GASIFICATION

Spouted-bed gasification of flame retardant textiles as a potential non-conventional biomass

Yasin, S., Curti, M., Rovero, G., Hussain, M., Sun, D. 2020. Spouted-bed gasification of flame retardant textiles as a potential non-conventional biomass, *Applied Sciences (Switzerland), 10*(3)

Renewable energy from thermal valorization plays a key part in today's energy from natural cellulosic textiles that are resourceful biomass and safe from toxicity at high temperature treatments. The situation is opposite, when technical textiles are treated with synthetic chemical finishes adding functionality as anti-bacterial, water repellent or flame retardant, etc. Incineration of flame retardant textile results in possible unfavorable gases, toxic fumes and contaminated ash. Other thermal valorization techniques like gasification would assist in avoiding the formation of additional toxic hazards. Herein, gasification of flame retardant textile is carried out the likelihood to get quality gas composition. For comparative analysis, flame retardant textiles, after their flame retardant ability being revoked, are also gasified. The output gas components suggested that gasification can be a useful thermal valorization approach for flame retardant textiles and relevantly improved gas composition was seen in textiles with their flame retardant substrate/species being removed.

Waste management system in the clothing industry in Santa Catarina State Brazil: An initial overview

Correia, J., Dal Forno, A.J., Marangoni, C. and Valle, J.A.B. 2018. Waste management system in the clothing industry in Santa Catarina State Brazil. *Management of Environmental Quality: An International Journal*

Purpose - The purpose of this paper is to identify and diagnosis waste management practices used by clothing manufacturing companies in Santa Catarina state Brazil. Design/methodology/approach - The data for this multiple case study were obtained from interviews and by using a questionnaire to collect company data. After the analysis of the responses to questionnaires issued to 22 companies, a scoring system was developed to systematically classify these companies at either a basic, intermediate or advanced levels.

Findings - According to the classification used, eight companies were characterized at the basic level, eight at the intermediate level and six as advanced. Most of the companies have already implemented measures for reuse or recycling of textile scraps, probably because of the economic value added. Research limitations/implications - The classification system proposed proved to be an effective tool for identifying: if each company had a plan of action involving requirements of Brazil's National Solid Waste Policy; if the company had a management system in accordance with Law 12,305; the quality of solid waste treatment at the entire company and in its clothing sector; if the company adopted shared responsibility actions; and if it had knowledge of the negative environmental impacts. Originality/value - This paper presents a classification system for companies based on a questionnaire. The system allows determining the degree of compliance with Brazilian waste management legislation.

An alternative for the end-of-life phase of flame retardant textile products: Degradation of flame retardant and preliminary settings of energy valorization by gasification

Yasin, S., Curti, M., Rovero, G., Behary, N., Perwuelz, A., Giraud, S., Migliavacca, G., Chen, G., Guan, J. 2017. An alternative for the end-of-life phase of flame retardant textile products: Degradation of flame retardant and preliminary settings of energy valorization by gasification, *BioResources, 12*(3), 5196-5211

It is well established that current flame retardant (FR) products at disposal generate various ecological hazards. Irrespective of their environmental impacts, the FR market is growing and is estimated to reach 2.8 million tons globally in 2018. In the textile domain, FRs are incorporated into baby clothing, pushchairs, car seats, etc. When disposed, these FR textile products end up in a landfill or are incinerated. These disposal processes are unsustainable. With landfilling, there is a huge chance of the FR product leaching into the environment. Similarly, FRs decrease energetic yields in the incineration process due to incomplete combustion. To cope with such issues, degradation and elimination of the FR product from the textile products before disposal could be a sustainable alternative. This study dealt with the preliminary degradation of flame retardant from the cotton textiles and its thermal characterization. Energy valorization by gasification is considered beneficial opposed to incineration with overall low energy recovery. The initial optimum gasification conditions including FR-treated cotton as a feeding material and potential outcomes of FR-treated cotton after degradation were characterized.

Effects of coal and ammonium polyphosphate on thermal degradation and flame retardancy of polyethylene terephthalate

Zhu, X., Pan, Q., Xu, H., Lu, J. 2010. Effects of coal and ammonium polyphosphate on thermal degradation and flame retardancy of polyethylene terephthalate, *Journal of Polymer Research, 17*(5), 621-629

Polyethylene terephthalate (PET) is of excellent mechanical properties and melt processability and is widely used as raw material for textile fibers and engineering plastics. However, its flame retardant properties are rather poor, and its melt-dripping behavior during burning hasn't been handled properly. In this work, coal powder and ammonium polyphosphate (APP) were blended with PET, and the thermal degradation, flame retardancy, char formation and mechanical properties of the modified PETs were investigated. All results show that the initial thermal degradation was accelerated remarkably with APP but to less extent with coal. The gasification of carbonaceous residues was suppressed by the two additives at higher addition levels. The oxygen indice of the modified PETs with APP were increased whereas unchanged with coal unexpectedly. APP/Coal synergistically improved the flame retardancy of PET. There existed some physical and chemical interactions among PET, APP and coal during combustion process. The mechanical properties of the modified PETs were worse than those of virgin PET.