

<div class="translate-tooltip-mtz blue sm-root translate hidden_translate"><div class="header-wrapper"><div class="header-controls"> </div><div class="header-title">Development of in vitro toxicity methods for fire combustion products</div></div><div id="gtx-trans" style="position: absolute; left: 430px; top: 36.2699px;"> </div>

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Deskripsi Lengkap: <https://lib.fkm.ui.ac.id/detail.jsp?id=46704&lokasi=lokal>

Abstrak

<audio class="audio-for-speech" src="https://lib.fkm.ui.ac.id/"></audio><div class="translate-tooltip-mtz blue sm-root translate hidden_translate"><div class="header-wrapper"><div class="header-controls"> </div><div class="header-title">A large range of polymers are used in building and mass transport interiors which released more toxic products during combustion. This work explores the cytotoxicity of selected chemicals and smoke derived from materials combustion. A selection of polymers and fiberglass reinforced polymer (FRP) composites used in building and railway carriage interiors including: polyethylene (PE), polypropylene (PP), polycarbonate (PC), polymethyl methacrylate (PMMA), polyvinyl chloride (PVC), melamine plywood, and two FRPs were studied. A small scale laboratory fire test using a vertical tube furnace was designed for the generation of combustion products. The volatile organic compounds were identified using ATD-GCMS (Automatic Thermal Desorption-Gas Chromatography Mass Spectrometry). The in vitro techniques were developed for human cells exposure to fire effluents including the indirect (impinger) and direct (air/liquid interface using Harvard Navocyte Chamber) exposure. Cytotoxic effects were assessed based on cell viability using a range of in vitro assays. Human skin tissue was also used as preliminary study to assess the toxic effects at the tissue level. A minor change in the cellular function of the skin from the exposure of PMMA combustion products was observed. The combustion study was conducted under different burning stage of fire: non-flaming and flaming combustion. Results suggested that PVC was the most toxic material for both non-flaming (IC50 1.24 mg/L) and flaming combustion (IC50 1.99 mg/L). The degree of toxicity generated depends on the fire stage: non-flaming or flaming combustion. Some materials revealed to be more toxic under flaming combustion (PP, PC, FRPs), whilst others (PVC, PMMA, PE, and melamine plywood) appear to be more toxic under non-flaming combustion. A strong correlation was shown between the change in toxicity as measured by IC50 and TLC and the change in concentration of volatile organic compounds (VOCs) and particulates. A comparison between in vitro data versus published in vivo combustion data indicated the in vitro results to be more sensitive than animal toxicity data. The outcome of this study has the potential for an alternative method to current fire toxicity standard, whilst providing more accurate toxicity information for fire safety professionals, materials manufacturer, building designers and consumer safety data.</div></div></div>