

研究论文

## 高效液相色谱法测定尿中苯的代谢物反,反-粘糠酸

刘黎文 宋世震 胡霞敏 叶方立

武汉科技大学, 湖北 武汉 430080

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**摘要** 建立了高效液相色谱测定职业苯接触者尿中苯的代谢物反,反-粘糠酸(tt-MA)的方法。该方法采用C18柱进行分离,以冰乙酸-四氢呋喃-甲醇-水(体积比为1:2:10:87)为流动相,以香草酸为内标,于264 nm处进行紫外检测。尿样经2 mol/L盐酸酸化后用乙酸乙酯进行萃取。结果表明,所建立的标准曲线在tt-MA的质量浓度为0.10~10.00 mg/L时线性关系良好( $r=0.9999$ ),加标回收率为95.1%~100.5%,日内和日间测定的相对标准偏差分别为4.0%~9.0%和6.2%~8.8%。应用该法测定职业苯接触者56人和非职业苯接触者24人尿中的tt-MA,结果显示职业苯接触者的尿中tt-MA含量明显高于非职业苯接触者,并与接触的苯的浓度呈线性相关( $P<0.01$ )。该方法灵敏、快速、经济、简便,可用于职业苯接触者的生物监测和毒物动力学研究。

**关键词** [高效液相色谱法](#) [苯代谢物](#) [反,反-粘糠酸](#) [尿](#)

分类号

## Determination of Urinary trans, trans-Muconic Acid by High Performance Liquid Chromatography

LIU Liwen, SONG Shizhen, HU Xiamin, YE Fangli

Wuhan University of Science and Technology, Wuhan 430080, China

### Abstract

A method for the determination of urinary trans, trans-muconic acid (tt-MA) (benzene metabolite) by high performance liquid chromatography (HPLC) was developed. The separation was carried out on a C18 column (Spherisorb C18, 150 mm×4.6 mm i.d., 5 μm) at 25 °C with glacial acetic acid-tetrahydrofuran-methanol-water (1: 2: 10: 87, v/v) as mobile phase. Urinary sample was acidified by 2 mol/L hydrochloric acid and pretreated by liquid-liquid extraction using diethyl ether. After removal of diethyl ether with a stream of nitrogen, the residue was re-dissolved in 1 mL of mobile phase for HPLC injection. Good linearity was observed within the range from 0.10 mg/L to 10.00 mg/L ( $r=0.9999$ ) and the detection limit was 0.10 mg/L. The average recoveries for tt-MA were 95.1%-100.5%. Relative standard deviations (RSD) for intra-day and inter-day determinations were 4.0%-9.0% and 6.2%-8.8%, respectively. The method was applied to 56 benzene-exposed workers and 24 control workers. Urinary tt-MA in benzene-exposed workers were significantly higher than that in the control group. They can be correlated with benzene exposure concentrations ( $P<0.01$ ). This analytical method for tt-MA is sensitive, rapid, and convenient. It is suitable for monitoring of occupational exposure to benzene and toxic kinetics studies.

**Key words** [high performance liquid chromatography \(HPLC\)](#) [benzene metabolite](#) [trans, trans-muconic acid](#) [urine](#)

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通讯作者 宋世震

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