

FIELD SURVEY OF
ROHM AND HAAS COMPANY

PB82162561

BRIDESBURG FACILITIES
PHILADELPHIA, PENNSYLVANIA

MAY 1, 1972

(REVISED)

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III. THE PLANT:

The plant is located in the Bridesburg area of Philadelphia and consists of approximately 90 buildings on 106 acres. An original plant has been on this site since 1820, but this location was not acquired by Rohm and Haas until 1920. The plant population is approximately 2100 employees, 1200 being blue collar. There is a companion plant at Bristol which has also about 2100 people, and further away at Springhouse, Pennsylvania, is the research laboratories with 600 people.

Rohm and Haas makes many organic chemicals at all sites but uses chloromethylether (CME) only in the manufacture of anion exchange resins and for the manufacture of anionic bactericides at the Bridesburg plant. Bis(chloromethyl)ether (BCME) is an impurity that makes up 1 - 5% of the CME.

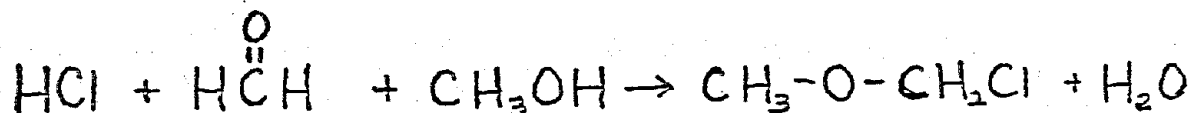
Rohm and Haas began handling CME in the research laboratories at the Bridesburg plant in the 1940's. Pilot plant work and full-scale commercial production became a reality in the 1950's. The elaborate safety precautions and enclosure of the reaction system did not occur until the possible harmful effects of prolonged BCME exposure became known. Final modifications to enclose the system were completed and an elaborate monitoring device was added last summer.

The Philadelphia plant is not unionized except for the maintenance department, a group of approximately 200 mechanics who are represented by the International Union of Operating Engineers. The 1260 blue collar workers at the Bristol plant are represented by the United Glass and Ceramic Workers of North America.

IV. PROCESSES:

CME Production:

CME is produced by the following reaction:



This is a continuous totally enclosed process. The CME is stored in tanks and pumped to various locations for use.

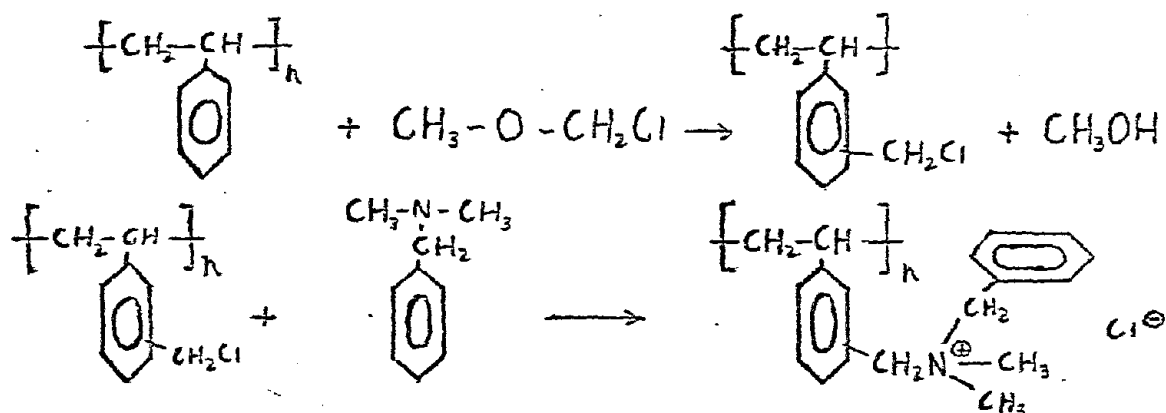
The Rohm and Haas Company has made CME for its own requirements from the beginning, at this plant site. As other companies began to manufacture similar products, some of them (such as Dow) also made their own CME, but Hooker supplied CME for some. Hooker discontinued this business in the summer of 1971. CME and bis-CME can still be imported into the U.S. from Ugine-Kuhlmann in France.

CME Use:

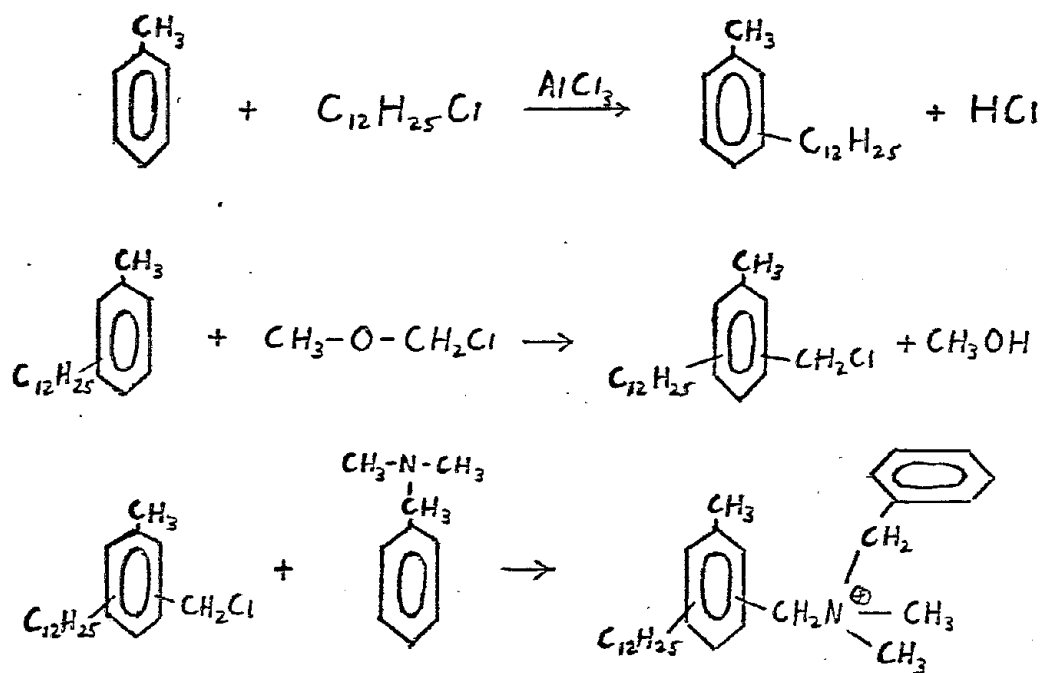
Chloromethylether is used in industry in the following ways:

- (1) In organic synthesis
- (2) Treatment of textiles
- (3) Fabrication of polymers
- (4) As a solvent in polymerization reactions

Anionic exchange resins are produced by the chloromethylation of polystyrene beads with CME, followed by amination with a secondary or tertiary amine.



The bactericides are produced thus:



This is a material easily dispersed in water to form a contact bactericide. This material was not being produced at Bridesburg while we were there.

Other producers of chloromethylated bactericides: Benzol Products, a subsidiary of Continental Oil, makes this type of bactericides in Baltimore and also carries out custom chloromethylations.

Dow also makes bactericidal agents of this type. There are at least 12 manufacturers of this material. Refer to Chemical Manufacturer's Green Book for a list of suppliers.

Handling of CME:

Operations involving the synthesis of CME are continuous and are controlled remotely from a room on the third floor of Building 6.

At intervals, an operator must inspect the reactors and maintenance must be performed. Anyone entering the reactor area must wear an air-supplied mask which is hooked into one of many convenient locations around the plant.

Operations involving the use of CME are fully enclosed batch types which in addition have a house built around them within Building 6. The vents from the various pieces of equipment (kettles, etc.,) pass through an aqueous scrubber before being discharged to the out-of-doors. In addition, the inside area is under slight negative pressure resulting from a large volume exhaust fan located on the roof of the building. Everyone going into this building or onto the tower that produces CME is equipped with air-line respirators, including the fork-lift drivers. The equipment is all completely enclosed and liquids are pumped into tanks, valves are remotely controlled and solids are charged from tote bins and screw conveyors. There are currently about 26 employees involved in the CME operations.

V. MONITORING SYSTEM:

Rohm and Haas has invested considerable expense and manpower time in developing a monitoring system for bis-CME that will be accurate to the extremely minute concentrations that may prove to be the only safe levels acceptable.

Although grab samples run by a mass spectrometer can give values to a fraction of a part per billion, it is impractical because of its size and expense to be used as a continuous monitor, which the company feels is necessary to reveal leaks in the system as soon as they might occur.

They have developed, therefore, an impressive technique for measuring this bis-CME to a sensitivity of at least 1 ppb using gas chromatography. The major refinement is to use two columns in series of different components in the chromatograph.

The research division has constructed an elaborate feeder system for the monitor (currently housed in a trailer). Twenty plastic lines, one inch in diameter, are strung throughout the areas in which CME is being produced, stored, and used. The ambient air is sucked through these tubes continuously into the monitor trailer and from there are vented or fed sequentially into the gas chromatograph. With the present setup, a different sample can be tested every six minutes. The facilities are presently being transferred to the production division and the technique is being published.

VI. MEDICAL:

In-plant medical facilities are under the part-time direction of Dr. Harold Herman, a local physician. A required pre-employment examination includes a 14" x 17" chest X-ray, urinalysis, urine for drug screening, audiometry, and a physical examination. The medical department does not have in-plant X-ray equipment. Annual physical examinations are encouraged of all employees greater than 40 years old.

Since October, 1971, employees with the highest probability of contact with bis-CME have been sent to Johns Hopkins University in Baltimore for sputum cytology evaluation as participants in a sputum cytology-lung cancer research protocol under the direction of Dr. Frost and under a grant from the National Cancer Institute.

The research protocol includes a maximum of three stages of sputum cytology.

Stage I

- Container with 5 morning sputum samples is taken to Johns Hopkins with employee
- Chest X-rays are taken
- Sputum specimens are obtained with aid of ultrasonic nebulizer and saline
- 4 cytologists read slides in blind fashion
- This takes approximately one month between visit and final reading
- If malignant cells are found, hospital work-up is undertaken
- If any non-negative but non-malignant cells are found, employee will return to Johns Hopkins for Stage II

Stage II

- Stage I sputum collection protocol is repeated
- If non-negative, non-malignant cells are found, employee will return to Johns Hopkins for Stage III

Stage III

- Additional ultrasonic mists and collection procedures are undertaken
- If non-negative, non-malignant cells are still found, employee is hospitalized for lung cancer work-up which includes fiber optic bronchoscopy and tantalum chest X-rays

Three-hundred and four employees have completed Stage I with a yield of 63 non-negative and no malignant readings. All chest X-rays have been normal. Fourteen of the 63 non-negative employees have completed Stage II evaluations, and only three of these fourteen individuals remain non-negative. Thus far, no lung cancer has been diagnosed by this sputum cytology program. Rohm and Haas is planning to send everyone from the Philadelphia plant to Johns Hopkins, and presently fifteen employees per week are sent to Baltimore on the Metroliner at the company's expense.

EPIDEMIOLOGY:

Rohm and Haas, with epidemiological consultation from Dr. Martin Levin at Johns Hopkins, has begun a retrospective mortality study to compare death rates and mortality patterns at the Philadelphia plant, Bristol plant, and Springhouse research site. The cohort includes active employees and pensioners since 1954. The minimum requirement for the pension plan is five years of employment, and most individuals drop out of the pension plan when they terminate employment prior to retirement. The data include 80,000 mid-year entries since 1954.

The following summary data is now available from the Philadelphia plants regarding cause of death:

Deaths (1954-1971)	Philadelphia plant	Bristol plant
Respiratory cancer	30	20
Cancer (Other, specified and unspecified)	46	55
Other deaths	<u>291</u>	<u>313</u>
Total	367	388

The company has not been able to obtain hospital records on all cancer deaths and has not had the benefit of Social Security determination of vital status; however, 8.17% of these Philadelphia plant deaths are listed as lung cancer. Indeed, this appears excessive because lung cancer deaths usually account for only 4 to 5% of total male deaths.

The following three lung cancer cases are of particular interest because of their relatively young ages and work locations with possible exposure to bis(chloromethyl)ether. Since 1954 to the present, chloromethylation has been done in Building 6, where these three individuals worked at one time:

- (1) A 37-year-old male died of lung cancer in November, 1971. He was first employed at the Philadelphia plant in 1958 and worked in Building 6 throughout his employment at Rohm and Haas. In January, 1968, he became shift foreman of the chloromethylation operation and indeed he had potential for exposure to bis-CME.
- (2) A 34-year-old male died of lung cancer in April, 1963. He was first employed in the Philadelphia plant in February, 1954 and worked in Building 6 for three months before a transfer to Building R-6 for less than a one-year period. From May, 1955 to February, 1960, this employee again worked in Building 6.
- (3) A 45-year-old male was diagnosed as lung cancer in 1971. He had worked in Building 6; however, the details of his employment history were not immediately available. He was considered a heavy smoker and had some exposure to asbestos in filtering operations prior to his employment with Rohm and Haas.

Both the 37-year-old death and 34-year-old death are the only two lung cancer deaths that occurred in individuals less than 40 years old among the the total of 30 lung cancer deaths in the Philadelphia plant.

The Philadelphia plant employs a total of 2100 people (approximately 900 salaried and 1200 hourly employees). Less than 60 individuals currently work in Building 6 including about 26 individuals that work in the chloromethylation operations over three shifts.

