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USE OF INORGANIC TIN COMPOUNDS AS FIRE RETARDANT
IN PLASTICIZED POLYVINYL CHLORIDE



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การวิจัยนี้เป็นการศึกษาสมบัติในการเป็นสารหน่วงไฟของซิงค์ไฮดรอกไซด์และซิงค์ออกไซด์และซิงค์แอสแตนเนตสำหรับพลาสติกไซซ์โพลีไวนิลคลอไรด์ โดยการวัดค่า แอลโอไอ และการทดสอบการติดไฟในแนวระนาบ และตรวจสอบหาปริมาณและชนิดของสารพิษที่เกิดขึ้นในระหว่างการเผาไหม้ โดยใช้เทคนิคไพโรไลซิสก๊าซโครมาโตกราฟี พร้อมทั้งตรวจสอบผลกระทบที่มีต่อสมบัติทางกายภาพของพลาสติกไซซ์โพลีไวนิลคลอไรด์ และในการศึกษาพบว่า ซิงค์ไฮดรอกไซด์และซิงค์แอสแตนเนต สามารถใช้เป็นสารหน่วงไฟในทางอุตสาหกรรมได้ โดยมีประสิทธิภาพเทียบเท่ากับสารหน่วงไฟแอนติโมนีไดออกไซด์ที่ใช้อยู่ในทางอุตสาหกรรมเมื่อใช้กับพลาสติกไซซ์โพลีไวนิลคลอไรด์ที่มีปริมาณพลาสติกไซซ์เซอร์น้อย และมีประสิทธิภาพน้อยกว่าสารหน่วงไฟแอนติโมนีไดออกไซด์เมื่อใช้กับพลาสติกไซซ์โพลีไวนิลคลอไรด์ที่มีปริมาณพลาสติกไซซ์เซอร์มาก และยังมีข้อดีกว่า คือไม่มีความเป็นพิษ และสามารถช่วยลดปริมาณของ เบนซินที่เกิดขึ้น ซึ่งเป็นการช่วยลดปริมาณสารพิษที่เกิดขึ้นระหว่างการเผาไหม้ นอกจากนี้ยังมีผลกระทบต่อสมบัติทางกายภาพของพลาสติกไซซ์โพลีไวนิลคลอไรด์น้อยมาก

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This thesis investigated the effectiveness of Zinc Hydroxy Stannate ($ZnSn(OH)_6$), Zinc Stannate ($ZnSnO_3$) as fire retardants in plasticized polyvinyl chloride. The fire retardancy of the additives are studied by measuring the LOI value, evaluation the burning behavior in horizontal position, analysis for evolved toxic gas by pyrolysis gas chromatography technique and observe the mechanical properties changed of plasticized polyvinyl chloride film. It was found that zinc hydroxy stannate and zinc stannate had small effect on mechanical properties of plasticized polyvinyl chloride film and can be used as industrial fire retardants that show similar effectiveness as antimony trioxide in low plasticizer content polyvinyl chloride film and show less effectiveness than antimony trioxide in high plasticizer content polyvinyl chloride film and offer the advantages over antimony trioxide that they were non-toxic additives and can reduce the toxic benzene evolved from burning of the polymer.

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พอลิเมอร์ประยุกต์และ
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