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MONSANTO CO

Contractor

Document Title
INITIAL SUBMISSION: LTR FR MONSANTO CO RESPONDING TO A DYNA-MAC CORP/TSCA ITC REQ FOR INFO ON THE MECHANISM OF PARAPHENYLENE DIAMINE ANTIOXIDANT PROTECTION IN TIRES, DATED 7/28/86

Chemical Category
PARAPHENYLENE DIAMINE

Monsanto

Monsanto Chemical Company
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July 28, 1986

Ms. Roberta Wedge
Dyna-Mac Corporation
11140 Rockville Pike
Rochester, MD 20852

Dear Ms. Wedge:

Enclosed is information relating to the mechanism of paraphenylene diamine (PPD) protection of rubber, as you requested. It indicates a low potential for environmental release of PPD from tires.

The mechanism of paraphenylene diamine antioxidant (PPD) protection in vulcanized rubber is generally understood to be the following:

1. Migration of PPD to the surface.

2. Preferential oxidation and ozonation of the PPD to a water-insoluble polymeric film, which prevents oxygen and ozone entry into the bulk of the rubber.

References 1, 2, and 3 give experimental evidence for this mechanism with several PPD's.

In addition, Monsanto research has shown that 6PPD (Santoflex® 13 antioxidant) in benzene or tetrahydro furan is ozonized to a tan solid of molecular weight between 550 and 600 (as determined by gel permeation chromatography). 6PPD was described as having "a high efficiency toward polymer formations." Monsanto research also indicated that the infrared spectrum of a brown solid removed from the surface of styrene-butadiene rubber compounded with 6PPD and exposed to ozone aging was identical to the infrared spectrum of the tan solid above. (Reference 4.)

Monsanto also analyzed two rubber tires made with 6PPD (Santoflex 13 antiozonant) during the useful life of the tires for internal 6PPD content. (Reference 5) Results were as follows:

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Tire Age, Miles	Average % PPD
0	1.11 ± 0.08
20,000	0.68 ± 0.04
40,000	0.46 ± 0.03
60,000	0.30 ± 0.04

I trust this information will be useful to you during your evaluation of para-phenylene diamines.

Sincerely,

for Bernard J. Hill
Manager, Product Safety

Enclosure

cc: Ms. Kathryn Rosica
Chemical Manufacturers Association
2501 "M" Street, N.W.
Washington, DC 20037

15.206/BJHS.2

REFERENCES

1. Audrices, Ross and Diem, Rubber Chemistry and Technology, 48, pp 41-49 (1975).

2. Razumorskii and Batashova, Rubber Chemistry and Technology, 43, pp 1340-1348 (1970).

3. Lorenz and Parks, Rubber Chemistry and Technology, 36, pp 194-200 (1963).

4. Monsanto, unpublished data, 1966.

5. Monsanto, unpublished data, 1964.