**Monsanto**

FROM (NAME & LOCATION): A. W. M. Coaker - St. Louis Organic Research

DATE: June 17, 1970

CC:
C. D. Bias Res. 3
M. W. Farrar Res. 1
P. R. Graham PGRAH
R. C. Gross Res. 3
J. K. Sears Res. 3

SUBJECT: EASTMAN'S DESIRABILITY PARAMETERS FOR ADDITIVES FOR HOT MELT ADHESIVES

REFERENCE:

TO: J. R. Darby
Res. 1

Hot Melt adhesives

On June 15 Eastman Chemical Products, Inc. gave a seminar to Monsanto in St. Louis on hot melt adhesives. They define the ingredients of a hot melt adhesive as consisting of a "polymer" such as polyethylene, poly-(ethylene-vinyl acetate) or polyester, etc.; a "resin" such as a polyterpene or a polychlorinated terphenyl, etc.; and, other additives such as stabilizers, extenders, viscosity modifiers and so forth.

Since Eastman is actively evaluating Aroclor 5460 in several formulations, we asked them to define the desirability parameters they apply to "resins" for use in their hot melt adhesives. The way I interpreted the reply was:

1. Physical form: solid flake (want).

2. Softening point > 120° C (want).

3. Compatible with Epolene C-10 at 10/90, 25/75 and 50/50 (must). This means compatible in the sense of not separating after mixing in and heating for 6 hours at 350° F and of not giving a weak, cheesy or grainy film after cooling.

4. Molten color: yellow or colorless (want).

5. Heat stability per se should be good; in mixtures with Epolene C-10, Eastman will determine whether specific stabilizers are needed. Good stability in the mixtures is a must.

6. FDA status: should be regulated for use in food packaging adhesives (very important to have this for broad use)--almost a must.

7. Does not increase melt viscosity and preferably decreases it substantially (want).

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8. Minimizes change of melt viscosity with change of temperature (want).

9. Available in T/L quantities (must).

10. Price < 35¢/lb. (want). ? lb must.

11. Specific gravity: the lower the better, absolute values being related to price and overall performance.

12. Good adhesive properties (must): Eastman will test this on any submittal they are convinced is worth testing based on data furnished with the sample.

Several opportunities may exist for us:

A. Expand A-5460 use by gaining FDA regulation.

B. Produce a modified Aroclor with higher softening point than Aroclor 5460.

C. In the other additives category there may be a use for some of our products or development products such as XL-8000 and Modaflow and we might explore some very low polarity plasticizers such as tri(C 11)trimellitate, DUP, di(C 11)adipate, etc.

D. A suitable grade of E/VCl might improve the polymer system in some instances.

E. Some of Monsanto's antioxidants may be useful as stabilizer ingredients for hot melt adhesives.

A couple of years ago at the behest of our Oil Additives people we did some work on means to formulate a material with small changes in viscosity as a function of temperature. Our Disclosure #3448, August 22, 1967, showed that small changes in viscosity with changes in temperature occur in compositions of PBSA diester, polyethylene, poly-(ethylene-vinyl acetate) copolymers and process oil.

For possible use in hot melt adhesives we shall look at compositions of EVA, PE, Aroclor 5460 and XL-8000, to see if we can identify desirable combinations of properties including low viscosity change as a function of temperature.

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