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Appendices

Appendix A: Determination degree of deacetylation of chitosan

Determination degree of deacetylation of chitosan was followed the method of Hirai, Odani, and Nakajima [136]. Briefly, 2wt% CD₃COOD/D₂O solution was added to sample and was kept at 70°C to dissolve sample in solution before NMR analysis. 45° single pulse sequence and widths 5.8 μs was used for FID accumulation. The pulse repetition deals and spectral width were 6s and 6000 Hz, respectively. NMR analysis was run at 70°C.

Then, the degree of deacetylation of chitosan was evaluated from equation a.1

$$\text{The degree of deacetylation (\%)} = \left\{ 1 - \frac{\left(\frac{I_{\text{CH}_3}}{3} \right)}{\left(\frac{I_{\text{H}_2} - I_{\text{H}_6}}{6} \right)} \right\} \times 100 \quad (\text{A.1})$$

Where I_{CH_3} was the integral intensity of CH₃ residue. $I_{\text{H}_2} - I_{\text{H}_6}$ was the sum of integral intensities of H₂, H₃, H₄, H₅, H₆, and H_{6'} protons.

CHITUSAN-30AS-1H
 Automation: Biotools
 Pulse Sequence: zgpg30

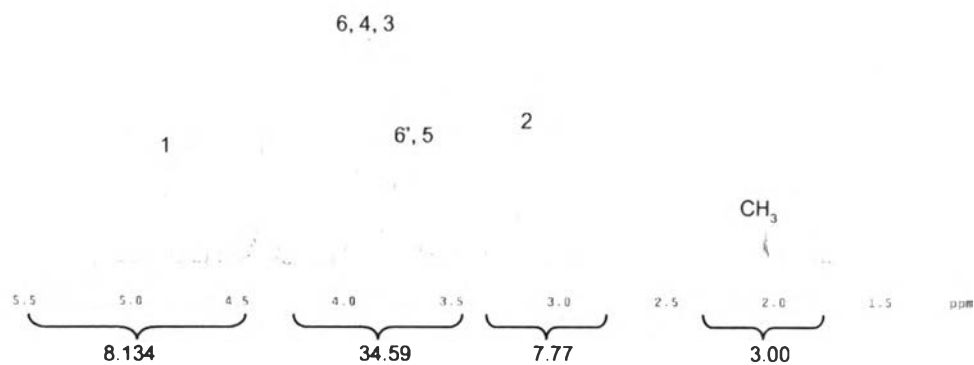
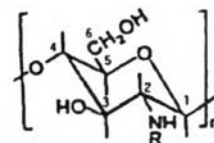


Figure A1. $^1\text{H-NMR}$ spectra of chitosan with degree of deacetylation around 85.

$$\begin{aligned}
 \text{The degree of deacetylation (\%)} &= \left[1 - \frac{\left(\frac{I_{\text{CH}_3}}{3} \right)}{\left(\frac{I_{\text{H}_2} - I_{\text{H}_6}}{6} \right)} \right] \times 100 \\
 &= \left[1 - \frac{\left(\frac{3}{3} \right)}{\left(\frac{34.59 + 7.77}{6} \right)} \right] \times 100 \\
 &= 85.84
 \end{aligned}$$

Appendix B: Calculation HLB of mixed emulsifier

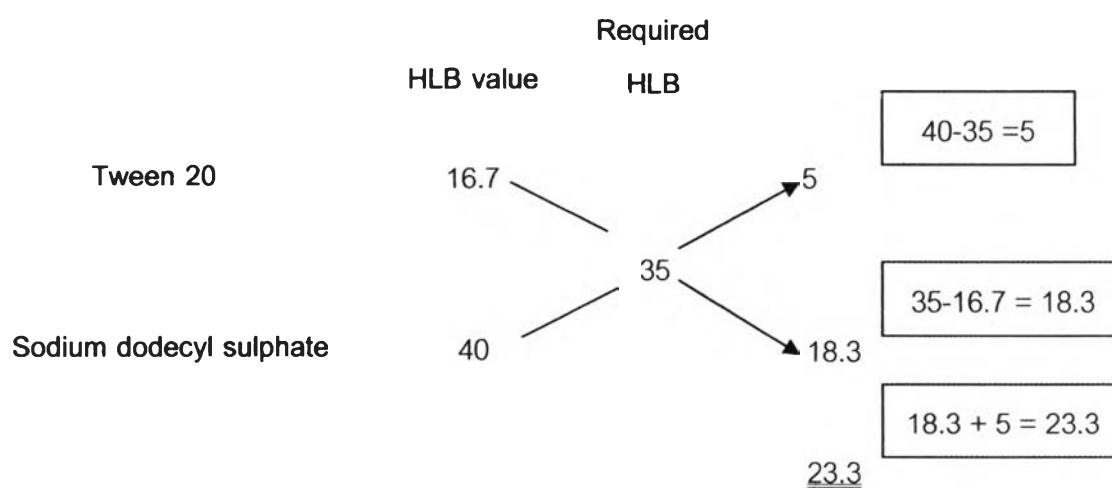
The HLB value of combined emulsifiers was calculated from the sum of each weight of the individual emulsifier multiplied by their HLB values [137].

Example

If a required HLB value was 35. For this purposed a mixture of 0.79% sodium dodecyl sulphate (HLB 40) and 0.21% of tween 20 (HLB 16.7) could be tried:

$$\text{HLB} = (40 \times 0.79) + (16.7 \times 0.21) = 35$$

Schematic drawing of calculation:



From formula used emulsifier 1% w/v = 1g/100 ml

Emulsifier	23.3	parts was assumed	1	g
Emulsifier	5	parts was assumed	(1 x 5)/23.3	g
			= 0.2146	g

We will use tween 20 0.2146 g. to mix with sodium dodecyl sulphate 0.7854 g. in solution 100 ml.

Appendix C: Workmanship of Suchada Chongprakobkit

A. SCHOLARSHIPS

2008-2010 **Thailand Graduate Institute of Science and Technology (TGIST)**
(TG-55-09-51-033D)

National Science and Technology Development Agency

2009-2010 **The 90th Anniversary of Chulalongkorn University Fund**
(Ratchadaphiseksomphot Endowment Fund) (65455202100005)

Graduate School, Chulalongkorn University

B. LIST OF CONFERENCES (POSTER)

1. **43rd IUPAC World Polymer Congress**

At Glasgow, United Kingdom on July 11-16, 2010

Title: Evaluation of emulsifying capability of water soluble sodium phosphorylated chitosan.

C. LIST OF PUBLICATIONS

1. S. Chongprakobkit, R. Maniratanachote, S. Chirachanchai, W. Tachaboonyakiat.
Novel Sodium Phosphorylated Chitosan Emulsion: An approach for Encapsulation (*In preparation*).
2. S. Chongprakobkit, R. Maniratanachote, S. Chirachanchai, W. Tachaboonyakiat.
The Effect of Systematic Conditions on Destabilization Mechanism of Emulsion Emulsify by Sodium Phosphorylated Chitosan (*In preparation*).

VITAE

PERSONAL DATA

Name: Suchada Chongprakobkit
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EDUCATION

June 1999 - May 2003 **Bachelor of Engineering**
 Department of Materials Science and Engineering,
 Faculty of Engineering and Industrial Technology,
 Silpakorn University, Nakhon Pathom, Thailand
Major: Petrochemiclas and Polymeric Materials

November 2003- October 2005 **Master of Science**
 Department of Materials Science, Faculty of Science,
 Chulalongkorn University, Bangkok, Thailand
Major: Applied Polymer Science and Textile Technology
Thesis Title: Synthesis of Maleic Anhydride Grafted Polypropylene by
 Solution Process for Using as Compatibilizer in
 Polypropylene/Polyamide 6 blends

May 2006 - present **Doctor of Philosophy**
 Doctor of Philosophy Program in Nanoscience and Technology,
 Graduate School, Chulolongkorn University, Bangkok, Thailand
Major: Nanoscience and Technology
Dissertation title: Development of Anionic Chitosan Derivative as
 Water Soluble Emulsifier

