On-Line Solvent Extraction Coupled to a Reversed Micellar Mediated 
Chemiluminescence for Sensitive and Selective Determination of 
Gold (III)/Gallium (III) Binary Mixtures in Environmental Samples 

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A rapid and sensitive flow method, based on the combination of on-line solvent extraction with 
reversed micellar mediated chemiluminescence (CL) detection using rhodamine B (RB), was 
investigated for the selective determination of Au(III) and/or Ga(III) in aqueous sample. The 
concentrations of 2.0 mol dm\(^{-3}\) and 5.0 mol dm\(^{-3}\) HCl were selected as optimum values to formation of 
the \([AuCl_4]^–\) and \([GaCl_4]^–\), respectively. The Au(III) and/or Ga(III) chloro-complex anions were 
extracted into toluene as ion-pair complexes formation with the protonated RBH\(^+\) ion from an aqueous 
acidic solution, followed by membrane phase separation in a flow system. In a flow cell of a detector, 
the extract was mixed with the reversed micellar solution of cetyltrimethyammonium chloride 
(CTAC) in 1-hexanol-cyclohexane/water (1.00 mol dm\(^{-3}\) HCl) containing cerium(IV). At the reversed 
micellar interface, uptake of the ion-pair by CTAC reversed micelles occurred easily, followed by an 
oxidation reaction of RB with Ce(IV), the produced CL signal was measured. Using a flow injection 
system, a detection limit (DL) of 0.4 \(\mu\)mol dm\(^{-3}\) Au(III) and 0.6 \(\mu\)mol dm\(^{-3}\) Ga(III), and linear 
calibration graphs with a dynamic ranges from the respective DLs to 8 \(\mu\)mol dm\(^{-3}\) for Au(III) and 10 
\(\mu\)mol dm\(^{-3}\) for Ga(III) were obtained under the optimized experimental conditions. The proposed 
method is simple and provides a good precision with a relative standard divation (n = 6) of ca. 7%. 
Much higher tolerable levels of potential interfering metal ions were achieved for the present on-line 
procedure. The presented CL methodology has been applied for the determination of Au(III) and/or 
Ga(III) in water samples with satisfactory results.