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Preparation and properties of modified porous starch/carbon black/natural rubber composites

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# 1            **Preparation and Properties of Modified Porous** 2            **Starch/Carbon Black/Natural Rubber Composites**

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## 8    **Abstract**

9    Starch is considered as a cost-effective, abundant, renewable and  
10    environmental-friendly filler for rubber reinforcement via proper modification. In  
11    the present study, porous starch (PS) was modified by esterification with  
12    dodecenyl succinic anhydride (DDSA) for preparation of DDSA-modified porous  
13    starch (DDSA-PS). The suitable esterification conditions (e.g., temperature, time  
14    and dosage of DDSA) were discussed by single-factor experiments as 40 °C, 8 h,  
15    and 8 wt % (based on porous starch dry weight), respectively. Later on, a series  
16    of DDSA-PS/carbon black (CB)/natural rubber (NR) composites were prepared  
17    from the mixture of carbon black and DDSA-PS/NR compound that was pre-  
18    processed by co-coagulation of DDSA-PS and rubber latex. When the total filler  
19    dosage is constant as 60 parts per hundred rubber (phr), various properties of  
20    DDSA-PS/CB/NR composites were investigated by varying the composition ratio  
21    of DDSA-PS/CB. The results showed that when the ratio of DDSA-PS/CB was

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