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TRIS (2-BUTOXYETHYL) PHOSPHATE/SULFUR AS AN ALTERNATIVE FLAME RETARDANT SYSTEM FOR EXPANDABLE POLYSTYRENE MADE BY SUSPENSION POLYMERIZATION

S.A.C Abarca^{a,*}, M. Bianchi^a, M.L. Leite^a, R.A.F. Machado^a

^a Chemical Engineer Department, Federal University of Santa Catarina. Brazil

*Corresponding author: silvia@eng.ufsc.br

One of the complications about working with expandable polystyrene (EPS) is the higher flammability presented by the material when exposed to a heat source. At high temperatures EPS used to decomposes forming volatile combustible products which act as a feed source to combustion process. Some of these volatile products can be prejudicial and toxic for human health. To solve this unexpected characteristic of EPS industry has been incorporated in process production of this polymer an additive known as flame retardant (FR). Actually, the most used class of flame retardants is halogen-based compounds.

The combustion of halogen-based compounds generates the formation of smoke with a number of negative characteristics. Searching for an environmental safety alternative with a good FR efficiency it was studied the synergies between two halogen free compounds, sulfur and tris(2-butoxyethyl) phosphate. The technique used to add the FR in polymers was polymerization reaction in batch stirred tank reactor. FRs addition was made *in situ*; one of them during the polymerization reaction and the other right after polymer is ready, with polystyrene into the reactor. To evaluate the efficiency of FR analysis like TGA, DSC and flammability was performed. Nowadays, FR used to be added into polymers by physical mixture to form polymer/FR blends, however is suspension polymerization the most used process production of EPS. It becomes an important issue to expandable polystyrene industry have an incorporation methodology of FR *in situ* and using free halogen based compound. This can improve the actual process and help the product to be in agreement with new regulations adopted by health and environmental organizations.