

ABSTRACT

Arson is one of the most difficult crimes to investigate due to the lack of physical evidence associating a suspect to the crime. In fire investigation, gasoline is the most commonly found because of their volatility, flammability and availability. The importance of this study is to determine the chemical fingerprint of RON 95 petrol for Petronas, Shell and BHP by using chemometric analysis. The research was conducted in two phases. Phase one involved the determination of the chemical fingerprint of RON 95 petrol for three selected brands. While phase two was to determine the composition differences of RON 95 petrol based on the locations of service stations. All samples from 15 service stations were then stored in glass bottle covered with aluminium foil to prevent exposure from light and heat. Hexane was used as a solvent during the extraction of hydrocarbons. Samples were injected into the gas chromatography flame ion detector (GC / FID) for analysis. After getting the data, analysis of chi-square test, principle component analysis (PCA) and QUEST model analysis were conducted. A chi-square test result shows the data obtained are consistent. No positive results were obtained from PCA analysis. QUEST model analysis shows a validity of 93.3%. Chemical fingerprint of RON 95 Petronas was identified at a standard retention time of 5.25 minutes, 6.70, 9.20, 10.25 and 22.95. For RON 95 Shell petrol, the standard retention time was at minute 5.25, 5.60, 6.70, 9.20, 10.25 and 22.95. While for RON 95 BHP was at 5.60, 6.70 and 10.25. All chemical fingerprints were based on the characteristics of the area under the peak.

ABSTRAK

Arson merupakan jenayah yang sukar dibuktikan kerana kekurangan bukti fizikal yang boleh menghubungkan seseorang suspek dengan jenayah tersebut. Dalam penyiasatan kebakaran, petrol kerap dijumpai kerana bahan penggalak ini senang meruap, terbakar dan mudah didapati. Kepentingan kajian ini adalah untuk menentukan cap jari kimia RON 95 bagi Petronas, Shell dan BHP menggunakan analisis kemometrik. Kajian penyelidikan dijalankan dalam dua fasa. Fasa pertama melibatkan penentuan cap jari kimia RON 95 bagi ketiga-tiga jenama petrol yang dipilih. Manakala fasa kedua adalah untuk menentukan perbezaan komposisi petrol RON 95 berdasarkan lokasi stesen minyak. Semua sampel daripada 15 stesen minyak disimpan di dalam botol kaca yang dibalut dengan kepingan aluminium bagi mengelakkan sampel terdedah kepada cahaya dan haba. Heksana digunakan sebagai pelarut semasa proses pengekstrakan hidrokarbon. Sample disuntik ke dalam kromatografi gas pengesanan nyalaan ion (GC/FID) untuk dianalisis. Setelah data diperolehi, ujian *chi-square*, analisis komponen utama (PCA) dan analisis model QUEST dijalankan. Hasil ujian *chi-square* menunjukkan data yang diperolehi adalah konsisten. Tiada keputusan positif diperolehi daripada analisis PCA. Analisis model QUEST menunjukkan kesahihan sebanyak 93.3%. Cap jari kimia bagi petrol RON 95 Petronas dikenalpasti pada masa penahanan piawai minit ke- 5.25, 6.70, 9.20, 10.25 dan 22.95. Bagi petrol RON 95 daripada Shell, masa penahanan piawai dikenalpasti pada minit ke-5.25, 5.60, 6.70, 9.20, 10.25 dan 22.95. Manakala bagi RON 95 BHP pada minit ke-5.60, 6.70 dan 10.25. Kesemua cap jari kimia adalah berdasarkan ciri-ciri pada luas di bawah puncak.