台北市乾洗業界使用石油系乾洗劑化學成份之初探

A Preliminary Chemical Study on the Petroleum Series Dry Cleaning Agents used in Dry cleaners in Taipei

中文摘要

長期暴露於高濃度石油系乾洗溶劑下會造成皮膚炎與中樞神經抑制，如果含高濃度苯，則有引發再生不良性貧血及白血病的可能；如國內市售汽油中含有 2%的苯。本研究收集台北市乾洗業界所使用之石油系溶劑，107 件樣本經 GC(FID) 與 GC-MS 儀器分析顯示，這些乾洗劑含苯量極低 (0~0.014%)；同時與標準品對照，依其層析圖之主要成份 C9~C14 正烷烴可分為五種，A 種有 66 件，B 種 10 件，C 種 20 件、D 種 9 件及 E 種 2 件。其中正烷烴含量：A、B 和 C 三種各佔總量的 26~27%，D 種 22%及 E 種 77%。E 種的蒸氣樣本更達 98%，假如建議使用 E 種，則可使乾洗業工作者暴露於揮發性有機物質下的危險性達最低程度。B 種的二甲苯與 1,2,4-三甲基苯芳香烴各佔 2%左右。
從以上發現，初步了解台北市乾洗業使用的乾洗溶劑化學特性；研究結果可作為乾洗業界選購乾洗油的參考；同時，經由適當的正烷類有機溶劑混合，或可作為發展或合成更環保更具職業安全性與更佳洗淨力的--第 21 世紀新一代 Stoddard 溶劑。

英文摘要

Long term, chronic exposure to high concentration petroleum series dry-cleaning solvent will cause dermatitis and central nervous system depression; Aplastic anemia and leukemia might occur if high concentration of benzene is not refined. The benzene concentration in our domestic gasoline is around 2.0%. By means of the GC(FID) and GC-MS analysis, 107 samples of petroleum series dry-cleaning solvent from the dry-cleaning stores in Taipei were evaluated. Almost undetectable level of benzene (0-0.014%) is determined in this study. Other than the non-detectable benzene, samples can be classified into 5 types according to the majority components with the authentic standards, i.e. C9~C14 n-alkane compounds. The 107 samples can thus be grouped as : type A (66)、B

(10)、 C (20)、D (9) and E (2). The n-alkane content varies: type A, B &C is around 27%, D is 22% and E is 77%. The vapor phase of type E sample (C9~C14 n-alkane) is even more 98%, might suggest the least hazard of VOCs expoure in dry-cleaning operation if sample E were used. Around 2% of the aromatic compounds, including xylene, and 1,2,4-trimethylbenzene were found in type B sample.

From the above findings, the preliminary chemical characteristics of petroleum series dry-cleaning solvent used in Taipei were unveiled. These results will be useful for vendor''s selection in their future solvent purchase.

Also, the more environmental-occupational, and operational solvent--the 21st. century new Stoddard dry-cleaning solvent, might be developed or synthesized through proper n-alkane series combination.