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PII: S0040-6031(13)00234-7
DOI: http://dx.doi.org/doi:10.1016/j.tca.2013.04.027
Reference: TCA 76452

To appear in: *Thermochimica Acta*

Received date: 17-12-2012
Revised date: 21-3-2013
Accepted date: 20-4-2013

Please cite this article as: Z. Bai, X. Wang, G. Tang, L. Song, Y. Hu, R.K.K. Yuen, Structure-property relationships of synthetic organophosphorus flame retardant oligomers by thermal analysis, *Thermochimica Acta* (2013), http://dx.doi.org/10.1016/j.tca.2013.04.027

Structure-property relationships of synthetic organophosphorus flame retardant oligomers by thermal analysis

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Abstract: A series of flame retardant oligomers with different chemical components in molecular chains, designated as FP-1, FP-2 and FP-3, respectively, were successfully synthesized using solution polycondensation and well characterized. The thermal properties and flammability of these oligomers were investigated by thermogravimetric analysis (TGA) and microscale combustion calorimeter (MCC). The results demonstrated that FP-3 had the lowest flammability in terms of the lowest maximum mass loss rate, and FP-1 possessed the highest thermal stability and char yield, due to its higher stable hexatomic ring structure of piperazine compared with the linear alkane chain structure of neopentyl glycol. The gases evolved during