in order to administer drugs.
- ❖ The starting material used was high oleic soybean oil.
- ❖ Most drugs being produced to treat diseases are insoluble in water making them difficult to administer.
- ❖ The polymers we are making are amphiphilic for the purpose of making administration easier.

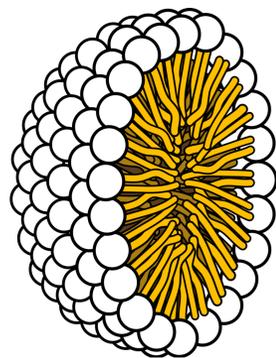
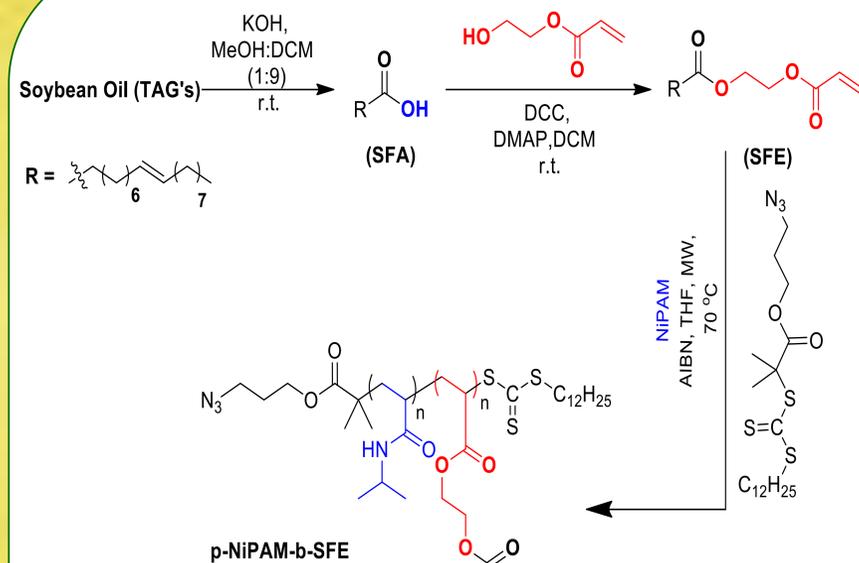


Figure 1: This is a micelle, it is the structure the polymers would form. It is amphiphilic, meaning it is both hydrophobic and hydrophilic. The hydrophobic component would be on the inside and the hydrophilic component would be on the outside. ^a



Scheme, 1: Preparation of amphiphilic block copolymer p-NiPAM-b-SFE by RAFT polymerization

- ❖ The synthesized soybean oil fatty acid monomer was purified by silica gel column chromatography.

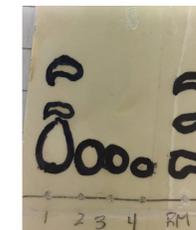


Figure 4: This is a TLC card comparing the purified fractions to the reaction mixture on the right.



Figure 5: Column chromatography, one way to separate impurities from product.

Methodology

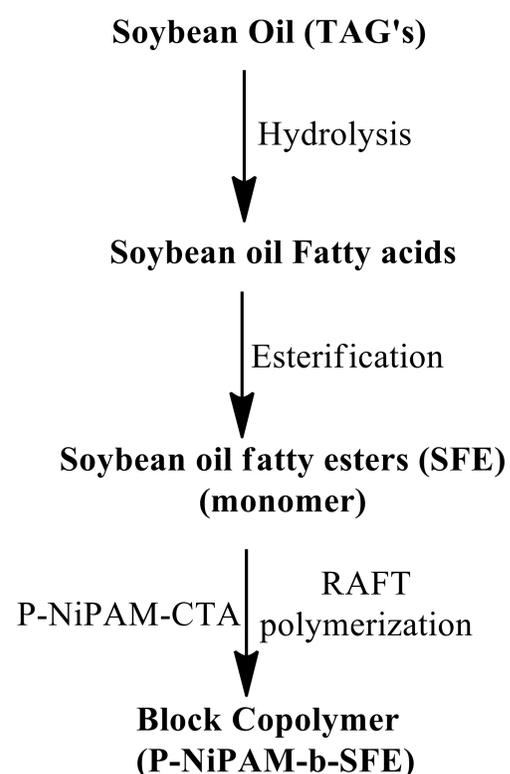


Figure 2: Flow chart representing monomer (SFE) and block copolymer preparation.

Results

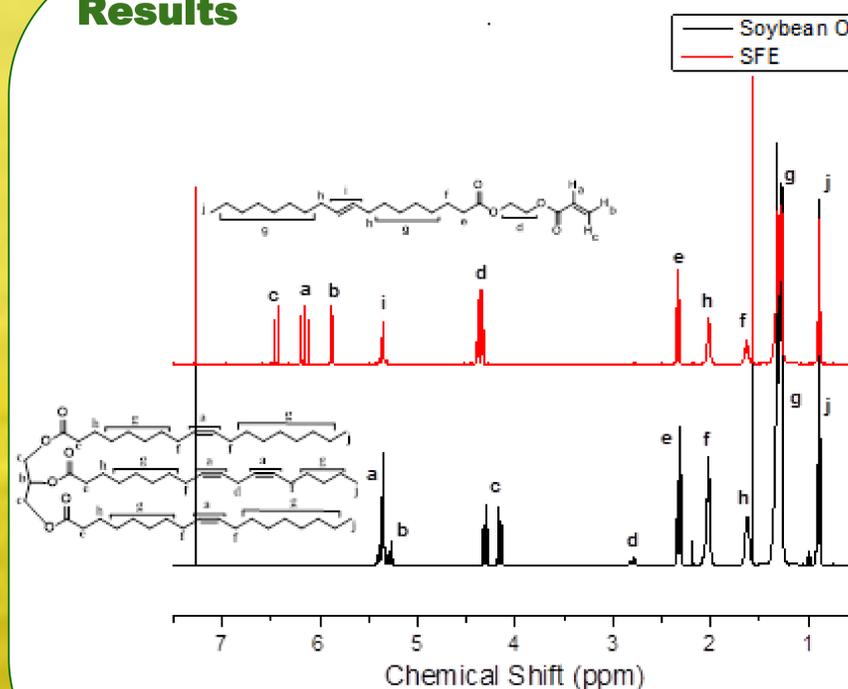


Figure 3: Proton NMR spectra of soybean oil and soybean fatty ester monomer (SFE) in deuterated chloroform. Each peak corresponds to a bond in the molecule.

Conclusions

- ❖ Successful hydrolysis of soybean oil (TAG's) into fatty acids.
- ❖ Successful esterification of fatty acids with 2-hydroxy ethyl acrylate into monomer (SFE).
- ❖ P-NiPAM was also synthesized successfully by RAFT polymerization.
- ❖ The synthesis of fatty acid monomer and homopolymer was confirmed by ¹H NMR spectroscopy.
- ❖ The block copolymer preparation by RAFT method is in process, which will be studied to evaluate its drug encapsulation and release behavior.

Literature Cited

- ^a Villarreal, M. R. (2013, February 20). Phospholipids aqueous solution structures [Diagram]. Retrieved from: <https://commons.wikimedia.org/wiki/File:Micelle.svg>

Acknowledgements

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