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Title: Emulsification liquid-liquid microextraction based on deep eutectic solvent: an extraction method for the determination of benzene, toluene, ethylbenzene and seven polycyclic aromatic hydrocarbons from water samples

Author: TahereKhezeli Ali Daneshfar Reza Sahraei

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1 **Highlights**

- 2 • For the first time, the utilization of DESs in ELLME was developed.
- 3 • ELLME-DES was successfully applied for the extraction of seven PAHs and BTE.
- 4 • DESs were synthesized at a short time with high purity at room temperature.
- 5 • RSM based on BBD and ANOVA was used for optimization.

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8 **Emulsification liquid-liquid microextraction based on deep eutectic solvent: an** 9 **extraction method for the determination of benzene, toluene, ethylbenzene and seven** 10 **polycyclic aromatic hydrocarbons from water samples**

11 TahereKhezeli, Ali Daneshfar*, Reza Sahraei

12 Tel/fax: +98-843-2227022

13 E-mail: daneshfara@yahoo.com; adaneshfar@mail.ilam.ac.ir

14 Department of Chemistry, Faculty of Science, Ilam University, Ilam, 69315-516, Iran

15 *Corresponding Author

16 **Abstract**

17 In this study, for the first time, a simple, inexpensive and sensitive method named
18 emulsification liquid-liquid microextraction based on deep eutectic solvent (ELLME-DES)
19 was used for the extraction of benzene, toluene, ethylbenzene (BTE) and seven polycyclic
20 aromatic hydrocarbons (PAHs) from water samples. In a typical experiment, 100 μ L of DES
21 (as water-miscible extraction solvent) was added to 1.5 mL of sample solution containing
22 target analytes. A homogeneous solution was formed immediately. Injection of 100 μ L of
23 THF (as emulsifier agent) into homogeneous solution provided a turbid state. After
24 extraction, phase separation (aqueous phase/DES rich phase) was performed by
25 centrifugation. DES rich phase was withdrawn by a micro-syringe and submitted to isocratic
26 reverse-phase HPLC with UV detection. Under optimum conditions obtained by response

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