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ALCOHOL TESTING REAGENT

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5 Claims. (Cl. 23—232)

This invention relates to an improvement in the process of detecting the alcohol content in breath exhaled into a gas testing tube.

For detecting the alcohol content in exhaled breath, especially in the so-called testing tube process, it is known to use potassium bichromate-sulphuric acid as the oxidation medium. This acid is usually placed on a carrier, as, for example, on a silica gel carrier.

This known process has the disadvantage in that the reaction does not always proceed uniformly through the reaction layer, and therefor the reaction is dependent upon the composition of the carrier.

The object of this invention is to avoid the disadvantages of the known processes. The invention is directed to an improvement in the reagent used for the process of detecting alcohol in the exhaled breath by means of potassium bichromate-sulphuric acid. This improvement is especially suitable for carrying out the process by means of gas testing tubes.

According to the invention, it has been found that the reagent is improved by the presence of a small amount of a trivalent arsenic compound. Surprisingly, it has been shown that such an addition speeds up the detection reaction in such a manner that the reaction always proceeds similarly in the same fashion, and that the reaction is independent of the kind of carrier upon which the reagent medium is applied. An arsenic content of approximately 5 percent with reference to the chromic acid content has been found to be favorable in the production of the desired results.

In a preferred form of the invented process, the reagent contains additional small amounts of iodine. This iodine mixed with the arsenic trioxide serves a catalytic function. The iodine content of the reagent with reference to the chromic acid content is approximately 0.3 percent.

The following is an example of the composition of the reagent used for carrying out the process according to the invention.

500 gm. pure dry silica gel having a loose weight of 400–500 gm./l. and a grain size of 0.8 to 1.2 mm. are mixed dry with 3.5 gm. of finely powdered potassium bichromate into a first mixture. Then 100–200 mgm. arsenic trioxide and 5–20 mgm. iodine, both as fine powders in dry state, are mixed with the first mixture, and the whole mixture is mixed homogeneously. Then 300 ml. of sulphuric acid in a concentration of 90–98 percent weight is added. The mixed powders are uniformly impregnated by the acid in a shaking device. After the impregnation, the preparation is subjected to a heat activation. For this purpose, the preparation is heated in a closed container to a temperature of at least 100° C., maximum 200° C. This heat treatment period

is between one and six hours. For example, the preparation is heated for six hours at a temperature of 100° C. The finished treated composition has a yellowish coloring. The testing tubes are then filled with the preparation in the usual manner.

During the test with the alcohol containing exhaled breath, the yellow composition shows with practically no delay the alcohol content by changing color to an intense green, if the alcohol content is over 0.3 percent. The length of the discolored zone is proportional to the alcohol content in the exhaled air, and therefore also proportional to the alcohol content in the blood.

According to a suitable form of the invention, the arsenic can be present partially in the form of AsI_3. It is assumed that this compound is produced by the above-disclosed process or by equivalent processes.

The effect of the invented process seems to be due to the reduction of a small amount of chromate into a trivalent chrome because of the small addition of the trivalent arsenic compound, so that the composition is colored slightly green. The green color disappears during the heat treatment but without causing any loss in the activity of the composition. The heat activated compositions are durable and stable during storage.

Having now described the means by which the object of the invention is obtained, I claim:

1. A process for the testing tube detecting of the alcohol content in exhaled breath comprising drawing the exhaled breath through a testing tube containing silica gel on which has been heat stabilized a composition of potassium bichromate-sulphuric acid with arsenic trioxide and iodine, said iodine serving a catalytic function.

2. A process for preparing a reagent for testing of alcohol in breath exhaled through a testing tube comprising dry mixing approximately 500 gm. of silica gel, approximately 3.5 gm. of potassium bichromate, 100 to 200 mgm. of a trivalent arsenic compound and 5 to 20 mgm. of iodine, impregnating said mixture with approximately 300 ml. of sulphuric acid, and heating the impregnated mixture until it changes from a slightly greenish to a yellowish color in a stable composition.

3. A reagent for the testing of alcohol in breath exhaled into a testing tube comprising an admixture of approximately 3.5 gm. of potassium bichromate, and 100 to 200 mgm. of a trivalent arsenic compound impregnated with approximately 300 ml. of sulphuric acid and heat stabilized on approximately 500 gm. of silica gel, said reagent containing a trivalent chrome formed by the reduction of a portion of said potassium bichromate in the presence of said arsenic compound.

4. A reagent as in claim 3, further comprising a small amount of iodine in the reagent.

5. A reagent as in claim 4, said iodine comprising approximately 0.3 percent of the weight of said chromic acid.

References Cited in the file of this patent

UNITED STATES PATENTS

2,141,646	Ferguson	Dec. 27, 1938
2,591,691	Forrester	Apr. 8, 1952

OTHER REFERENCES

Williams et al.: Anal. Chem., 22, 1556–61 (1950).