

NOTES ON THE DETERMINATION OF
LEAD IN THE ATMOSPHERE.

TETRAETHYL LEAD.

The following brief comments are made in relation to the method described in a report from Abadan (Development Report No. 8501).

Despite the preliminary test of the method described in the report, it is believed that the absorption of tetraethyl lead vapour from the atmosphere by means of T.V.O. would be incomplete under the conditions prevailing in the P.O.D. It has been shown that the use of similar solvents (kerosene, mineral oil) for this purpose is reasonably satisfactory only when the concentration of tetraethyl lead vapour in the air is quite high, and that the efficiency of the absorption drops off sharply as the lead concentration in the air diminished. For this reason the use of an absorbing medium which reacts promptly with tetraethyl lead (one containing bromine or iodine) is recommended as being necessary.

The estimation of the lead extracted from the air by the absorbent can be carried out by anyone of several methods with satisfactory accuracy provided the quantities of lead to be dealt with are within the range of the sensitivity of the individual method chosen. The analytical error associated with the use of the A.S.T.M. method D 526-39T as outlined in the report from Abadan is appreciable, and can be reduced to practical insignificance only by the collection of a sample that will contain quantities of lead of the order of several mgms. In general, the quantities of lead dealt with in the report appear to have been sufficient to justify the use of this analytical method. It is believed, however, that the results given in the report tend to err somewhat on the low side. The analytical error would be quite small as compared with that resulting from the use of the somewhat inefficient method of extracting tetraethyl lead from the air.

For the reasons given above, it seems probable that the conditions with respect to lead exposure in the can-filling section of the P.O.D. were somewhat more severe than the data indicate. This conclusion is especially justified in connection with the analytical results given in the Second Interim Report (D.R.No.8620). It seems certain that any type of increased ventilation would have reduced the lead concentration (as well as the concentration of petrol vapours) in the atmosphere of the filling section. However, the data in Table 1 (D.R.8620) cannot be relied upon implicitly for the following reasons:-(1) The air samples were comparatively small; (2) The quantities of lead found were outside the range of sensitivity of the analytical method; and (3) In all probability the extraction of the tetraethyl lead vapour from the air was incomplete. Moreover, it would seem that there would be significant variations in the lead content of the atmosphere at different times and in different parts of the filling section unless the ventilation had been designed in such a manner as to remove the vapors from the building by picking them up at their point of origin.

The method for the collection and determination of tetraethyl lead as outlined in the memorandum of Dr. Cassells dated 16th July 1943 can be expected to yield satisfactory results. The efficiency of the absorption of t.e.l. from the air is high for even quite low concentration, while the analytical procedure is sufficiently accurate for the purpose.

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