

بسم الله الرحمن الرحيم

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## **Abstract**

**Poly ethylene glycol (PEG4)oleate nonionic surfactant was synthesized using a general method by esterification of poly ethylene glycol (PEG4) as hydrophilic portion with oleic acid as hydrophobic portion of the surfactant. IR was used to investigate esterification product which shows peaks at  $1739.69\text{ cm}^{-1}$ ,  $1137.92\text{ cm}^{-1}$  due to (C=O) and (C-O) groups respectively, which confirm the presence of ester function. The hydrophilic-lipophilic balance (HLB) of the prepared surfactant was calculated using Griffin's method and found that the HLB for PEG4 mono and dioleate was 8.176, 5.138 respectively. The surfactant functionality in emulsification was investigated using n-hexane as oil phase and water. Dilution test showed that the type of emulsion was to be w/o type.**

## المخلص:-

باستخدام الطريقة العامة تم تحضير مادة أوليات البولي اثيلين جلاكول اللا ايونية وهي مادة ذات نشاط سطحي و تستخدم هذه المادة في تحضير المستحلبات وذلك بتفاعل استرة البولي اثيلين جلاكول ذي الاربع جزيئات ايثوكسيد ممثلا الجزء المحب للماء مع حمض الاوليك الجزء الكاره للماء . وتم تأكيد عملية الاسترة بتحليل المركب الناتج بالاشعة تحت الحمراء والتي اظهرت امتصاصين في  $1739.69$  سم<sup>-1</sup> و  $1137.92$  سم<sup>-1</sup> مما يؤكد وجود مجموعتي الكربونيل والايثوكسيد علي التوالي وهذا يدل علي حدوث عملية الاسترة . وبطريقة العالم قريفن تم حساب قيمة.

لثنائية HLB سم<sup>-1</sup> لمركب أوليات البولي اثيلين جلاكولواحادية الأوليات. و  $5.138$  سم<sup>-1</sup> وكانت القيمة هي  $8.176$  ثم تم اختبار مقدرة مادة أوليات البولي اثيلين جلاكول في تكوين المستحلب بتحضير مستحلب بين مركب الهكسان العادي كطور زيتي والماء واظهر اختبار التخفيف ان المستحلب من النوع ماء في زيت.

## Table of content

content	Page No
الإبارة	I
<b>A cknowldgment</b>	V
<b>Abstract</b>	III
<b>Abstract in arrabic</b>	V
<b>Table of contents</b>	V
<b>List of table</b>	VI
<b>List of figure</b>	VII
<b>List of abbreviations</b>	VIII
<b>Chapter one introduction</b>	
<b>1.1 True solution</b>	<b>1</b>
<b>1.2 Suspensions</b>	<b>1</b>
<b>1.3 colloids</b>	<b>2</b>
<b>1.4formation of colloids</b>	<b>4</b>
<b>1.5 shape of colloidal particles</b>	<b>4</b>
<b>1.6 emulsifying agent</b>	<b>5</b>
<b>1.7 characteristic feature of surfactant</b>	<b>7</b>
<b>1.8classification and applications of surfactants</b>	<b>9</b>
<b>1.9 PolyEthyleneGlycol ester surfactants</b>	<b>13</b>
<b>1.10 emulsion</b>	<b>15</b>
<b>1.11 type of emulsions</b>	<b>15</b>
<b>1.12 pharmaceutical applicationsof emulsion</b>	<b>17</b>
<b>1.13 hydrophilic hydrophobic HLB system</b>	<b>18</b>
<b>1.14 emulsification process</b>	<b>18</b>
<b>1.15 stability</b>	<b>19</b>
<b>1.16 the effect of defferent process variable on emulsion stability</b>	<b>27</b>
<b>1.17 emulsification equipments</b>	<b>28</b>
<b>1.18 foaming during agitation process</b>	<b>29</b>
<b>1.19 emulsion stability assessment</b>	<b>30</b>
<b>1.20 test for identification emulsion type</b>	<b>30</b>
<b>1.21 how to measure stability</b>	<b>31</b>
<b>1.22 objective</b>	<b>38</b>
<b>Chapter tow material and method</b>	
<b>2.1 material and method</b>	<b>39</b>
<b>2.2 methods</b>	<b>39</b>
<b>Chapter three results and discussions</b>	
<b>3.1 results and discussions</b>	<b>42</b>
<b>3.2 HLB calculations</b>	<b>42</b>
<b>3.3 Emulsion type test</b>	<b>44</b>
<b>3.4 Emulsion stability</b>	<b>44</b>
<b>3.5 conclusions</b>	<b>35</b>

## List of tables

<b>Table</b>	<b>Page No</b>
<b>Table 1.1</b> Types of colloidal systems	<b>3</b>
<b>Table 1.2</b> Common colloid types	<b>5</b>
<b>Table 1.3</b> Some commonly used emulsifying agents, their HLB values, characteristics and functions.	<b>6</b>
<b>Table 1.4</b> Classification of emulsifying agents on the basis of presence of formally charged groups in their heads	<b>7</b>
<b>Table 1.5</b> Common hydrophilic groups found in commercially available surfactants	<b>10</b>
<b>Table 1.6</b> Hydrophobic groups used in commercially available surfactants	<b>10</b>
<b>Table 1.7</b> PEG Monoleate Surfactants Corresponding nonylphenolethoxylates	<b>14</b>
<b>Table 2.1</b> The phases and surfactant ratio in emulsion	<b>40</b>
<b>Table 3.1</b> Emulsion diluted with acetone and water	<b>44</b>
<b>Table 3.2</b> variation of separated volume ( $V_x$ ) vs time h	<b>45</b>
<b>Table 3.3</b> $V_x/V_\infty$ ratio with time	<b>46</b>

## List of Figure

<b>figure</b>	<b>Page No</b>
<b>Figure 1.1 Types of solutions</b>	<b>1</b>
<b>Figure 1.2 Chemical structure of typical double-chain surfactants.</b>	<b>11</b>
<b>Figure 1.3 O/W emulsion.</b>	<b>16</b>
<b>Figure 1.4 O/W emulsion</b>	<b>16</b>
<b>Figure 1.5 Three cases of interdrop repulsion</b>	<b>23</b>
<b>Figure 1.6 Three cases of variation of the interdrop forces versus interdrop distance according to the extension of the DLVO theory</b>	<b>17</b>
<b>Figure 1.7 Instability types of emulsion.</b>	<b>25</b>
<b>Figure 1.8 Variation of the separated phase volume vs. time</b>	<b>33</b>
<b>Figure 1.9 Comparison of the stability of two emulsions (A and B) according to the criterion defined in figure 1.8</b>	<b>36</b>
<b>Figure 3.1 IR spectroscopy</b>	<b>43</b>
<b>Figure 3.2 variation of separated volume <math>V_x</math> Vs time</b>	<b>45</b>
<b>Figure 3.3.3 comparison of the stability of the three emulsion according to criterion defined in figure 3.1. <math>V_x/V_\infty</math> against time</b>	<b>46</b>

## List Abbreviations

**PEG 4** poly ethylene glycol with 4 ethylene group

**NPE** nonyl phenol ethoxylate

**HLB** hydrophilic-lipophilic balance

**w/o** water in oil emulsion

**o/w** oil in water emulsion

**v** velocity separation

**D<sub>r</sub>** density difference

**R** sphere radius

**D** diameter of the particle

**V<sub>x</sub>** separated volume at time t

**V<sub>∞</sub>** Separated volume at infinite time

**η** viscosity

**g** gravitational acceleration

**ρ<sub>s</sub>** dispersed phase density

**ρ<sub>o</sub>** continuous phase density

**c<sub>m</sub>** critical micelles concentration





**Sudan University of Science and Technology**

**College of Graduate Studies**



# **POLY ETHYLENE GLYCOL SYNTHESIS AND APPLICATION IN EMULSION**

**تخليق مادة ايثايلين جلايكول وتطبيقه في المستحلبات**

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