

In this case, [REDACTED] the plaintiff, entered the employ of the Standard Oil Company after preparation in his work of chemistry, largely conducted at the University of Chicago. While there, [REDACTED] made study and tests with mercury, a detail of which will be forthcoming in a number of published articles, copies of which are to be furnished by Dr. Sullivan. These articles will disclose the extent of his tests with mercury.

On going to the Standard Oil Company, [REDACTED] came under the supervision of Dr. F. W. Sullivan, Jr., the chief chemist at the Laboratory at Whiting, who has taught chemistry in school. The other superior was F. N. Rogers, also a graduate chemist.

[REDACTED] worked for quite a time in treating light distillates, and was engaged in work with lead tetraethyl for a little over two months. He worked with this product experimentally from August 4, 1924 to October 21, 1924, on which latter date he left on sick leave.

Prior to coming to work at the Standard Oil Company, [REDACTED] had probably worked under Stieglitz at the University of Chicago. The period of [REDACTED] employment with the Standard Oil Company was from January 3, 1923 to November 24, 1924, at which time he left on a leave of absence to December 31. His associates in his work were August French and Don Balcome - Balcome working with him only a few weeks and French practically

The lead tetraethyl is made by applying tests to a lead sodium alloy, which is a hard substance having a lead base. It was disintegrated with a mortar and pestle, by application of force to the product under oil. In this state the product is not voluble, and there is no occasion for any physical contact with it, nor would there be any harm if there were. The work of disintegrating it is done in a dish, about the size of an oatmeal dish, and after being crushed into pellets - which are small grains and not a powdery state - it is transferred to a reaction vessel, which is a glass flask. In this flask the product is disintegrated chemically in a diluent of hydro carbon, the resulting product~~s~~ being:

- 1- Lead sulphate,
- 2- Finely divided lead,
- 3- Lead tetraethyl.

The method of extracting the lead tetraethyl is by injecting steam into the flask. The heat of the steam increases the volatile character of the product, leaving the non-volatile portions as a residue in the flask. The flask employed is of conventional type. From the flask, by means of the injecting of steam, the gas is carried through a condenser, which consists of two tubes: The inner tube, containing the vapor; the outer tube, containing water productive of the condensation of the product in the inner tube. The flask is of glass, as is the condenser, and the joints between are of cork. From the condenser the product is carried into a glass receiver, and the process is complete. In the receiver there will be two layers: The

lower layer being water, and the upper layer being the lead tetraethyl in hydro carbon diluent. The specific gravity of the tetraethyl alone is heavier than water, but being mingled with the diluent, which is ¹/₂ lighter specific gravity, the lead tetraethyl (in the diluent) floats. Analysis of this layer of oil with a tetraethyl content is made to find what lead tetraethyl has been produced by the process. The receiver is conical shape, with a neck and flare lip. After the process of decomposition has reached the point where the product is contained in this receiver, the decomposition is complete, and there is no more danger in working with the product after it has reached that stage than there would be danger in working in a room which had been painted and the paint had dried.

It was the estimation of Dr. Sullivan that the largest amount of tetraethyl with which the plaintiff dealt during the entire period of his experimentation was some 29 grams. These conclusions are reached from the record which Chalkley made in his own handwriting, showing the quantities of material employed in his processes and experiments, and the resulting product. In all the experiments which were made by Chalkley, in an effort to derive or produce tetraethyl lead, he succeeded in deriving it only on two occasions. The remaining times there was no resulting tetraethyl product produced. The experiments were for the purpose of trying new methods. In general, the work was conducted with diethyl sulphate, which is classified as non-toxic.

The work which Chalkley did was performed

in a hood, which was specially sealed. It is made of oak, with glass windows. The platform on which the work is conducted is about waist high, and the hood extends from that level to the ceiling, consisting of four walls, two of which are solid and two of which contain glass set in oak frames. At the point where the joints occur extra strips are placed over the joints to seal the hood. There is a fan employed to produce overhead ventilation connected with the sealing of this hood. This fan commonly is used to exhaust from four hoods.

During the time [REDACTED] was engaged in this experiment, and during that entire period, the fan was employed only on this one hood and disconnected from the other three. I am to be furnished the exact dimensions of the hood and, by tests, the capacity of the fan, as to the number of cubic feet of elimination by its use in specified time, is to be furnished. A test was made, while I was there, with the hood, (which is in the same condition as it was at the time, except that the fan is now used to discharge from four hoods,) by pouring ammonia inside the hood and then taking a piece of paper with hydro chlorid acid on it and holding it all about the various joints and openings of the hood, to attempt to produce a heavy smoke, which is produced when the fumes from these two products come in contact. No smoke was produced except when the paper was held inside the hood, and when held just inside the hood, with the door of the hood open six or eight inches, the smoke all went up into the hood and out through the ventilators, none of which could be discerned coming out of the room, nor was there

any odor of ammonia to be discerned at any time.

Dr. Sullivan wrote a letter analyzing the record of [REDACTED], as made by him in his book, giving periods of tests, ingredients employed, tetraethyl used, and so forth. This letter is said to be in Mr. Fellingham's file, and copy of it is to be furnished to me. I looked over [REDACTED] notes and they are too deeply scientific for me to analyze, so that the letter of Dr. Sullivan is very valuable to a person who is to handle the case.

As respects rubber gloves, Rogers says he has seen [REDACTED] use rubber gloves. They were kept by the storekeeper and were to be had for the asking. French and Balcome say they never saw [REDACTED] work at any time without gloves, and as French worked with him through the whole period, his testimony should be quite strong as to the fact that [REDACTED] did wear gloves through all of his experiments. Both French and Balcome are graduate chemists, and they say that [REDACTED] warned them to wear gloves and to be careful not to get the fumes, and seemed to be quite familiar with the dangers involved.

The first complaint that was made by [REDACTED] to anyone about not feeling well was just before November 4, when he laid off. There had been newspaper articles published before that, telling about deaths from tetraethyl, and [REDACTED] was evidently scared to death, according to Sullivan.

I talked to Dr. Arthur Brown, who was not employed in this work while [REDACTED] was there but has done it since with the same hood and worked from April 7 to June 4, 1925. The process he used was to add sodium to molten lead and

then add ethyl sulphate, drop by drop, and used a mechanical stirrer. As I understand, [REDACTED] did not use a mechanical stirrer. I do not know if the difference in process is of any materiality. Brown made 22 runs, using 75 grams in each test, and produced more than 400 grams of tetraethyl, whereas, according to his understanding, [REDACTED] produced 63 grams. Brown worked with gloves and had no bad results. Dr. Sullivan places considerable reliance upon Brown's experience; my own impression is that it is of slight value and may be incompetent in evidence.

I interviewed Drs. French and Balcome jointly. They worked with [REDACTED] - French, most of the time, and Balcome for a few weeks. They said there was a practice of changing working clothes. They always wore rubber gloves; [REDACTED] did the same and warned them to do so. French studied at the Chicago University and Balcome at the University of Michigan. No masks were used at either place in working with lead products. Both said there was no complaint of ill-health until the last few days. French says that [REDACTED] talked to him about a dream or a hallucination he had, which was that of having a weight hanging over his head. He spoke to Dr. Reeves about it and he told him it probably was a dream. I pressed them as to how they felt themselves and what effects they had, whereupon French opened up and told how he had low blood pressure, was very tired along about the time that [REDACTED] was complaining. He said he did as much of the work as [REDACTED] and made the tests complete, and that in making the tests, the opening of the hood was

closed a much greater part of the time than it was open. He and Chalkley discussed the dangers of the matter before they started in the work. The particular hood used was in a room, known as Laboratory No. 17. I am thoroughly convinced that French believes he had lead poisoning at that time and that he thinks [REDACTED] did too. I led him along the line of being frightened and he admitted that he was frightened and that he thought it was very reasonable to be so. His testimony, if used at all, will have to be used with great caution, as I believe he is of the conviction that he and [REDACTED] both had lead poisoning, although naturally I did not press him to the point of saying so.

Dr. E. E. Reeves, employed as a physician in the hospital at Whiting, in the Standard Oil plant, examined [REDACTED] on various occasions; one occasion being July 30, 1924, which is before he went into this work, and at various times after. He did not examine his blood pressure. A report of his examinations of Chalkley is to be furnished, showing the dates and what he found.

Dr. Morton accompanied me on this trip, and I employed his skill in helping get at the facts. I believe the foregoing tells the situation as completely as possible.

To sum up:

Witnesses available: Dr. Sullivan is apparently highly competent; regards this case as pretty much nonsense; is somewhat reluctant to enter into the

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detail of it; I judge with the feeling that it is not necessary.

Dr. Rogers is very close-mouthed and hard to draw out.

Dr. French was frankly scared about lead poisoning and thinks he had it.

Dr. Balcome doesn't know much about the matter and if anybody asks, he will say so.

The possible witnesses are:

Dr. Sullivan,
Dr. Rogers,
August French,
Don Balcome,
Dr. E. B. Reeve,
Dr. Arthur Brown.

The storekeeper may have to be used as to the supply of rubber gloves, their availability, and how frequently they were furnished, and, possibly, some repairman, on the question of changing over the fan from four hoods to one. I did not see the storekeeper, but was told that he has the impression that [REDACTED] did not like the gloves he had and that he wanted some special kind, which were ordered and secured for him.

R. J. F.

KE 0017031

Stock, Alfred. "The Dangers of Mercury Vapor." (Zeitschrift für angewandte Chemie 39 (1926) 461-466)

The insidious danger of mercury has long been insufficiently recognized, and has been disregarded in just those places where it is particularly threatening; namely in physical and chemical laboratories.

The author suffered for years from health difficulties which began gradually and gradually increased until they became almost unendurable.

Symptoms are described as they developed, beginning with headache and increasing nervousness and irritability. Later congestion of respiratory passages and catarrhal troubles.

States that there is great similarity between mercury poisoning and lead poisoning.

Previous mercury poisoning imparts increased sensitivity to new poisonings on later contact. Claims that it is unwise to have amalgam fillings in the teeth.

Schmidt, A. Pinkus, Georg. Reihlen, H., Gradenwitz, F. Wolf, Ludwig "Comments in Regard to the Hazards of Poisoning from Mercury Vapors" (Zeitschrift für angewandte Chemie 39 (1926) 786-790)

The comments of several authors, mostly confirming the statements of Stock as to the toxic nature and the danger of chronic mercury poisoning.

Buska, Julius. "Observations on Mercury Poisoning Among the Arabian Alchemists and Physicians" (Zeits. angew. Chem. 39 (1926) 790-791)

Stock, Alfred. "The Danger of Mercury Vapor" Reply to comments of Gradenwitz and others. (Zeits. angew. Chem. 39 (1926) 790-791)

Stock, Alfred. "The Dangers of Mercury Vapors and of Amalgams" (Zeits. angew. Chem. 39 (1926) 984-989)

Gives accounts of confirmatory evidence of mercury poisoning. States that "it is proven that the continued inhalation of even extremely small quantities of mercury (.01 to .001 milligrams daily) causes health disturbances which at first are not specific and affect principally the nervous system and the upper respiratory passages, particularly the nose."

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