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Curing Kinetics and Mechanical Properties of Aldol Resin Cured by Ionic Liquid

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Abstract: To obtain a friendly green catalyst for aldol resin, the ionic liquid $[\text{HSO}_3\text{-pHim}]\text{HSO}_4$ was applied to cure aldol resin. The curing kinetics of aldol resin were studied by differential scanning calorimetry (DSC) method, and the mechanical properties of aldol resin based PBXs were studied by electronic universal testing machine. Results show that the average apparent activation energy, frequency factor and reaction order are $2.59 \text{ kJ} \cdot \text{mol}^{-1}$, 994.61 s^{-1} and 0.93, respectively. When the content of $[\text{HSO}_3\text{-pHim}]\text{HSO}_4$ is 0.9% and curing temperature is $30 \text{ }^\circ\text{C}$, the tensile strength, compression strength and elongation to fracture of PBX are 16 MPa, 41 MPa and 0.81%, respectively. Comparing to cured by diethyl sulfate (DES), the compression modulus of the PBX cured by $[\text{HSO}_3\text{-pHim}]\text{HSO}_4$ decrease by 35%.

Key words: polymer bonded explosive; $[\text{HSO}_3\text{-pHim}]\text{HSO}_4$; aldol resin; mechanical properties

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《含能材料》“损伤与点火”征稿

含能材料的损伤特征与点火过程有密切的联系,炸药、推进剂的内部损伤及其对力学特性、安全特性和点火行为的影响规律受到了含能材料学界的高度重视,为推动这一重要研究方向的学术交流,本刊特设立“损伤与点火”专栏。专栏主要征集炸药、推进剂等含能材料的损伤观测与多尺度表征技术、含损伤的本构方程、准静态与动态损伤演化规律、损伤与破坏的宏(细)观模式、损伤对起爆、爆炸、爆轰成长以及非冲击起爆行为的影响等方向的原创性研究论文。来稿请注明“损伤与点火”专栏。

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