

DIFFERENCES BETWEEN PETROLEUM ASPHALT, COAL-TAR PITCH AND ROAD TAR

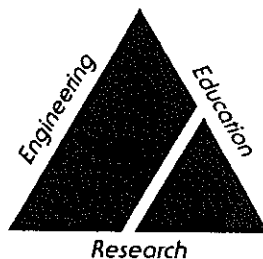
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VII SUMMARY

7.1 Petroleum asphalts and coal-tar derived road tars and pitches, because of similar appearance and engineering applications, often are considered to be the same or at least similar materials. However, the survey and comparison of various properties and behavior indicate fundamental differences between these two separate classes of materials. Differences in raw materials and in the manufacturing processes are the underlying causes of this variability.

7.2 Petroleum asphalt cements and roofing asphalts, are derived from crude petroleum oil by a process not involving cracking or thermal conversion. On the other hand, coal-tar, used to manufacture pitches and road tars, is obtained by the high temperature carbonization of bituminous coal.

7.3 Chemically, pitch or road tar, just as their parent material coal-tar, are predominately composed of highly condensed-ring aromatic and heterocyclic hydrocarbons. Petroleum asphalts, on the other hand, contain a much higher proportion of high molecular weight paraffinic and naphthenic hydrocarbons and their derivatives.

7.4 The physical or mechanical properties of coal-tar products and petroleum asphalts differ greatly. Rheologically, for a given viscosity level, asphalts are less susceptible to temperature changes and are significantly more sensitive to shearing forces than coal-tar products.

Asphalts exhibit high heat stability. When heated under comparable conditions, the viscosity of asphalts changes considerably less than that of pitches or road tars.

The density or specific gravity of asphalts is substantially lower than density of coal-tar products. The solubility characteristics of asphalt are highly different from those of pitches or road tars. Finally, asphalts flash at considerably higher temperatures than comparable coal-tar pitches or road tars.

7.5 When exposed to standard laboratory heating or distillation conditions, the coal-tars generate high amounts of fugitive volatiles. This means that under comparable heating during application, coal-tar products would generate substantially more emissions than petroleum asphalts. Furthermore, because these materials differ in their chemical makeup, it may be expected that the chemical composition of these emissions would differ significantly. It should be noted, however, that the amount of emissions could be moderated by using lower application temperatures.

7.6 The epidemiological surveys of workers exposed to normal concentrations of petroleum asphalt fumes did not indicate adverse effects on human health. Exposure, even to the unrealistically high concentration of such fumes, also did not generate harmful or toxic effects on test animals. On this basis, petroleum asphalts could be classified as non-toxic materials.

Similar direct evidence regarding the health or toxic effects of coal-tar

products, road tars and pitches, is lacking. However, it is well established that these materials, particularly if overheated, produce fumes which are noxious and irritating.

7.7 In conclusion, this study indicates profound differences between coal-tar products, pitches and road tars, and petroleum-derived asphalt cements and roofing asphalts. In view of these differences, it is imperative that coal-tar products and petroleum asphalts be considered and treated as entirely separate entities.