

Tar analysis

Road coverings traditionally use a resilient material such as Coal Tar or Asphalt/Bitumen to bind a stone/aggregate base. Historically, the binder used was manufactured from Coal Tar which is a by-product from a coal carbonisation process. However, in recent years, this binder has been replaced by refined petroleum Asphalt/Bitumen. These binders are made up of a complex mixture of compounds, many of which are hazardous and/or toxic. As waste disposal costs are increasing the type of binder needs to be established prior to disposal or reuse because asphalt/bituminous mixtures containing Coal Tar are classified as hazardous as an absolute entry (concentration is irrelevant) in the European Waste Catalogue (EWC 17-03-01*).

Coal Tars - Usually black or brown viscous liquids or semi-solids. They are complex mixtures of PAHs, phenols and heterocyclic NSOs (resins).

Coal Tar Creosotes - distillation products of coal tars having an oily consistency. Creosotes contain at least 75% of PAHs comprising mainly naphthalene, phenanthrene, anthracene and their substituted derivatives.

Coal Tar Pitch - is a residue produced during the distillation of coal tar and is shiny, black or dark brown in appearance and contains PAHs.

Asphalt/Bitumen - a sticky, black, highly viscous liquid or semi solid that is present in crude oils and some natural deposits.

PAHs (Polynuclear Aromatic Hydrocarbons) are organic compounds which contain fused aromatic rings. They are ubiquitous pollutants of low solubility and high toxicity which biodegrade very slowly. Some are known carcinogens and the ability to accurately determine concentrations of these compounds in road tarmacs is essential in order to assess the toxicity and the possibility for recycling.

By using a combination of Saturates, Aromatics, Resins and Asphaltenes (see SARA flyer) together with GC-MS analysis for PAHs and biomarkers, it is possible to determine whether the tarry material was derived from Coal Tar or Asphalt/Bitumen. Unfortunately, there is no single analysis that can conclusively identify the presence of coal tars. The 16 USEPA PAHs analysis, alone, would result in incorrect coal tar content being reported.

Case Study

Twelve tar cores from a 6km stretch of road were submitted for analysis. By sampling the top, middle and bottom of just 3 cores for a full analysis, and the remaining 9 for just SARA analysis (see associated flyer), layers were profiled and classified for disposal, saving the client many £1000's.

