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Effects of Different Pretreatments on Compression Molding of Wheat Straw and Mechanism Analysis

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1 **Effects of Different Pretreatments on Compression Molding of Wheat Straw and**
2 **Mechanism Analysis**

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6 **Abstract**

7 This study investigated effects of various pretreatments on characteristics of
8 compression molded wheat straw and molding energy consumption. And correlative
9 mechanism was explored. Pretreatments included natural air drying, vacuum sealing,
10 4% ammonium hydroxide+vacuum sealing. Hemicellulose and lignin contents and
11 crystallinity decreased following pretreatments, while surface porosities increased.
12 Cellulose and ash levels and lower heat value were not significantly affected ($P>0.05$),
13 while water resistance decreased and relax density and fall strength satisfied relevant
14 standards. Ignition index and comprehensive combustibility index of samples treated
15 with 4% ammonium hydroxide+vacuum sealing were the greatest, and molding energy
16 consumption was also the lowest. Optimal pretreatment time was 21 days. Mechanism
17 analysis indicated that crystallinity affected water resistance, lignin affected combustion
18 characteristics and hemicellulose affected molding energy consumption to the greatest
19 extent. Overall, 4% ammonium hydroxide+vacuum sealing pretreatment had the most
20 beneficial effect on compression molding and resulted in the lowest energy
21 consumption.

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