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THEORY OF SELECTIVE FILTRATION: PART III  
DISPLACEMENT PROCESSES

REPORT NO. RD.430-R

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THEORY OF SELECTIVE FILTRATION: PART III  
DISPLACEMENT PROCESSES

(Report No. RD.430-R)

SUMMARY AND CONCLUSIONS

The displacement of substances from cigarette filters into the smoke stream can be an important factor in filtration and is also of considerable interest as a method of adding flavours to smoke.

Two types of displacement are possible:-

- (1) Passive displacement in which the role of the smoke is simply to carry away the substance released from the filter.
- (2) Active displacement in which substances being removed from the smoke compete for a limited number of active sites on the filter material with the substance already present. This forces some of the latter substance to leave the filter.

The factors affecting active displacement are discussed in this report and the following conclusions are reached:

1. Active displacement is most likely to occur with adsorbents like charcoal and silica which have a limited sorptive capacity for which different sorbates can compete. (Adsorbents of this type give isotherms which are concave to the pressure axis.) It is improbable that active displacement will be an important process with adsorbents like cellulose acetate and polyethylene glycol.
2. If one substance tends to actively displace a second substance, then the second substance also tends to displace the first.

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3. Completely involatile substances cannot be displaced, even if a driving force exists.

It is proposed to carry out a more detailed theoretical study of the kinetics of displacement and to relate this to the results of current experimental work on displacement from cigarette filters.

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