

Notes on visit to Dewey and Almy Chemical Company, Cambridge, on November 27, 1934 and December 11, 1934 and to the Multibestos Company, Walpole, on November 28, 1934.

By: H. B. Elkins

Officials met:

Mr. Egan (chief chemist)
Mr. Ferguson (plant manager)
Mr. Leach
Mr. Edwards
Mr. Ross
Mr. Jensen
Mr. Taggart

Mr. McMordie (engineer)
Mr. Bateson (superintendent, Multibestos)
Mr. Slagle
Mr. Martin
Mr. Mears
Mr. Stowe

The more important contacts are underlined.

Note: Due to the nature of its business many of the processes of this company are unique. Items which it is believed may not be general practice are marked with an asterisk and should be treated as confidential until passed upon by an official of the company.

The Dewey and Almy Chemical Company manufactures primarily latex cements and allied products, such as solvent rubber cements, rubberized fabrics, and rubber bonded brake linings. It was because of their developments in this last field that they acquired the Multibestos Company, which manufactures brake linings and clutch facings of all types.

Dewey and Almy Company

Mr. Egan showed me about the plant in Cambridge.

Latex cements:

Rubber latex is obtained in solutions containing 35, 50 or 75 per cent solids. In the dilute solutions there is about three fourths of a per cent of ammonia, which keeps the solution at a pH of 11, and so prevents fermentation and spoilage. In the most concentrated solutions the alkalinity is maintained by a mixture of caustic potash and a potassium coconut oil soap. Ammonia is preferable for most purposes because it evaporates off. Its concentration is so low that it is no problem except when the cement or compound is used in very large quantities.

Various materials such as pigments and fillers are added to the latex solution in making the compound. One such material is a modifying soap made from beeswax and ammonia under high pressure. Sulfur is added whenever it is desirable and possible to cure the rubber in the cement or other product. In the linings for tin cans sulfur can not be used but fortunately an uncured material is more satisfactory.

For many purposes a latex cement is inferior to an artificial rubber emulsion, made by masticating vigorously coagulated rubber and then dispersing it with protective colloids and other suitable chemicals. A cement of this type seemed much finer and more homogeneous than corresponding latex cements, and its cost was said to be the same.

Latex cements are of interest to us because they compete with solvent rubber cements. One of the chief uses of benzol is as a solvent for the latter. For some purposes non-toxic non-inflammable latex cements are better substitutes for toxic, inflammable benzol cements than the slightly toxic but inflammable naphtha cements.

Mr. Ferguson said that there had been a swing away from latex sealing compounds toward solvent compounds, but that he felt that its peak had passed and the immediate future would see an increased use of the latex products.

Solvent room:

This company makes both benzol and naphtha solvent cements and compounds. The latter constitute about two thirds of the total, and it was said that probably next year three quarters of the solvent compounds would be made from naphtha. The so-called solvent room is the second floor of an isolated building. It is about 33' x 13' x 8', and contains two mixers, for naphtha and benzol products, respectively. Each mixer holds about a hundred gallons.

Exposure to the solvent may occur chiefly in three places; the pump room, the solvent room, and muddler room, in which the finished cement is loaded into drums for shipment. In the pump room there is some leakage of vapor, or seemed to be, but the pumps are operated from outside, and the room is rarely entered. In filling the drums there is undoubtedly some exposure, but the greatest hazard is certainly in the solvent room.

The solvent is ordinarily pumped through a meter into the mixer. The stirrers are heavy spiral shaped knives which twist and tear the small pieces of rubber which are introduced. Some heat is evolved in this operation, so that the temperature of the mixture is raised, the outside of the mixer being above body temperature when the process was observed. The mixers are closed except for an opening in the top about 18" x 10" which is covered loosely except when materials are being added, when the batch is being inspected, and when it is being emptied. The addition of rubber (cut in small pieces) takes some time, as the several layers are torn apart by hand or they are fed into the machine. Some other materials, such as wax, are usually added. In the operation observed inspections of the batch as it was being mixed were frequent. As the top of the mixer is about five feet from the floor the tendency is for the workman to put his face close to the opening in looking in at the batch.

After two to eight hours, depending chiefly on the kind of rubber used, the mixer is tipped on its side and the batch of finished product is dumped through an opening in the floor into the muddler. The dumping operation observed took four minutes, including the time required to rake out the residual compound. The opening in the mixer through which the substance is poured is about three feet from the floor, and the operator stands three to four feet away except when he is cleaning out the residue. The extremely viscous and elastic mass was said to contain only thirty per cent of solids. Its vapor pressure would presumably be a precipiably more than 70 per cent of that of pure benzol, but the viscosity of the mixture should cut down its rate of evaporation considerably.

A blower was operating in the wall opposite the mixer, near the floor, and above it the window was opened. The operator was between the window and the mixer, but a little to one side most of the time. The efficiency of this system of ventilation seems somewhat questionable. Tests on the air in this room (made by the insurance company) showed satisfactory conditions, however, it was said.

The men working on this job are given blood counts every three months and as a rule are transferred after six to nine months. No real cases of benzol poisoning have been encountered.

AR dope:

This impregnating material is a mixture of about five parts coal tar pitch and one part toluol. The components are heated in mixing, and ventilating equipment has been ordered for the process. The fumes did not seem bad at the time a finished batch was observed in the open mixer.

*Rubber bonded brake lining material:

Certain brake linings, especially those for heavy work, are made from asbestos to which carbon black and other substances may be added, and rubber latex. The various materials are mixed in a paper beating machine, spread on a wire screen and the water sucked out, then pressed in a hydraulic press, cured and brought to the proper thickness with a sanding machine. The last operation is well ventilated, but the method of feeding the paper beater was said to be dusty and needs improvement. Probably some such method as was worked out at Salpole will be applied here. None of these processes were in operation.

*Artificial leather:

A soft absorbent paper is passed through a latex solution containing sulfur, coloring matter, etc., and then over a series of heated rolls where the water and ammonia are given off and the rubber is cured. An exhaust system provides for the removal of the ammonia given off (estimated at three pounds, or about sixty cubic feet, per hour).

It is necessary to stop the machine for brief periods in order to attach new rolls of paper. If the stop is for too long the paper in contact with the hot rolls tends to disintegrate. Even the short stops unavoidably made may cause variations in quality in the finished material.

The rubberized sheet is passed through a calender to bring it to the proper thickness. Ten or more sheets are often cemented together, sometimes two or three rolls being combined on a machine similar to the impregnating machine, but smaller. No provision for the removal of ammonia is made in this case, but there was no appreciable odor of ammonia around the machine.

If still thicker sheets are to be made, pieces about five feet square are cemented together by hand. In the operation observed a naphtha solvent cement was used.

Other products:

Soda lime, used in gas masks for absorbing phosgene, chlorine and acid gases, is made in some quantity. Zinc chloride solutions and zinc ammonium chloride crystals are also made. Some dermatitis has been caused by these materials.

Chloroform and toluene are used as preservatives. Carbon tetrachloride is also used for some purposes. Apparently these are used in relatively small amounts. Another small use of benzol is in cleaning out drums.