

Experiment #06

Determination of Specific Gravity of Bitumen

The specific gravity of semi-solid bituminous material, asphalt cements, and soft tar pitches shall be expressed as the ratio of the mass of a given volume of the material at 25 °C to that of an equal volume of water at the same temperature.

This test is done to determine the specific gravity of semi-solid bitumen road tars, creosote and anthracene oil as per IS: 1202 – 1978. AASHTO: T-228

Apparatus

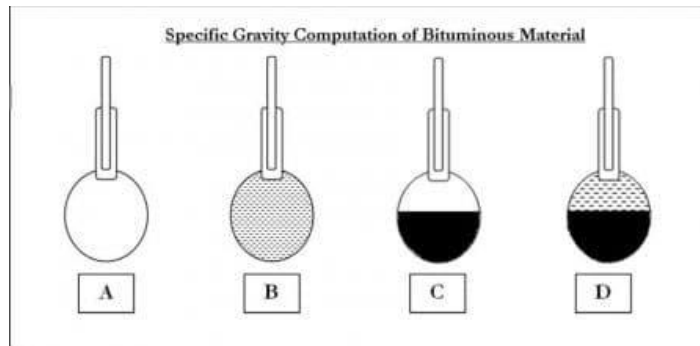
- Specific gravity bottle of 50 ml capacity, ordinary capillary type with 6 mm diameter neck or wide mouthed capillary type bottle with 25 mm diameter neck.
- Balance having least count of 1g.
- Thermometer.
- Water bath.

Procedure

1. The specific gravity bottle is cleaned, dried and weighed along with the stopper.
2. It is filled with fresh distilled water, stopper placed and the same is kept in water container for at least half an hour at temperature 27⁰C.
3. The bottle is then removed and cleaned from outside. The specific gravity bottle containing distilled water is now weighed.
4. The bituminous material is heated to a pouring temperature and is poured in the above empty bottle taking all the precautions that it is clean and dry before filling sample materials. The material is filled up to the half taking care to prevent entry of air bubbles.
5. To permit an escape of air bubbles, the sample bottle is allowed to stand for half an hour at suitable temperature cooled to 27⁰C and then weighed.

6. The remaining space in the specific gravity bottle is filled with distilled water at 27⁰C , stopper placed and is placed in water container at 27⁰C.
7. The bottle containing bituminous material and containing water is removed, cleaned from outside and is again weighed.

From the weights taken, the specific gravity of bitumen can be found out.



Observation:

$$\text{Specific Gravity} = \frac{(W_2 - W_1)}{(W_3 - W_1) - (W_4 - W_2)}$$

Where,

W1 = Weight of empty specific gravity bottle

W2 = Weight of bottle+bitumen

W3 = Weight of bottle +water

W4 = Weight of bottle + water +bitumen

Result

Specific Gravity of bitumen =

The specific gravity of pure bitumen ranges from 0.97 to 1.02.

IMPORTANCE OF Specific gravity

1. Marshall Mix Design is a volumetric mix design process. So, the result obtained from Marshall Mix design will be in terms of volume. But while making the mix, we mix different constituents in terms of their weight.

For finding out this weight, we need the value of Specific Gravity.

$$\text{Weight} = \text{Specific Gravity} * \text{Volume}$$

2. Apart from this, specific gravity is found out for Quality Control purpose. i.e. 80/100 bitumen will have a certain specific gravity value which will be different from 30/40 bitumen. So, based upon specific gravity value, we can ensure that we are getting the bitumen we are looking for.