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Marshall Laboratory
July 19, 1954

MEMORANDUM REPORT NO. 717

PREPARED BY: H. E. EASTLACK

"DUTCH BOY" BENTONES & PLASTICIZERS
VISIT BY NATIONAL LEAD COMPANY REPRESENTATIVES

On July 12, Messrs. R. E. Smith and A. I. Scarbrough of the National Lead Company visited the Marshall Laboratory and discussed their Bentone products and plasticizers with W. T. M. Johnson and the writer.

Three Bentone products are in commercial production: Bentone 18-C, Bentone 34, and Ben-O-Gel (previously known as "Thix"). The bentonite used in the manufacture of Bentones is carefully selected for quality (chemical composition) and is treated to obtain the primary mineral montmorillonite in a high degree of purity. The Bentone derivatives prepared from the latter are claimed to be highly reproducible and very uniform in composition. X-ray data shows the Bentones to consist of layers (2 molecules thick) of organic ammonium cations sandwiched between platelets of montmorillonite. Solvation of the amine chains causes the structure to swell and expand somewhat like an accordion, to form a gel. Excessive dispersion or too much polar solvent will de-gel the system.

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Bentone gels are not markedly affected by temperature so that good application properties and storage characteristics are retained over a considerable range. They will function satisfactorily within a pH range of about 4 to 10. Solvent release (drying time) is not retarded by Bentone gels, nor is adhesion adversely affected. The gel structure is retained after the film dries. There is experimental evidence that Bentone 34 acts as a film reinforcing agent in that a small amount greatly improves the check resistance of Pliolite films on outdoor exposure. It is also claimed to improve the water and chemical resistance of most films.

Bentone 18-C has recently been developed as an improvement over their Bentone 18. It is an 18-carbon atom onium salt of montmorillonite. It will thicken and gel solvent mixtures which include both polar and non-polar solvents, and is recommended particularly for use with lacquers. It is priced at 45¢/lb. as compared with 60¢/lb. for Bentone 34. A brochure describing the product and suggested applications is being sent to us. W. T. M. Johnson is obtaining some Bentone 18-C for evaluation.

Bentone 34 (the dimethyldioctadecyl ammonium salt of montmorillonite) gives better gel structures with non-polar solvents and is being used to various extents by about 800 paint manufacturers. The advantages claimed include improved application properties (brushability, sag-resistance, and prevention of flooding) and better storage stability (prevention of pigment caking). Bentone has only a slight flattening effect, and within limits can be used in enamels without appreciably lowering the gloss.

Full details on the use of Bentone 34 in various types of finishes and related products are included in a brochure of which we have copies.

Ben-O-Gel is a completely inorganic derivative of bentonite. We have had samples under its previous designation "Thix". It forms gels in aqueous systems only. It is said to improve the scrubability of latex paints. Both the "oil" phase and the water phase of an emulsion paint can be gel-controlled by using Bentone and Ben-O-Gel in a single product.

Plasticizers. Following rather extensive exposure studies (mostly with vinyl resins) the National Lead Company has recently brought out four new plasticizers. They also produce four standard plasticizers: dioctyl phthalate (DOP), diisooctyl phthalate (DIOP), dioctyl sebacate (DOS) and dibutyl phthalate (DBP). They make no claims for these in comparison with competition, except that they are high quality products.

Newburgh has had samples and information on the four new plasticizers which were described as follows:

A-54 is the phthalate ester of a primary alcohol. It is said to be very close to DOP in properties but 2¢/lb. cheaper. It

is about the same as DOP in light and heat stability, but is slightly more volatile, and slightly inferior in low temperature flexibility.

F-21, F-31, and F-41, were described as plasticizers which combine the low volatility of polymeric plasticizers with the low temperature flexibility of monomeric plasticizers. It was intimated that they might be dimers or trimers of dibasic acid esters. (Further information will be released when their patent position has been established.)

F-21: Volatility: comparable with Paraflex G-50.
Low temperature flexibility: better than DOP. Price: 39.5¢/lb. delivered in tanks.

F-31: Volatility and low temperature flexibility: comparable with dioctyl adipate. Price 46¢/lb.

F-41: Similar to F-31 but better in light and heat stability. (Much better than DOP.) Price 49¢/lb.

Samples of these new plasticizers are being sent to W. T. M. Johnson for evaluation. A brochure on each is also being obtained.

H. E. EASTLACK

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