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Advances in fire retardant materials

Edited by A. R. Horrocks
and D. Price



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Advances in fire retardant materials

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Fire retardant materials

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This authoritative reference work provides a comprehensive source of information for readers concerned with all aspects of fire retardancy. The emphasis is on the burning behaviour and flame retarding properties of polymeric materials. It covers combustion, flame retardants, smoke and toxic products, and then concentrates on some more material-specific aspects of combustion in relation to textiles, composites and bulk polymers. Developments in all areas of fire retardant materials are covered, including research into nanocomposites.

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Because of the many advances in flame retardant materials made over the past few years, this new book has been assembled to update our previously successful text, *Fire Retardant Materials*, published in 2001 by Woodhead Publishing and CRC Press LLC. The two books complement each other.

The increasing use of flammable, polymeric materials in domestic, industrial and other situations necessitates the development of means to render them resistant to both the initiation and sustaining of fires. Driving these developments are the annual losses of life and property resulting from fires involving polymeric materials. In the 31 countries covered by CTIF statistics, fires result in the deaths of some 37 000 persons per annum with at least 10 times that number of associated injuries with a total cost of 1% GDP estimated in terms of property loss and replacement, cost of medical services, etc. These data refer to the 2.3 billion inhabitants living in these countries (www.ctif.org, www.cefic-efra.org). Approximating the world's population to over 6 billion, it can be estimated that roughly 6–24 million fires occur in the world annually. These would cause some 100 000 deaths per annum with a cost of about £500 billion. Such data presents an overwhelming case for further development of improved technologies for flame retarding inherently flammable materials. Such developments are often driven by new legislation motivated by either tragic events, e.g. the English Channel tunnel fire in 1996, domestic furniture fires, and skyscraper hotel fires, or environmental concerns, e.g. the dioxan problem. The UK provides an excellent example of this. Following a sequence of domestic fire tragedies over the Christmas period in 1988, the UK government's introduction of legislation requiring domestic furniture to be flame retarded has resulted in about 140 fewer deaths per year compared to what was previously the case.

This book is structured into three parts. In Part I we have combined those chapters which consider the advances made in fire retardant materials during recent times, whereas in Part II the whole associated area of testing, regulation and assessing the benefits of fire retardant materials is considered. Part III focuses on the major applications of flame retardant materials where the most stringent levels of fire retardant behaviour are demanded and these are often