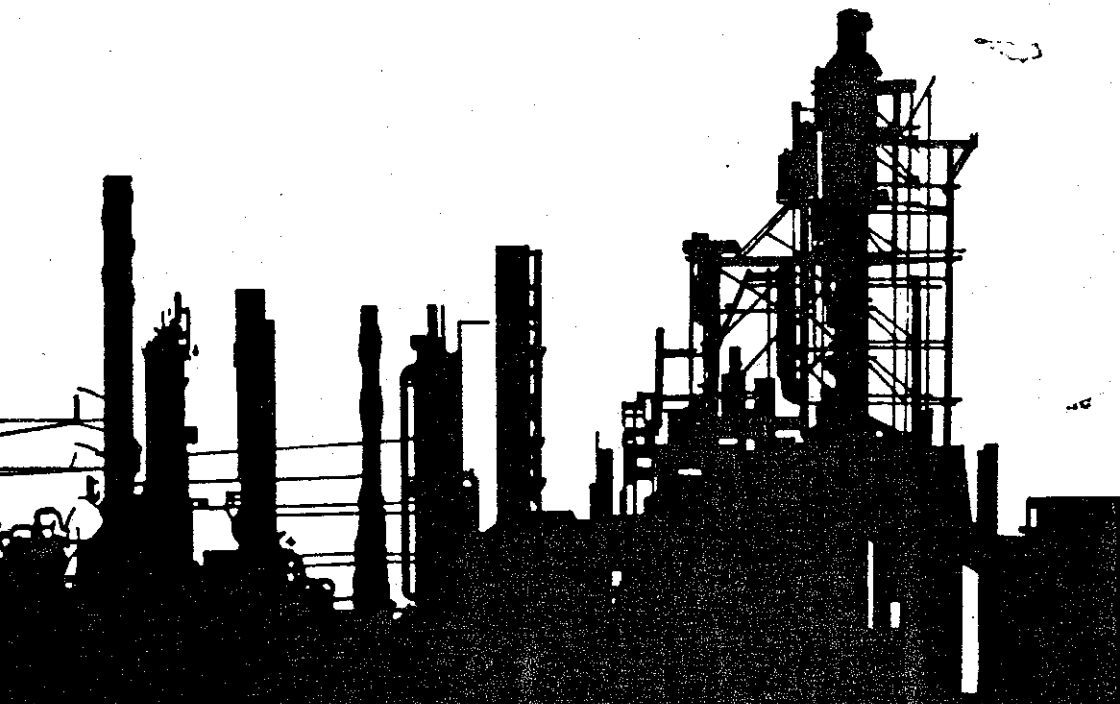
SOUVENIR



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Fire Environment—Smoke Generated by Materials

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Accidental fires result in losses of life and property. Most of the injuries and fatalities are caused by smoke generated during fires which migrates to different areas in a building and vitiates the environment. The harmful effects of smoke in a fire are mainly due to the reasons that, it reduces visibility thereby hindering escape, rescue operations and fire fighting; it is a lachrymatory irritant and induces panic; and it is accompanied by toxic combustion products which can either lead to direct incapaitation or indirect adverse physiological disorders.

Smoke can be defined as visible suspended particulate matter. It is a result of incomplete oxidation of organic materials. Gaseous combustion products are not normally included in the definition of smoke. The particles tend to reduce transmittance across a smoke filled path causing a reduction in visibility which is also sometimes known as smoke opacity. While this property is quantifiable, other hazards associated with smoke are not so easily measurable. The amount and rate of smoke generation depends upon, besides other factors, on the type of material involved in the combustion process. A wide variety of materials which can burn and produce smoke are used in buildings as wall linings, false ceilings, floor coverings, roofings, furnishings, furniture, thermal and acoustic insulation etc. From fire safety point of view, it is desirable that these materials do not produce smoke in excessive quantities. It is imperative that the materials before they are recommended for use are evaluated for their tendency to generate smoke.

Facilities conforming to various national and international standards have been provided at the Central Building Research Institute for the first time in the country for a assessment of various 'reaction to fire' characteristies of materials. In this paper studies on a few Indian materials using the ASTM E 662 Smoke Density Chamber are being reported. The apparatus essentially consists of an enclosed chamber of volume 0.5 m^3 in which a vertically oriented specimen (76 mm × 76 mm) of the material is eitlier exposed to radiant heat from a tubular furnace (flaming exposure mode). The chamber is fitted with a light source at the base and a phototube on top. During the test, as the smoke enters the vertical collimated light beam, attenuation of light intensity results which is measured in terms of specific optical density Ds Although normally only maximum specific optical density, Dm, is reported, other parameters such as time at which Dm occurs (t_{Dm}), time at which specific optical density equals 16 ($t_{Dm}=16$), maximum rate of smoke development, Rm, and a smoke obscuration index are also calculated.

The data generated can be used as a basis of selection of safer materials.