

## Evaluation of the Reactivity of HM X with Materials by Use of the Time to Complete Melting and Decomposing (TCMD) of Isothermal DSC Curve

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**Abstract** The isothermal DSC measurement is used to test the reactivity of various materials with HM X by measuring the time to complete melting and decomposing (TCMD). The results show that TCMD is an accurate screening criterion for materials which will be added to and in contact with HM X.

**Key words** analytical chemistry; HM X; TCMD; diphenylamine (DPA);  $\text{NH}_4\text{ClO}_4$ ; methyl centralite ( $\text{C}_2$ ); DSC; reactivity

## 用等温DSC曲线的全熔分解时间评价 HM X与材料的反应性

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**摘要** 用测定全熔分解时间(TCMD)的等温DSC法检验了各种材料与HM X的反应性, 结果表明, TCMD是一个精确筛选HM X组分和HM X接触材料的判据。

**关键词** 分析化学; HM X; TCMD; DPA;  $\text{NH}_4\text{ClO}_4$ ;  $\text{C}_2$ ; DSC; 反应性

**中图分类号**: TJ 55; TQ 560.71; O 657.909

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HM X decomposes partly before melting, and the melting is accompanied by decomposition, showing that it is difficult to obtain the kinetic parameters to evaluate the reactivity of HM X with other materials. In order to obtain information about the reactivity of HM X with various materials, an isothermal DSC measurement used for testing the reactivity or compatibility of various materials with HM X by measuring the time to complete melting and decomposing (TCMD) is presented. Table 1 and Fig. 1 show the values of TCMD for HM X of 1.5 mg and the 50/50-HM X/diphenylamine (DPA), 50/50-HM X/methyl centralite

( $\text{C}_2$ ) and 50/50-HM X/ $\text{NH}_4\text{ClO}_4$  binary mixtures of 1.5 mg/1.5 mg at different temperatures, indicating that:

(1)  $\text{C}_2$  and amines, including  $\text{NH}_4\text{ClO}_4$  and DPA used in this work promote the decomposition of HM X;

(2) the reactivity of the mixture under isothermal conditions decreases in the order HM X/ $\text{NH}_4\text{ClO}_4$  > HM X/ $\text{C}_2$  > HM X/DPA

(3) TCMD is found to be an accurate screening criterion for materials which will be added to or in contact with HM X.

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**Biography**: HU Rong-zu (1938-), male, professor, research yields: thermochemistry and thermal analysis; published over 300 papers

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Table 1 TCMD for HMX and HMX mixtures at different temperatures

T/	System <sup>a</sup>	TCMD /min
240	HMX	82~ 137
	50/50-HMX/DPA	7~ 18
	50/50-HMX/C <sub>2</sub>	5~ 18
250	HMX	43~ 68
	50/50-HMX/DPA	4~ 17
	50/50-HMX/C <sub>2</sub>	3~ 11
200 <sup>b</sup>	HMX	in excess of 144 min
	50/50-HMX/NH <sub>4</sub> ClO <sub>4</sub>	26~ 37

note: a DPA, diphenylamine; C<sub>2</sub>, methyl centralite;

b Since ammonium perchlorate reacted so readily with HMX, the test temperature of isothermal DSC was lowered to 200

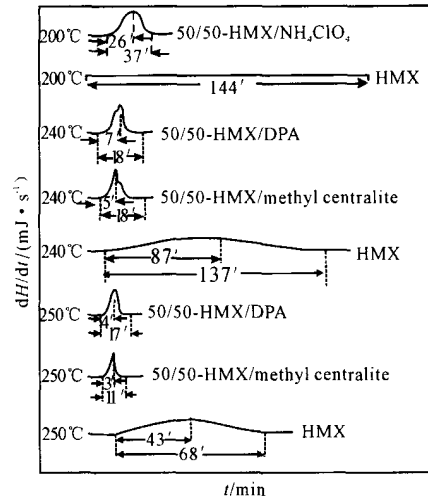


Fig 1 Isothermal DSC curves of HMX and its binary mixtures at different temperatures

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