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For the answers you won't

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A new way with fire Safety !!!

MIPS
Mixed Intumescent Polymeric Salts [1]

What are they and what can they do for me ?

MIPS are pale yellow powders that can give flame retardant and intumescent properties to thermoplastics, thermosets, adhesives, sealants, elastomers and coatings.

MIPS are intumscent compounds where the normal components of a phosphorus catalysed intumescent (catalyst, spumescent carbonific) have been integrated during synthesis. They are not to be confused with intumescent mixtures which consist of blends of separate components (phosphates pentaerythritol melamine)

MIPS activate at lower temperatures than other intumescent and flame retardant systems, so they can provide fire protection to polymer species that pyrolise at low temperatures.

MIPS contribute very little to smoke emission and can suppress overall smoke emission in a fire.

MIPS are halogen free but can work synergistically with both halogenated and subliming fire retardant systems

So , how much do I need ?

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MIPS is intended to make intumescent and flame retardant films, coatings, adhesives and sealants, where the incorporation method is merely a blending operation

MIPS is designed for use in thermoplastics and thermosets where a high processing temperature is required, such as in master batching, extrusion, blow moulding or hot press moulding.

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[1] MIPS is a new technology, hence this data sheet is both provisional and a live document subject to constant revision

If you compare the efficiency with ATH, generally you will need 1/3 the amount of MIPS as ATH to achieve the same degree of fire protection. This does means that you can make an adhesive flame retardant and it will still be an adhesive.

As a general rule 3 % phosphorus will give flame retardancy, 5 % phosphorus will produce non flammability. 7-9% phosphorus will give intumescence. MIPS contains about 14% phosphorus.

For example, 26% MIPS incorporated into polypropylene has given an indicated Euroclass B, DIN 4102 B2, and a pass on FAR 25 appendix G

O.K , so how do I use them ?

A bit of background. MIPS are made by wet precipitation process and appear as a sludge . They are then dried and ground to produce the powder. If the end product is aqueous, it is obviously environmentally preferable to start with the dispersion.

For example, an intumescent sealant can be made by adding 85% MIPS dispersion to a latex desisgned to produce gunnable sealants (Synthomer Revacryl 387, BASF Acronyl S410). No other components are needed but china clay may be added for cost reduction. Such a sealant has shown fire barrier performance in excess of the vacuum board it was used to seal.

MIPS can be dispersed into any latex provided the latex is stable at below pH 7. Do not attempt to raise the pH. MIPS is a salt and a buffer. Attempting to raise the pH will merely dissolve the MIPS.

MIPS may also be wet ground into epoxies, unsaturated polyesters vinyl esters and polyols. They may also be ground into plasticisers and solvent/resin solutions to allow dispersion in other media. The subsequent particle size reduction gives enhanced performance

MIPS can be dispersed into either part A or B of an epoxy system, and into unsaturated polyesters. Wet MIPS can be used in water dispersable epoxy resins.

MIPS can be incorporated into any thermoplastic where the processing temperature does not exceed 250^{O}C.

MIPS can be masterbatched into PP and PE and blends. The inclusion of the MIPS in the polymer does not alter the physical properties. At 25% loading the products gives UL94 V0, passes FAR 25 appendix G and gives and indicative Euroclass C or better.

MIPS can be incorporated into polyesters and epoxies to render them flame retardant. A separate information sheet on unsaturated polyesters is available.

And the bad new s ???

MIPS will not work very well for polyurethane foams or for expanded polystyrene, though excellent results have been obtained with HIPS.

MIPS does not seem to give any fire performance benefit when added to conventional thin film intumescents for structural steel, though they will obviously improve the suspect environmental stability of these coatings. However much more work is required on this aspect.

While the MIPS and PRP technology is progressing towards production, at the date of issue samples above 5 kg will be charged for at pilot plant production rates.

At the date of issue, MIPS are not registered under TOSCA, so requests for sample from the USA must be accompanied by an undertaking that the recipient understands that MIPS is a development material and will follow the requirements of the EPA.

Now tell me the technical bits I need to formulate

	MIPS T	
65% Dispersion		
Viscosity	1,000 poise	
SG	1.3	
Dry Powder		
Colour	pale yellow	
SG	1.42	
Phosphorus		
P	13.9%	
PO_4	42.6%	
Particle size	Powder	Dispersion
Maximum	64 µ	32 µ
Mode	24 µ	8 µ