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THE FILTRATIONAL PROPERTIES OF POLYAMINES

REPORT NO. RD.476-R

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Research & Development Establishment,  
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THE FILTRATIONAL PROPERTIES OF POLYAMINES

(Report No. RD.476-R)

SUMMARY AND CONCLUSIONS

A variety of polyamines, which were synthesised in the laboratory, have been examined as potential filter additives for the selective removal of volatile aldehydes from cigarette smoke. From this evaluation and previous work with other polyamines, it is concluded that amines, as free bases, are insufficiently reactive to give substantial filtration of volatile aldehydes.

It has long been known that the reaction between nitrogenous bases and carbonyl compounds, in aqueous solution, is catalysed by acids. The rate of such reactions is also dependent upon the pH of the reaction mixture, and there exists an optimum pH at which the rate has a maximum value. The principles governing this general reaction have been used to promote the reactivity of amines on a dry filter surface. The catalyst chosen for the present work was acetic acid. Theoretical and experimental evidence indicates that the required pH control of the filter can be achieved automatically by using the normal amine salt of a weak acid. Under such conditions, some amines give high filtration efficiencies for volatile aldehydes in cigarette smoke.

For example:-

ethylenediamine di-acetate	85%
tetrakis-(methylamino)-methyl-methane tetra-acetate	59%
poly(ethyleneimine) "acetate"	45%

(a loading of 10% on paper, based on the free amine).

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In practical terms, however, two basic problems have yet to be surmounted:-

- (1) High loadings of the amine salt are required.
- (2) With the exception of PEI, the toxicities of the above compounds are unknown.

Attempts are currently being made to reduce the level of additive whilst maintaining a high filtration efficiency.

It is proposed to have the relevant toxic properties of these two salts evaluated, and the necessary materials are being prepared for this purpose.

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