Sintesis dan karaskterisasi fire retardant composite non halogen melalui kombinasi resin epoksi, aditif Al (OH3) dan filler = Synthesis and characterization of non halogen fire retardant composite through combination of epoxy resin Al (OH3) and filler

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Abstrak

Resin epoksi memilki aplikasi yang luas dalam berbagai sektor, namun resin epoksi memilki keterbatasan dalam hal ketahanan api, sehingga epoksi sering dikombinasikan dengan fire retardant additive. Pada umumnya, fire retardant additives terdiri dari kandungan halogen yang dapat menimbulkan masalah lingkungan dan kesehatan. Pada penelitian ini dilakukan sintesis fire retardant composite melalui kombinasi 50 wt resin epoksi dan 50 wt aditif alumunium hidroksida komposisi optimum dengan variasi konsentrasi filler carbon black dan silika 1 ; 2,5 ; 5 ; 7,5 ; 10 wt. Konsentrasi filler carbon black dan filler silika terbaik adalah1 wt dan 2,5 wt. Penambahan 1 wt carbon black dan 2,5 wt silika dapat meningkatkan fire retardancy komposit hingga material tidak terbakar dan memiliki flammability rating V-0 berdasarkan standar UL-94V. Selain itu, penambahan 1 wt carbon black dapat menghasilkan stabilitas termal terbaik dibandingkan variasi konsentrasi carbon black lainnya dengan menurunkan mass loss rate hingga 10,75 /menit dan total mass loss hingga 53,76. Sedangkan, penambahan 2,5 wt silika juga dapat meningkatkan stabilitas termal komposit melalui penurunan mass loss rate hingga 9,32 dan total mass loss hingga 51,06. Disisi lain, penambahan 1 wt carbon black dapat menghasilkan tensile strength komposit sebesar 6,59 MPa dan hardness sebesar 65,8 shore D. Sedangkan penambahan 2,5 wt silika memiliki tensile strength komposit sebesar 9,89MPa dan hardness sebesar 71,2 shore D.

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Epoxy has a wide range of applications in many sectors. However, it still has some drawbacks such as flammable and not fireproof, so usually it is combined with fire retardant additives. Commonly fire retardant additive contains halogen compounds like chlorine or bromine that caused environmental and health problems. Therefore Al OH 3 additive is used to improve the fire retardancy properties of composite through decomposition that produced water vapour and formation of oxide layer on its surface. In this research, synthesis of fire retardant composite has been conducted by varying filler carbon black and silica 1 2,5 5 7,5 10 wt through optimum composition of Al OH 3 50 wt and epoxy 50 wt. It was found that the best concentration for carbon black and silica is 1 wt and 2.5 wt respectively. Both concentration significantly repairs the fire retardancy and thermal stability of composite. The addition of 1 wt carbon black and 2.5 wt silica could improve the flame retardancy and also hasV 0 flammability rating based on UL 94V standard. Besides that, the addition of 1 wt carbon black is able to increase the thermal stability of composite by reducing mass loss rate until 10.75 minute and total mass loss until 53.76. While adding 2.5 wt silica could also enhance its thermal stability by decreasing mass loss rate until 9.32 minute and total mass loss until 51.06. Furthermore, the addition of 1 wt carbon black yields 6.59 MPa for tensile strength and 65.8 shore D for hardness. Whereas the addition of 2.5 wt of silica produces composite with the tensile strength up to 9,89MPa and hardness up to71,2 shore D.