

Bitumen

Definition

It may be defined as a solid or semi-solid, black, sticky, ductile substance, obtained as an important byproduct from the distillation of crude petroleum. It may also be defined as that portion of petroleum asphalt and tar products, which will dissolve in carbon disulphide. Bitumen implies a group of hydrocarbons often mixed with some organic matter.

Bitumen is known as petroleum in the fluid state, mineral tar in the semi-fluid state and asphalt in the solid state.

In natural state bitumen is found in combination with finely graded mineral matter in the form of natural asphalt. The two terms asphalt and bitumen are used synonymously. The former is natural product whereas the latter is the refined product.

Properties of Bitumen

Following are the properties of bitumen:

- 1- It is characteristically solid or semi-solid, black and sticky.
- 2- It melts or softens on application of heat.
- 3- Its specific gravity is 1.09.
- 4- It is completely soluble in carbon disulphide.
- 5- It is a binder in all types of asphalt.
- 6- It possesses great chemical stability, but is affected by oil.
- 7- It has low permittivity and high insulation resistance

Uses of Bitumen

Following are the uses of bitumen:

- 1- It is used as a dam proof course in walls and under basements and in lining tanks, swimming pool etc.
- 2- Since it forms good expansion joint therefore, it is used for filling up the joints in leaky roofs. It is being extensively used as a road making material.

- 3- It is used for making heat insulating materials for buildings.
- 4- It is also employed in the manufacture of roofing felt, impermeable paints.
- 5- It is also used for making bituminous filling compounds for cable boxes, etc.

Forms of Bitumen

Following are the usual forms of bitumen:

1- Cut-back bitumen:

- It is obtained by fluxing asphaltic bitumen in the presence of some suitable liquid distillates of coal tar or petroleum.
- It can be applied cold as a bitumen paint.

2. Plastic bitumen:

- It comprises bitumen thinner and a suitable inert filler (40-45%).
- It is used for stopping leakages and for filling cracks in masonry structures.

3. Blown bitumen:

- It is obtained by passing air under pressure at high temperature.
- It can be used as heat insulating material, as roofing and damp-proofing felts.

4. Straight run bitumen:

It is the bitumen which is being distilled to a definite viscosity or penetration without further treatment.

5. Bitumen emulsion:

Bitumen emulsion is a liquid product containing bitumen in a very finely divided state to a great extent in an aqueous medium.

Asphalt

Definition

- Asphalt may be defined as natural or mechanical mixture in which bitumen is associated with inert mineral matter.
- It is a solid or semi-solid sticky product, formed by partial evaporation or distillation of certain petroleum oils. It is soluble in varying degrees in carbon disulphide.

Properties of Asphalt

Following are the properties of asphalt:

1. It is sticky or adhesive and binds strongly as cement.
2. It is usually solid or semi-solid in state.
3. It is black brownish in colour.
4. It is water-proof.
5. It is durable and retains its properties for several years.
6. It is elastic.
7. It becomes plastic and workable when heated.
8. It possesses binding properties when softened by heat.
9. It is not seriously affected by adverse weather.
10. It is a good conductor of heat, sound and electricity.
11. It is ductile and can be stretched without breaking.
12. It is soluble in varying degrees in carbon disulphide.

Uses of Asphalt

Following are the uses of asphalt:

1. It is used as damp-proof course (D.P.C.) for preventing dampness in walls, floors and roofs of buildings.
2. It is used as a water repellent layer over flat roofs.
3. It is used for lining walls of tanks, swimming pools and in other such places.
4. It is used for smooth and non-absorbent flows of bathrooms, etc.
5. It is used for preparing paints and roofing felts.

6. In the form of asphalt mortar and asphalt concrete it is extensively used for paving roads.
7. It is used for flooring purposes.
8. It is used for preparing useful electric insulating materials when mixed with wood tar rubber and other suitable compounds.

Types of Asphalt

The asphalt is classified into the following two categories:

1. Natural Asphalt

This variety of asphalt is obtained from nature. Depending upon the source of occurrence, natural asphalt may be broadly divided in two classes:

- **Lake asphalt:** It is obtained from lakes. It is a composite mineral containing about 40 to 70% of pure bitumen. It is refined by boiling in a tank. The water evaporates and impurities collected at the top are removed. It is widely used for road and pavement construction.
- **Rock asphalt:** It is natural asphalt impregnated in limestone rocks. It contains about 4 to 20% pure bitumen by volume, the rest consists of calcareous materials. It can be used for roofing sheets, paving tiles etc.

2. Residual or Petroleum Asphalt

- It is also known as the artificial asphalt.
- It is obtained by the fractional distillation of crude petroleum oils with an asphaltic base. The residual product which settles at the bottom contains asphalt.