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THE EXAMINATION OF ASPHALTIC ROAD MATERIAL

The engineer or contractor engaged in the work of laying roadways of material from bituminous origin will be interested in a description of a simple method of examining such materials and ascertaining their comparative composition. The materials of this nature which come to the contractor to be used as road materials are:—

Petroleums and petroleum products.

Malthas.

Asphalts.

Tars.

Bituminous aggregate, including rock asphalts, etc.

It is usual to submit the material to the following tests, viz. :—

Water.

Specific gravity.

Volatilization at 163°C.

*Bitumen soluble in carbon disulphide.

Bitumen insoluble in 86°B* paraffin naphtha.

Fired carbon.

The apparatus required to make an examination of this nature would include a sensitive balance with weights (Metric), glass plate, desiccator, small stool, glass beaker, hydrometer or small glass flask, thermometer, drying bath, Gooch crucible, funnel, flask, with side arm, asbestos felt, Bunsen burner, platinum crucible, Sulphuric acid.

In estimating the moisture, 3 grams of the asphalt or other material are spread over the surface of a clean glass plate, which is of such size as to allow being placed in a desiccator giving as large an area as possible. Sulphuric acid is poured into the lower portion of the glass and the material enclosed for about one hour. The asphalt is removed from the drying dish and reweighed with as much speed as possible, allowing for accuracy. The loss in weight represents the enclosed moisture which has been absorbed by the acid lying below it. To reduce the moisture to a percentage basis, is, of course, a simple application of proportion; supposing the loss to be 0.097 gram. then $3.000 : 97 = 100 : x.x. = \% \text{ moisture.}$

To determine the specific gravity of a sample, one or more methods may be used, depending on the sample being solid, thin liquid, thick or viscous fluids, or semisolids.

If the sample is solid or of sufficient stability to remain in definite form it is first weighed on the balance pan, such weight being represented by A. The small stool should be so constructed as to fit over the balance pan, allowing a free use of the same, as shown in Fig 1. The sample is suspended from the balance beam by a thin silk thread (for extreme accuracy the thread may be weighed and allowed for, this being well in the capabilities of a good balance). The beaker is filled about two-thirds with water, and for accurate results the water should be distilled and recently boiled, but allowed to become to the room temperature while covered.

The sample is again weighed while suspended, and the difference in weight represents the weight of an equal bulk of water B. The specific gravity of the sample would then

A
equal —
B

*Baume.

To determine the specific gravity of a liquid, the balance may be employed with equal results to those obtained by accurate hydrometers. A small glass flask with a permanent mark made on the neck, is counterpoised by a weight on the balance, the weight of a volume of distilled and recently boiled water is ascertained, the flask is emptied, dried and filled with the sample, the mark on the neck being used to fill the flask with equal volumes. After the weight of the sample is secured, the calculation is made as above. The specific gravity is usually calculated to the third decimal place.

The substance should be treated to a heating of 163°C (325°F.) to ascertain the loss through such a condition.

This test is not made on tars, the distillation test being used to ascertain the loss on materials of this nature.

An oven as shown in Fig. 2 is the favorite in many laboratories in the United States, but any form of drying

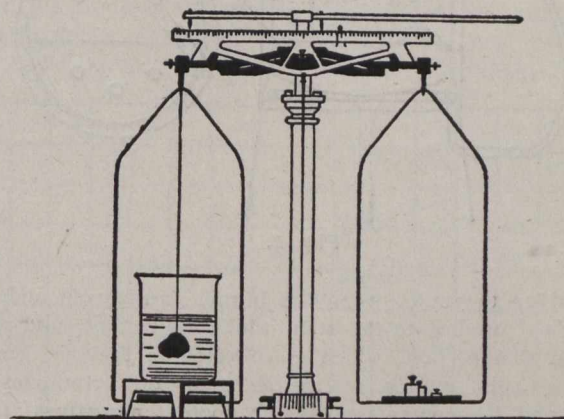


Fig. 1.

bath may be used that will give a uniform temperature in the lower parts or on the shelves, if such are used.

The object of this test is to determine the percentage of loss when a quantity, usually 20 grams., is subjected to this heat for a period of five hours.

In preparing a heating chamber for a prolonged heating, the interior is first heated to show a temperature of 163°C. The interior is then wiped with a clean cloth, removing any grease or other adhering material. The material being weighed is placed in a small copper saucer, when the door is closed, and the temperature of 163°C. maintained. A slight variance of two or three degrees at times will make no difference, should the gas pressure or other causes alter the conditions.

At the close of the time allowance, the sample is removed, and allowed to cool in a desiccator. If many samples are to be examined it is an economy to have the oven of such dimensions that several samples may be handled at the one time.

To put a sample of tar to this test, a retort of about $\frac{3}{4}$ litre capacity is used. The substance is distilled at such a rate that 250 cubic centimetres (c.c.) will deliver about 50 drops per minute. This distillate is collected in weighed glass graduates, the weights of which have been determined beforehand, and the weight marked on to the glass in some