Preparation and characterization of soybean oil-based waterborne polyurethane/acrylate hybrid emulsions for self-matting coatings

Yeyun Meng a,b, Peng Lv a,b, Qi Liu a,b, Bing Liao c, Hao Pang a *, Weiqu Liu a *. 

a Key Laboratory of Cellulose and Lignocellulosics Chemistry, Guangzhou Institute of Chemistry, Chinese Academy of Sciences, Guangzhou 510650, China

b School of Chemistry and Chemical Engineering, University of Chinese Academy of Sciences, Beijing 100049, China

c Guangdong Academy of Sciences, Guangzhou 510650, China

Table S1 General Properties of MESO

<table>
<thead>
<tr>
<th>Polyol</th>
<th>OH number (mg KOH/g)</th>
<th>Acid number (mg KOH/g)</th>
<th>Iodine value (g/100 g)</th>
<th>Hydroxyl functionality</th>
<th>Equiv weight (g/equiv)</th>
<th>Mw</th>
<th>Mw</th>
</tr>
</thead>
<tbody>
<tr>
<td>MESO</td>
<td>129</td>
<td>0.5</td>
<td>6</td>
<td>2.4</td>
<td>434</td>
<td>1030</td>
<td></td>
</tr>
</tbody>
</table>

Table S2 Chemical composition

<table>
<thead>
<tr>
<th>Polyol</th>
<th>Molar ratio</th>
<th>Residual NCO (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>polyol</td>
<td>OH (MESO)</td>
<td>NCO (IPDI)</td>
</tr>
<tr>
<td>MESO</td>
<td>1.0</td>
<td>1.2</td>
</tr>
</tbody>
</table>

The hydroxyl value of polyols were determined by Acetic Anhydride Acetylation.

Measurement process
1. Prepare 0.5 N KOH solution;

2. Prepare acetylation reagent: 80 mL of ethyl acetate, 1 g of p-toluenesulfonic acid, and 9 mL of acetic anhydride were mixed in a brown erlenmeyer flask;

3. Prepare pyridine aqueous solution: pyridine and water were mixed with the ratio of 2:1 in a brown erlenmeyer flask.

4. 10 mL acetylation reagent and W g were mixed in the iodine flask, and the reaction kept at 65 °C for 30 min. Then, the reaction mixture was cooled to room temperature, subsequently, 20 mL pyridine aqueous solution was added to the iodine flask. Add 0.1 mL of the phenolphthalein indicator solution and titrate immediately with the 0.5 N KOH solution to a pink end point that persists for at least 15 s.

Calculate the hydroxyl number, mg KOH/g, of sample as follows:

Hydroxyl number = \[(A-B)N \times 56.1\]/W

where:

A = KOH required for titration of the blank, mL,

B = KOH required for titration of the sample, mL,

N = normality of the KOH, and

W = sample used, g.