Patented Sept. 24, 1940 2,215,620

UNITED STATES PATENT OFFICE

2,215,620

COMPOSITION OF MATTER FOR REMOVING POISON FROM TOBACCO SMOKE

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No Drawing. Application June 1, 1938, Serial No. 211,271. In Germany April 19, 1938

8 Claims. (Cl. 131—207)

As is well known, active silica gel is used for removing poison from tobacco and tobacco smoke as well as improving the taste of the smoke. Now, it has been found, that not all active silica gels may be used for this purpose, because the improvements of the taste effected by the silica gel are very different. Depending on the kind and the composition of the smoke (cigarette smoke, cigar smoke, pipe smoke and the like) certain silica gels only, either of uniform colloidochemical nature or as mixtures come into considerations which gels must possess exactly the properties described later on. Only then effects may be obtained by the use of the silica gel as adsorption agent which, as far as the taste is concerned, suffice the expectations of the smoker and which also take into consideration and prevent if possible the different influences of the individual ingredients of the smoke upon the organism which are far more complicated than generally is supposed. As far as the validity of the present perceptions is concerned, it is of no importance whether the gel is worked into the tobacco itself, or is applied to the tobacco smoke in form of a cartridge.

The properties of the gel and the composition and the physical-chemical nature of the tobacco smoke in consideration as well as the suitable mutual relation between these two factors are determinative alone. It has been found that the heat tone of the adsorbent (active silica gel) is decisive for the range of use of an active silica gel for the adsorption of tobacco smoke. With the smoke conditions (kind and moisture of the tobacco, velocity of smoke and smoke volume per puff, smoke temperature at the adsorbent etc.) continuing the same, the heat tone, integrated from the moist heat or heat of hydration or humidification and the adsorption heat indicates the limits of the range of use of a silica gel as adsorbing agent for the tobacco smoke. As, however, the values for this heat tone are no absolute values, they may be obtained by comparative measurements only. It has, however, been found, that parallel to these the moist heat of the gels runs with regard to water and that then the values for this moist heat represent a direct measure for the range of use of an active silica gel for the adsorption of tobacco smoke in such a manner, that fundamentally such silica gels only may be used the moist heat of which with regard to water at 18° C. amounts to not more than 28 cal./g. and not less than 14 cal./g. for the gel of 0.5 to 1 mm. average dried diameter at 125° C. up to the constancy of weight. The use of active silica gels having a moist heat of more than 28 cal./g. is unsuitable for the reason, that, due to the higher heat tone, temperatures occur which cause decompositions of the tobacco smoke undesired with regard to the taste as well as to the health in such a manner, that the tar products and empyreumatic oils already present are increased and are not sufficiently adsorbed. Colorimetrical measurements of the chloroform layer of the smoke of 20 cigarettes or 4 cigars=about 20 g. of tobacco, passed over 2 g. active silica gel of 30 cal./g. moist heat the first time and of about 18 to 20 cal./g. moist heat the second time and received in 30 ccm. of diluted sulphuric acid and 30 ccm. water, have shown, that in the first case the contents of tar products and empyreumatic oils of the tobacco smoke were about 2.5 times as large as with the second test. Due to the sudden high heat tone at the first contact of the smoke with the first mentioned gel, films of the tar products probably are formed on the upper surface of the gel which render difficult the further penetration into the gel capillaries, whereas, due to the high heat tone, simultaneously an increased tar formation is favored.

It has further been found, that gels having a moist heat of 28 cal./g. decreasing downwardly are effective for the adsorption of the following smoke constituents: nicotine, pyridine, the other alkaloids of the nicotine group, alkylamines and pyroles, whereas gels having a moist heat of 15 cal./g. increasing upwardly are effective for the adsorption of the tar products and the empyreumatic oils. The adsorption of ammonia and, as far as may be judged from the determinations, of methyl alcohol remains uniformly distributed with all gels. The determinations of these ingredients were chemically, stalagmometrically or colorimetrically effected.

From the above mentioned results about the effective range of use of a silica gel and their establishment, now the further important perception follows, that for the adsorption of tobacco smoke, in contradistinction to the hitherto known state of knowledge, not a simple kind of active silica gel is uniformly to be used but mixtures of various gels having a moist heat of 28 to 14 cal./g. are to be employed. It is an absolutely wrong view to which in the literature attention often has been directed by authoritative investigators, to make a single certain ingredient of the smoke, i. e. mostly nicotine, responsible for the harmful effects of tobacco smoke. The tar products, largely adsorbed by the gels having a high moist heat (up to 28 cal./g. strongly adsorbable substances mentioned above) as well as the empyreumatic oils

largely adsorbed by the gels having a lower moist heat (up to 14 cal./g.), exert intensive and harmful, different effects upon the human organism. While the first mentioned ingredients are noxious to the function of the heart and to the central nervous system, the latter ingredients are responsible for injuries of the respiratory organs and the formation of carzinomae. Moreover, the tests carried out have shown, that the contents of tar products and empyreumatic oils in the tobacco smoke substantialy influence the reception by the respiratory organs of the nicotine, remaining in the tobacco smoke, and presumably of the other noxious ingredients also. Although the exactness of these tests which necessarily must be carried out on the smoker himself naturaly is limited only, it has been proved beyond any doubt, that with an equal content of nicotine in the smoke (about 0.3% of the weight of the tobacco) and a reduction of the contents of the tar products and empyreumatic oils to less than half, the nicotine content of the smoke breathed out has been found to amount to about double that which is breathed out when the smoke contains the entire content of the tar products and the empyreumatic oils. Presumably mixing or the resorption of the nicotine by the tar products occurs which biologically would absolutely be comprehensible.

On the basis of adsorption measurements it has further been ascertained, that for the use of an active silica gel as an adsorption agent for smoke, the size of the grain of the gel employed is of considerable influence and this not in a manner only as the general influence of the size of a grain of an adsorbent for the adsorption of gases and vapors, but in quite a definite direction. A grain size (ascertained by counting the particles and measurement of their volume) has been proved to be suitable which, calculated to the cube, has a length of the edge of 0.50 to 2 mm. With smaller grain sizes caking of the individual particles occurs, whereas with larger grain sizes the silica gel-insertion becomes loose. In both cases the adsorption of the smoke ingredients is unfavorably influenced. The water content of the gel used is of importance with regard to influencing the taste of the smoke by the active silica gel. Therefore, the water content of the gel should at least be 3% and preferably amount to 10% of the weight of the gel. When sprinkled with water, the gel should not crumble. For the use of silica gel in tobacco pipes, the gel may either be enclosed in an insertion which is arranged in the path of the smoke in a manner similar to that in connection with cigar and cigarette holders respectively, or the gel is formed in a single piece and dried, whereupon this preferably perforated piece of gel is inserted into the bowl of a pipe. The gel may also with caution be incorporated in clay and burnt, and insertions for the bowl of the pipe may be made in this manner which correspond to the well known clay insertions, but have with regard to the latter advantages which are evident from a study of the above statements.

What I claim is:

1. A composition of matter for removing poison from tobacco smoke and for improving the latter and arranged in the smoke channels of cigars, cigarettes, pipes, pipe bowls, cigar and cigarette holders and the like, comprising an insert composed of a mixture of different types of active granular silica gels, the moist heats of the individual gel types present in the mixture lying between 14 cal./g. and 20 cal./g. with respect to water.

2. A composition of matter according to claim 1, in which each active silica gel has a water content of 3% to 10% of its weight.

3. A composition of matter according to claim 1, in which the silica gels have a grain size possessing an edge length of 0.50 to 2 mm. calculated to the cube.

4. A composition of matter according to claim 1, in which a base material of clay is provided in which the silica gels are incorporated.

5. A composition of matter for removing poison from tobacco smoke and for improving the latter and arranged in the smoke channels of cigars, cigarettes, pipes, pipe bowls, cigar and cigarette holders and the like, comprising an insert composed of a mixture of different types of active granular silica gels, the moist heats of the individual gel types present in the mixture lying between 14 and 24 cal./g. with respect to water and having a water content of 3 to 10% of the weight of the mixture.

6. A composition of matter according to claim 5, in which the silica gels have a grain size possessing an edge length of 0.50 to 2 mm. calculated to the cube.

7. A composition of matter for removing poison from tobacco smoke and for improving the latter and arranged in the smoke channels of cigars, cigarettes, pipes, pipe bowls, cigar and cigarette holders and the like, comprising an insert composed of burned clay, and a mixture of different types of active granular silica gels in the clay, the moist heats of the individual gel types in the mixture lying between 14 and 28 cal./g. with respect to water and having a water content of 3 to 10% of the weight of the mixture.

8. A composition of mater according to claim 7, in which the silica gels have a grain size possessing an edge length of 0.50 to 2 mm. calculated to the cube.

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