

Dr. D.G. Felton

C.I. Ayres

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Project JANUS: Smoke Condensate for the Long-Term Tests

In this note a procedure is suggested for the preparation of the condensate solutions to be used in the long-term tests. This procedure differs from that in current use in the preparation of solutions for the Hyperplasia Test.

All doses are based on a weight of "rotary-evaporated condensate". At the time of application the condensate is 24 hours old. In the Hyperplasia Test, the condensate is washed from the traps with acetone, the bulk of the acetone is removed by distillation and the residue is brought to constant weight by evaporation in a rotary evaporator. Solutions of suitable concentration for the Hyperplasia Test are then made by dissolving the residue in acetone-water (9:1).

In the case of the long-term tests, it has been suggested that this extensive evaporation, with the inevitable loss of "volatiles", should be avoided. Furthermore, the operation is exceedingly time-consuming and if it is eliminated the task of preparing the condensate solutions will be eased.

The suggested procedure is:

Stage 1

In the three-month period prior to the start of the skin-painting, the delivery of "rotary-evaporated condensate" per cigarette is determined.

Stage 2

In the period of skin-painting, this average delivery of condensate is used to calculate the number of cigarettes which need to be smoked to obtain painting solutions of the required concentrations.

Stage 3

Periodic checks are made of the delivery of "rotary-evaporated condensate", whilst the nicotine contents of the painting solutions are continuously monitored. These checks should act as an adequate safeguard against any drift in the concentration of the painting solution passing undetected.

Stage 2 probably requires some amplification and consequently is illustrated by a numerical example.

The volumes of painting solutions required will vary over the duration of a long-term test, but a typical requirement at a particular time might be

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	Volume	Concentration
Solution A	105 ml	83.3 mg/ml
Solution B	105 ml	166.6 mg/ml
Solution C	105 ml	333.3 mg/ml

∴ if a small allowance is made for wastage, the weight of condensate required is 65 g.

Delivery of rotary evaporated condensate per cig = 23.2 mg (say)

∴ Number of cigarettes to be smoked = $\frac{65}{23.2} \times 1000 = 2,800$.

Four Mason machines will be needed to smoke this number of cigarettes. The condensate from the traps is combined and washed into a single flask with acetone (i.e., not acetone-water) to give solution I.

To obtain a solution containing 333.3 mg/ml of condensate, 65 g of condensate has to be in a final volume of 195 ml.

The suggested procedure is to evaporate Solution I to a volume of 75% of 195 ml and then make up to 195 ml with acetone-water (9:1). An aliquot (105 ml) of this solution is taken as Solution A. The residue of the solution can be used to prepare solutions B and C by suitable dilution with acetone-water (9:1) whilst a final aliquot is analysed for nicotine.

The aims of this procedure are:

- (i) To avoid the excessive evaporation in a rotary-evaporator.
- (ii) To be readily adaptable to the varying volumes of solution which will be required over the course of a long-term test.
- (iii) To ensure that in all solutions, the solvent is very close to the specified acetone-water (9:1).

D.G. Felton

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