



SHELL CHEMICAL CORPORATION

50 WEST 50TH STREET
NEW YORK 20, N. Y.

September 26, 1956

Shell Development Company
4560 Horton Street
Emeryville 8, California

Attention: Mr. C. L. Raymond

Gentlemen:

EPON ADHESIVE IX

We have been advised by our Resins and Plastics Sales Department that offtakes of this product are expected to increase appreciably, to about 1 M Lb/M, in the near future. We, therefore, believe that the time is opportune to transfer the manufacture of this product to the PDU at Houston, particularly in view of the poor condition of your equipment as outlined in your letter of August 31, 1956.

From previous correspondence, we believe that we have sufficient information concerning the manufacture of Adhesive IX, and we have prepared the usual PDU product transmittal forms, your copies of which are attached. We would like you to review these forms and if any corrections or comments are needed your prompt reply, with copy to our Houston Plant, would be appreciated.

Very truly yours,

M. R. Sprinkle

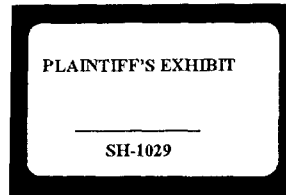
M. R. Sprinkle, Manager
Manufacturing-Development

Attachments

cc - Houston Plant - Manager

77021

SHELL DEVELOPMENT CO.			
REC'D OCT 1 1956			
13523			
CLR	R		
RAC	C		
LAMP	B		
JCR	JCR		
TO HON. FILE: RAC			
CC - MC - FBH, MOT. PP.			
TFC TEM			
REC'D: 10-8 - JCR			



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SHELL CHEMICAL CORPORATION

REFERENCE

SHELL DEVELOPMENT CO.

REC'D OCT 1 1956

13524

DATE SEPTEMBER 26, 1956

FROM MANAGER - MANUFACTURING DEVELOPMENT DEPARTMENT - HEAD OFFICE

SUBJECT INFORMATION FOR PDU STARTUP
EPON ADHESIVE IX

TO HOUSTON PLANT - MANAGER (3)

Transmitted herewith is information concerning the manufacture and evaluation of Epon Adhesive IX. We believe that the information presented is sufficiently complete to permit preparation and evaluation of this product. Should further information be desired, however, do not hesitate to call on us.

In the attached material Sheet One describes the manufacturing procedure, Sheet Two describes the testing and evaluation procedures, while Sheet Three describes the raw material position.

With the exception of dicyandiamide no new raw materials are introduced into the PDU with this product. The manufacturer's recommendations regarding dicyandiamide should be noted and observed.

Sheet Four concerning shipping and warehousing is not presented since this material is covered in the packaging manual.

For this previously marketed product the Resins and Plastics Department of the Chemical Sales Division has no comments to offer, hence Sheet Five, concerning marketing, is not presented. We are, however, transmitting herewith for your background and information a copy of Technical Bulletin SC: 55-47 "Experimental Epon Adhesive IX". Sales of Epon Adhesive IX are estimated to be on the order of 1 M LB/M.

We would appreciate your advising us when you consider yourself in a position to manufacture this product on a regular basis

Attachments 2 (hold) Tech Bulletin SC: 55-47

HHC/hk

cc + Sheets 1-3

Mr. A. W. Floor

Shell Development - Emeryville (2)

Manufacturing Operations - Manager

Distribution - "

Purchasing Stores - "

Resins & Plastics - "

Industrial Hygiene - "

Market Development - Manager

Union Tech. Serv. Lab. - Director

Houston Research Lab. - "

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Product Development Unit Candidate - Epon Adhesive IX

Sheet One: Manufacturing Procedure

Compiled by Resin Section - Manufacturing Development Department

The manufacturing procedure used by Emeryville is described in the attachment; this was transmitted to us by Shell Developments' letter of June 22, 1956 which dealt mainly with Epon Resin 562. As has been determined by previous transfers of adhesive manufacture, the changes in kneading equipment may well require further development work and changes in operating procedure.

With regard to the blending of the curing agent - dicyandiamide: Emeryville has been using a colloid mill to obtain the 25%w dicy in Epon 828 concentrate. Since Houston does not have a colloid mill you may wish to attempt to use your small kneaders in a manner similar to your present preparation of Titanox dispersions. Alternately an outside firm, such as RBH Dispersions Division of Interchemical, might be used.

9/26/56

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Product Development Unit Candidate - Epon Adhesive IX

Sheet Two: Testing and Evaluation Procedures

Compiled by Resin Section - Manufacturing Development Department

Epon Adhesive IX will have the same performance and sales specifications as Epon Adhesive VIII. Since the curing agent is embodied in IX the sample panel preparation procedures should be modified in accordance with information presented in brochure SC: 55-47 "Experimental Epon Adhesive IX" which is attached.

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Product Development Unit Candidate - Epon Adhesive IX

Sheet Three: Raw Material Position

Compiled by Resin Section - Manufacturing Development Department

The recipe for Epon Adhesive IX calls for the following raw materials which are the same as used in the manufacture of Epon Adhesive VIII:

Epon 828
Vinylite AYAF
Allyl Glycidyl Ether
Asbestos Floats

In addition, dicyandiamide, pulverized grade, a product of American Cyanamid Company, is also used. A sales brochure covering the material is attached.

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EPON ADHESIVE IX

Semi-Scale Manufacturing Practice

EPON Adhesive IX is essentially the same formulation as Adhesive VIII except that it contains a dispersed solid catalyst, dicyandiamide. It is particularly suited for long, open-assembly time applications, since it will not readily cure at 300°F and temperatures of 345-350°F are normally required.

Formulation of EPON Adhesive IX is certified under MIL-A-8331 (USAF) and no modification of the amounts of ingredients are permitted.

Process Equipment

Blending of the adhesives is carried out in a tilting Read-Standard kneader which is equipped with double sigma blades operating at 21 rpm, external heating coils, and a 7.5 hp motor. The unit has a total capacity of 150 gallons and a working capacity of 70 gallons if loaded to 0.9 times the 10-inch blade radius above the blade centerline. This volume permits the processing of a full 500-pound drum of EPON resin and allows the kneader blades to break the surface during the entire addition and kneading time. A drum hoist is provided to charge the mixer, which is located at ground level. Finished material is discharged into suitable containers by tilting the mixer.

In addition to the above-described mixer, two other pieces of equipment are utilized in the operation. The first of these is a 100-gallon stainless steel tank equipped with heating coil and air-driven propeller agitator. This tank is used for pre-dissolving solid resins (i.e., polyvinyl acetate) in the liquid EPON.

The second piece of auxiliary equipment is a Morehouse Hy-R-Speed mill equipped with replaceable carborundum stones with variable clearance. This mill is required for premixing of pigment or catalyst with the resin.

Processing

The procedure for typical batch runs as carried out in plant equipment is as follows:

Formulation

EPON 828	100 parts by weight
Vinylite AYAF	6
Allyl Glycidyl Ether	2
Asbestos	30
Dicyandiamide	8

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Vinylite AYAF is dissolved in EPON resin by stirring 30 pounds with 380 pounds of EPON 828 for one hour at 160°C (320°F). The solution is transferred to the Read mixer and blended for two hours at about 70°C (158°F) with 150 pounds of asbestos.

In a separate vessel 120 pounds of EPON 828 is heated and mixed at 65-70°C (149-158°F) with 40 pounds of dicyandiamide (Dicy). The mixture is then passed through the Morehouse mill three times using 60-grit carborundum stones with sufficient clearance to keep the temperature below 70°C. The EPON-Dicy concentrate is then added to the EPON-Vinylite-asbestos mixture in the Read mixer and the charge completed by the addition of 10 pounds of allyl glycidyl ether. Blending at 70°C is continued for one hour to give the finished adhesive.

No study has been carried out as to the maximum allowable mixing temperature and all runs to date have been made at temperatures not exceeding 70°C.

Process Materials

EPON 828 and allyl glycidyl ether are supplied by Shell Chemical Corporation.

Asbestos 7TF is a product of the Johns-Manville Company and is classified under the designation of "shorts" and "floats".

Vinylite AYAF is obtained from Union Carbide and Carbon Corp. The designation AYAF determines the grade and viscosity of this polyvinyl acetate.

Dicyandiamide is a micro-pulverized grade supplied by American Cyanamid Company.

Titanium Dioxide is marketed under the trade name of Titanox Ti-Pure-R and is supplied by E. I. duPont de Nemours and Co., Ltd.

Acetamine Orange is also obtained from duPont under the designation of GR Conc 175%.

Testing

Each batch of finished adhesive is tested for tensile shear strength and viscosity.

Test specimens are cleaned, assembled, and cured as outlined in Shell Chemical Corporation Technical Bulletins SC:52-46, SC:55-29, SC:55-30, and SC:55-47. They are then tested according to MIL-A-8331, which requires certain minimum performance standards.

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Viscosities are run after constant temperature (77°F) storage for 48 hours, using a Brookfield Synchro-lectric viscometer with No. 7 Spindle. A maximum viscosity specification of 1 million cp measured at 2 rpm has been imposed upon Adhesive VI. No maximum has been set for Adhesive VIII and IX.

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