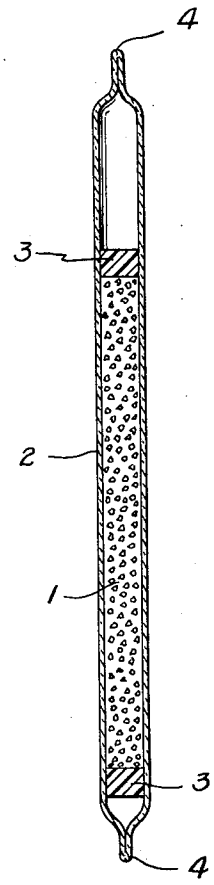
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REAGENT CARRIER FOR GAS DETECTING TUBES

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REAGENT CARRIER FOR GAS DETECTING TUBES

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This invention relates to a reagent carrier for detecting tubes.

Detecting tubes are devices utilized for detecting the presence of gases, suspended materials, or the like in air or other gases. The air or gas to be sampled is drawn through one of these tubes by means of a suction device. The detecting tube is filled with a carrier generally of granular structure upon which a reagent is precipitated in order to detect certain components of the air or gas being sampled. Inorganic carrier substances are used as the reagent characters and, in particular, silica gels are used. These conventional inorganic reagent carriers have the disadvantage of being porous and thus absorbing the reagent. Furthermore, in many cases, the inorganic carriers are not chemically inert with respect to the reagent and/or the components being detected in the sample air or gas.

The object of this invention is to produce a reagent carrier which avoids the disadvantages of the conventional reagent carriers for detecting tubes.

In general, this and other objects of the invention are obtained by using as a reagent carrier plastics which are brittle at normal temperatures ranging approximately from —20° to +20° C. These reagent carriers have the advantage in that they are not penetrated either by the reagent or by the component being detected, and the plastics do not react with the components of the reagent. Above all, chemically defined materials are utilized as the plastic reagent carriers. Whenever possible, the plastics must not contain any softener in order to eliminate the possibility of dissolving the reagent or the component of the air or gas being detected.

Brittle or frangible plastics are defined in this invention as non-porous plastics which break up or crack under impact at normal temperatures, as from —20° to +20° C.

The grain size of the plastics used as the reagent carrier ranges betwen 0.2 and 2.0 mm. and preferably between 1.0 and 1.2 mm.

The grains of the plastic reagent carriers of this invention have a predetermined liquid holding capacity on the surface of each grain, said capacity being measured by the roughness of the surface of the grain or of the superficial structure of the grain for any given grain size.

Preferably the liquid surface holding capacity for the grains of plastic reagent carrier of this invention is approximately 2 milliliters of isopropyl alcohol and preferably 5 milliliters per 100 grams of the plastic grains, with the grain size of the individual grains being approximately from 1.0 to 1.2 mm.

The grains for the carrier can be composed of plastic polystyrene. Preferably a polystyrene of clear glass granulation is used.

Also, plastics can be used of the coumarone type resin.

The plastic grains of this invention for use as the reagent carrier for a detecting tube are preferably produced as follows. The raw material consists of commercial coarse grains having a size of from approximately 3 to 5 mm. These coarse grains are broken up in a grinding mill or comminutor and then screened to obtain the desired fractional size grains. The coarse grains preferably are cooled to the lowest practical temperature immediately before being ground. This cooling has the advantage of providing rough surfaces on the fine grains obtained from the coarse grains. Plastic polystyrene cooled to —10° C. and then broken to a grain size of, for example, from 0.2 to 2.0 mm. produces fine grains having a liquid surface holding capacity of about 5 milliliters of isopropyl alcohol per 100 grams of grains.

The means by which the objects of the invention are obtained are described more fully with reference to the accompanying drawing which is a cross-sectional view through a detecting tube containing a filler of the plastic reagent carrier.

In the drawing, the plastic grains **1** are poured into a glass detecting tube **2** and are held in the tube by packing 3. The ends 4 of the tube are then sealed. When the tube is being used, the ends 4 are broken and the air or other gas drawn through the tube to detect the presence of any particular component in the air or gas.

The operation of the invention is as described in the following examples:

EXAMPLE 1

Preparation of a Detecting Tube Reagent Carrier for Filling a Detecting Tube for the Purpose of Detecting Hydrogen Fluoride

5 milligrams of a conventionally prepared alizarine-zirconium dye lacquer was precipitated from an alcohol solution onto 100 grams of granular polystyrene having grains of a size from between 1.0 and 1.2 mm. and a liquid surface holding capacity of 5 milliliters of isopropyl alcohol, as determined on the basis of the 100 grams of the reagent carrier. In order to increase the sensitivity of detection, the 100 grams of grains were then impregnated with an excess of 5 mg. alizarine. The alcohol was then evaporated. Following this, 2 ml. ethylene glycol plus 0.5 ml. glacial acetic acid was added to the grains. This prepared material was easily flowable and poured into the detecting tube **2** in the usual manner and held in place by the packing 3. This packing or retaining element was made of a material inert to hydrofluoric acid and composed, for example, of Teflon (fluorinated polyethylenes) or polyethylene. This detecting tube is used for the determination of HF in air. When an air test sample in the amount of 2 liters is taken, the range of measurement is between 2 micrograms and 30 micrograms HF per liter of air.

EXAMPLE 2

Preparation of a Detecting Tube Filler for the Detection of Acid Vapors

A polystyrene reagent carrier of the type described in Example 1 was used. 100 grams of the grains of polystyrene having a grain size of from 1.0 to 1.2 mm. were impregnated with a solution composed of 1.5 ml. butanol, 1.5 ml. of universal indicator, and 0.2 ml. n/10 NaOH. The solvent was then evaporated. Test tube **2** was then filled with this filler. The range of measurement of the detecting tube was approximately 1 microgram to 20 micrograms of acid vapor per liter of air using an air test sample of 1 liter. This measurement range was determined on the basis of detecting SO_3 as the acid vapor.

EXAMPLE 3

Preparation of a Detecting Tube Filler for the Detection of Hydrazine in Air

The reagent carrier was composed of polystyrene grains as set forth in Example 1. 100 grams of the grains were impregnated with 0.5 ml. of a 0.25% solution of methyl violet in ethylene glycol. Test tube **2** was filled with this prepared filler and had a measurement range of from 1 to 20 micrograms of hydrazine per liter of air when using an air test sample of 1 liter.

Having now described the means by which the objects of the invention are obtained,

I claim:

1. An indicator for a detecting tube comprising a gas detecting reagent coating on a carrier composed of non-porous grains of a plastic which is brittle at normal temperatures ranging from about minus 20 to plus 20 degrees centigrade.

2. An indicator as in claim 1, said grains having a size ranging from about 0.2 to 2.0 mm.

3. An indicator as in claim 2, said grains having a size ranging from about 1.0 and 1.2 mm. and having a liquid holding surface capacity of from about 2 milliliters to 5 milliliters of isopropyl alcohol per 100 grams of said grains.

4. An indicator as in claim 3, said grains comprising a plastic selected from the class consisting of colorless synthetic and natural resins.

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