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## Cloud point extraction of charged complex of aluminium-morin and its spectrofluorimetric determination in water samples and parenteral solutions

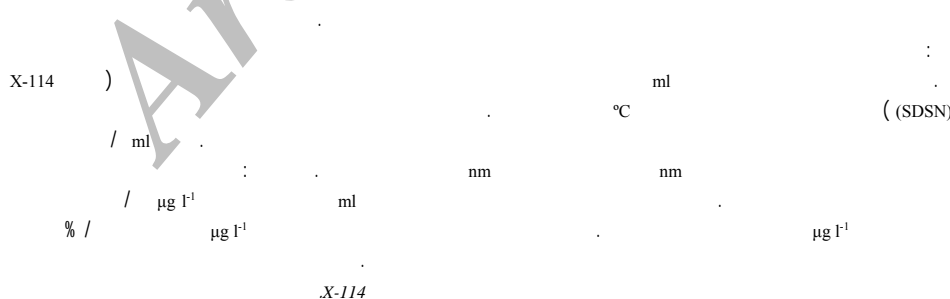
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**OBJECTIVES:** Aluminum (Al) is a toxic metal at high levels and has been involved as a causative factor in several diseases, therefore, its determination in different samples is very important. **METHODS:** In this study a method based on cloud point extraction (CPE) technique in mixed micellar medium was applied for the extraction and preconcentration of Al in different samples. For the CPE of Al, an aliquot of 25 ml solution containing appropriate amounts of Al, acetate buffer, morin and surfactant (Triton X-114 + SDSN) were kept in the thermostatic bath at 50 °C. Thus, two phases were appeared and separation of these phases was achieved by centrifugation. After cooling in ice-bath, the surfactant-rich phase became viscous and the upper aqueous phase decanted. The fluorescence intensity of chelate in the micellar phase (after addition of 2.5 ml of ethanol-water mixture) was measured at 512 nm with the excitation set at 442 nm. **RESULTS:** The parameters affecting complexation and phase separation were studied and optimized. Under the optimum experimental conditions, the detection limit of Al for the preconcentration of 25 ml of solution was  $0.52 \mu\text{g l}^{-1}$ . The calibration graph was linear within a range of 2-200  $\mu\text{g l}^{-1}$  Al. The relative standard deviation (RSD) of 5 replicated determinations of  $10 \mu\text{g l}^{-1}$  of Al was 2.1%. **CONCLUSION:** The method was successfully applied to the determination of Al in water samples and parenteral solutions.

**Key words:** Cloud point extraction, Al determination, Parenteral solutions, Spectrofluorimetry, Triton X-114.



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(Chelate = )

( )

( )

)

(

( $\mu\text{g l}^{-1}$ )

)

( )

(

( )

$\mu\text{g l}^{-1}$

(

)

(Total parenteral nutrition=TPN)

( )

(alzheimer)

( )

(parkinson)

)

(

( ) (Electrothermal atomic absorption spectrometry = ET- AAS)

(Inductively coupled plasma = ICP)

( )

"

( )

"

( )

(St. Louis, MO, USA) Sigma X-114

(Cloud point extraction = CPE)

Fluka (SDSN)

HCl / N

$\mu\text{g l}^{-1}$

( )

(  $\text{mol l}^{-1}$ )

(E. Merck)

(Riedel-de Haen)

( )

TPN ml / pH



Shimadzu RP-5301 PC  
cm  
nm

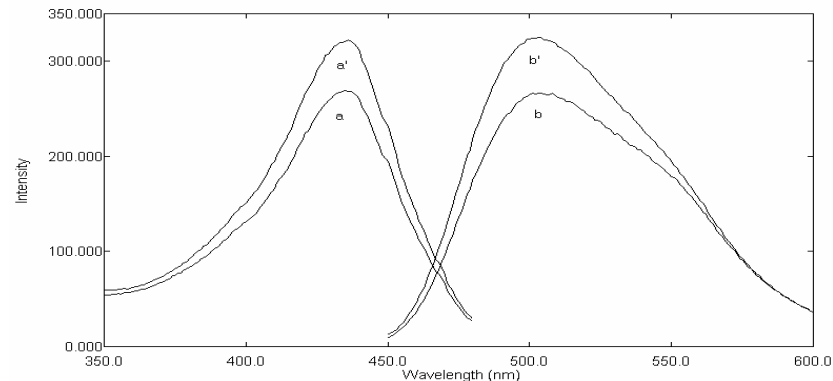
(636 Friedberg/Hessen, Germany)  
Hettich (EBA 20)

Corning M 120 pH

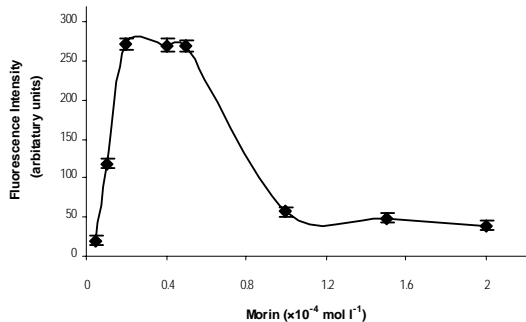
(i: mol l<sup>-1</sup> / ml ( μg l<sup>-1</sup> )  
mol l<sup>-1</sup> / ml (pH= / )  
(ii / ml X-114 % (v/v) / ml  
% (m/v) SDSN

(i ml °C  
(SDS)  
X-114 (SDSN)  
SDSN

( : ) / ml  
± nm nm nm  
± nm nm



b' a' X-114 CPE b a .  
× mol l<sup>-1</sup> SDSN % / (m/v) X-114 μg l<sup>-1</sup>: CPE  
( : ) pH= /



$\mu\text{g l}^{-1}$ :  
 SDSN % / (m/v) X-114 % / (v/v)  
 ( ) pH = /

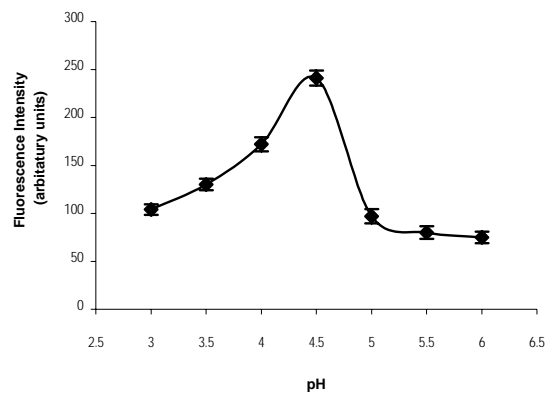
SDS  
 SDSN  
 (ii)  
 ( )

pH  
 pH  
 ( )  
 pH  
 pH = /

"  $\times \text{ mol l}^{-1}$   
 $\times \text{ mol l}^{-1}$

pH  
 / /  $\text{mol l}^{-1}$

X-114  
 % / (v/v)  
 X-114  
 % /  
 (m/v) SDSN  
 % / /  
 % /



$\mu\text{g l}^{-1}$ :  
 $\text{mol l}^{-1}$  SDSN % / (m/v) X-114 % / (v/v)



Al  $\mu\text{g l}^{-1}$

Li<sup>+</sup>, Na<sup>+</sup>, K<sup>+</sup>, Ni<sup>2+</sup>, Sn<sup>2+</sup>, As<sup>3+</sup>, Bi<sup>3+</sup>, I<sup>-</sup>, Cl<sup>-</sup>, ClO<sub>4</sub><sup>-</sup>, CO<sub>3</sub><sup>2-</sup>, SO<sub>4</sub><sup>2-</sup>, NO<sub>3</sub><sup>-</sup>, ascorbic acid

Ba<sup>2+</sup>, Ca<sup>2+</sup>, Mg<sup>2+</sup>, glycine, thiourea, urea, sulfosalicylic acid

Mn<sup>2+</sup>, Co<sup>2+</sup>, Cr<sup>3+</sup>, Zn<sup>2+</sup>, Cd<sup>2+</sup>, tartrate, salicylic acid

Cu<sup>2+</sup>, Pb<sup>2+</sup>, PO<sub>4</sub><sup>3-</sup>, F<sup>-</sup>, oxalate

Fe<sup>3+</sup>, EDTA, citrate

(%)	* Al <sup>3+</sup> ( $\mu\text{g l}^{-1}$ )	Al <sup>3+</sup> ( $\mu\text{g l}^{-1}$ )
	$\pm /$ $/ \pm /$	
	$\pm /$ $/ \pm /$	

$\pm$

\*

* Al <sup>3+</sup> ( $\mu\text{g l}^{-1}$ )	* Al <sup>3+</sup> ( $\mu\text{g l}^{-1}$ )	TPN
$/ \pm /$	$/ \pm /$	
$/ \pm /$	$/ \pm /$	NaCl
$/ \pm /$	$/ \pm /$	
$/ \pm /$	$/ \pm /$	
$/ \pm /$	$/ \pm /$	

$\pm$

\*

%

t

( ) ASTM

TPN

(  $\mu\text{g l}^{-1}$  )

nm

(American Society for Clinical Nutrition)

TPN

(American Society for Parenteral and Enteral Nutrition)

$\mu\text{g l}^{-1}$

( )

(WHO)

( )

$\mu\text{g l}^{-1}$

( )

ICP ET-AAS

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