

FOSTER D. SHELL METHOD OF DETERMINING

TAR AND NICOTINE CONTENT OF CIGARETTE SMOKE

The cigarettes are conditioned at 77°F. and 50% relative humidity. The average weight of the cigarettes is determined and only those cigarettes were selected for test which were fully packed and did not deviate from the average weight by more than 20 mg. The cigarettes are measured from the tobacco end and marked to allow for a butt length of 23 mm. Five cigarettes are smoked for each single determination. Determinations for tar and nicotine are run in quadruplicate.

Smoking

Cigarette smoking is carried out in a constant temperature, constant humidity room (77°F., 50% R.H.) on a four-unit constant volume machine water activated and electrically timed. Puffs of 35 ml. volume and 2 seconds duration are taken at one minute intervals until the cigarettes were burned to the predetermined butt length.

The smoke passes through an absorption train consisting of a 300 ml. Kjeldahl flask containing 1 ml. of 0.5 N hydrochloric acid and 10 ml. of 95% alcohol and then through two bubbler traps. The first bubbler contains 5 ml. of 0.5 N alcoholic hydrochloric acid. The second bubbler contains 5 ml. of 0.5 N aqueous hydrochloric acid. At conclusion of the run the smoke is allowed to settle for a minimum of 30 minutes.

Determination of Tar Content

The tar content of the smoke is determined by condensing and collecting it in the manner described above under Smoking. The apparatus train is washed with 95% alcohol and distilled water to remove the condensate in the train, all washings being placed in the Kjeldahl flask. The solution used in washing down the train, plus the condensate, total approximately 100 ml. This solution is allowed to sit for a minimum of 1 hour.

The solution is transferred to a dry, pre-weighed 150 ml. Pyrex beaker. The flask is rinsed with 95% alcohol and distilled water until the total volume of tar and solution is about 125-135 ml. The solution is evaporated to near dryness on a steam bath. The residue and beaker are placed in an oven for seven hours at 105-110°C., removed and allowed to cool for thirty minutes in a desiccator and weighed.

Determination of Nicotine Content

The cigarettes are smoked as described above. The apparatus train is washed thoroughly with 95% alcohol and distilled water and the

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washing added to the Kjeldahl flask. The solution, which is acidic is then steam distilled to remove the alcohol and other volatiles (about 900 ml. is collected to remove volatiles). The solution is then redistilled, this time adding 22 ml. of 30% NaOH and 3 gms. NaCl to the solution, collect distillate (about 700 ml.) into a 300 ml. beaker containing 35 ml. of 1:4 HCl and precipitate with 12% silicotungstic acid (15 ml.). The precipitate is then filtered through a preweighed Gooch crucible and dried at 105°C. for 3 hours, cooled in a desiccator for 30 minutes and weighed.

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