temperature for all products and thus does not depend on elongational behaviour. In table 1 the Newtonian viscosity at $T_{RB}$ was calculated using the William-Landel-Ferry equation

$$\eta_0(T) = \eta_0(T_s) \cdot 8.86(T - T_s)/(101.6 + T - T_s). \quad (3)$$

Figure 6 shows the penetration versus $\eta_0$ and $\tau_w$ at 30°C for all samples. Clearly the penetration is correlated to the Newtonian viscosity. It should be emphasized that different correlations are obtained for asphalts and asphalt-polymer. Furthermore, no correlation is obtained for the characteristic time. Thus it could be conjectured that the penetration is correlated not only with properties in shear but also with properties in elongation. In order to discuss this point further it is necessary to model the mechanical behaviour in shear as well as in elongation; further work in this direction is in progress.

References

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Rheological investigation of compositions of thixotropic disperse systems for cosmetic purposes

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Abstract: Rheological measurements of pharmaceutical creams are very important for the control of their quality and long-time stability. The paper deals with the results obtained from rheological investigations of structure stability, lubricity at different temperatures, viscoelastic properties and structure breakdown of a new Bulgarian antiallergic cream “Aviramin”. Rheological comparison with some other antiallergic creams is made.

Key words: Thixotropic disperse system, antiallergic cream, storage time, temperature effect

1. Introduction

The control of consistency and stability is very important for pharmaceutical cream products. Creams are usually non-Newtonian systems and display complex rheological properties – elasticity, viscosity, yield value and thixotropy – which are necessary for their utilization. The aim of the paper is to present the results from rheological measurements of the anti-allergic cream “Aviramin” produced by “Pharmachim”, Bulgaria. The cream is used in cases of allergy when different allergents affect the skin. Its active component is based on chlorpheniramine maleate ($C_{16}H_{19}CIN_2C_4H_4O_9$) which has a good solubility in water and allows the production of dermatologic substances of the “oil-water” type.

On the basis of rheological studies the structural and mechanical properties of the cream were deter-
Table 1. Influence of storage time on the structural and mechanical constants for Aviramin cream

<table>
<thead>
<tr>
<th>Storage time (day)</th>
<th>(G) (Pa)</th>
<th>(G_{\text{eq}}) (Pa)</th>
<th>(\eta_0 \cdot 10^3) (Pa·s)</th>
<th>(\sigma_0) (Pa)</th>
<th>(\sigma_d) (Pa)</th>
<th>(S) (cm²)</th>
<th>(d \cdot 10^{-3}) (Pa·s)</th>
<th>(\phi') (Pa·s)</th>
<th>(P \cdot 10^{-3}) (s⁻¹)</th>
<th>(D_{\text{max}})</th>
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<td>863</td>
<td>16.1</td>
<td>30.7</td>
<td>0.30</td>
<td>441.3</td>
<td>87.8</td>
<td>13.6</td>
<td>11.6</td>
<td>3.3</td>
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<td>3</td>
<td>702</td>
<td>26.4</td>
<td>41.4</td>
<td>0.27</td>
<td>399.8</td>
<td>87.8</td>
<td>11.0</td>
<td>14.2</td>
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<td>9.7</td>
</tr>
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<td>877</td>
<td>25.3</td>
<td>45.1</td>
<td>0.22</td>
<td>380.3</td>
<td>78.1</td>
<td>12.8</td>
<td>11.4</td>
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<td>23.9</td>
<td>48.2</td>
<td>0.27</td>
<td>382.8</td>
<td>85.3</td>
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<tr>
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<td>97.5</td>
<td>10.4</td>
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<td>1480</td>
<td>22.2</td>
<td>52</td>
<td>0.26</td>
<td>408.2</td>
<td>122.1</td>
<td>10.8</td>
<td>6.8</td>
<td>3.8</td>
<td>7.9</td>
</tr>
</tbody>
</table>

Deformation processes developing in the samples studied describe quantitatively the transition of the system into a stable state. After 10 days storage a large rise in \(G\) modulus and decrease in cream deformability is observed. These changes are due to advanced molecular interactions in the system. After about 20 days the cream structure is formed and remains stable for at least one year. The plasticity and mobility of the system do not change much during this period.

3.2. Temperature effect and thixotropy

The influence of temperature on the flow of the cream is shown in figure 1. At 20°C the rheograms are characterized by a hysteresis loop and a well-defined yield point. An increase in temperature causes a breakdown of the aggregate structure of the "oil-water" system and consequently a decrease in the values of \(\eta_{\text{app}}, \sigma_0, \) and \(\sigma_d\). Up to 40°C the cream is still a "solid-like" body, but at 48°C becomes a pseudoplastic system with a very low value for \(\eta_{\text{app}}\).

Figure 2 shows the influence of the storage time on the degree of thixotropic recovery at 20°C. Rheogram I was obtained after 96 hours storage in the viscometer. Rheogram II was obtained after the material had been rested for about 30 minutes after the