

(2011 / 3 / 14 2010 / 8 / 22)

.Chrome Azurol S Eriochrome cyanine R

t

The Applications of Al- Chrome Azurol S Color Reaction to Assay Mishraq Alum Purity and Fluoride in Tablet

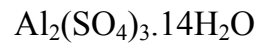
Farha K. Omar
Department of Chemistry
College of Education for Girls
Mosul University

Hanan H. Ahmad
Department of Chemistry
College of Science
Mosul University

ABSTRACT

In the present research, a spectrophotometric method is suggested as an alternative to the gravimetric method used to find mishraq alum purity. The method is based on the complex formation between aluminium ion and either Chrome Azurol S (CAS) or Eriochrome cyanine R (ECR) to give colored products suitable for the determination of aluminium. The same reaction has been applied to the determination of fluoride in tablet, depending on the bleaching effect of fluoride on the formed aluminium colored complex. Statistical comparison of method has given satisfactory results.

Keywords: Spectrophotometry ; Alum; Eriochrome cyanine ; Chrome Azurol S ; Fluoride Assay.



(100 / 87)

(Internet, 2002) ° 770 °86
 .1990 /)
 " "

()
 .(1991)

.(Internet, 1992) / 2
) %17 () (Al_2O_3)
 (1990 /

1990 1460

:

6

-
-
-

ECR CAS

(Marczenko and Balcerzak, 2000)

(2007)

.....

:

:

Shimadzu UV –Visible Recording Spectrophotometer UV-160

. 1

9421

:

.Philips PW pH meter

CECIL- CE-1021 Spectrophotometer

Sartorius BL2105

:

0.1

: (/ 1000)

100

(Hopkin and Williams)

1

:(/ 10)

100

0.1

:(/ 10)

/ 10

100

1.0

: (%1)

100

BDH

.(Marczenko and Balcerzak, 2000)

0.075

:(%0.075) Chrome Azurol S

100

Merck

.(Marczenko and Balcerzak, 2000)

:(%0.075) Eriochrome cyanine R

.(Ahmed, 2002)

24

.Fluka

Marczenko and Balcerzak,

.(2000)

BDH 40 :%40 •

100

: (1) •

. BDH

10 : (Sinaflor) •

1 Sinaflor

100

100 5 / 5

.(2007)

0.0005 :(/ 5) •

100 (Fluka)

:

(/ 10) :

8 (1) 0.7 2

(%40) 2

CAS 610 CAS 535 50 6.2 ECR

:

0.5 1 / 10 2

%40 2 CAS %0.075 1

/ 5

547 25

.....

CAS

CAS

(Miyada and Taniguchi, 2001)

: ECR CAS

:

30 0

ECR CAS

30

.(1)

. ECR CAS

:1

Time (min)	Absorbance of different amounts of aluminum sulfate /Reagent			
	ECR ¹		CAS ²	
	10 µg Alum	30 µg Alum	10 µg Alum	30 µg Alum
0	0.032	0.116	0.036	0.118
5	0.032	0.117	0.036	0.118
10	0.033	0.117	0.036	0.118
15	0.032	0.117	0.036	0.118
20	0.032	0.117	0.036	0.118
25	0.032	0.117	0.036	0.118
30	0.032	0.117	0.036	0.118

Alum =Aluminum sulfate

1: at λ max 535nm ,2: at λ max 610 nm

:2

Time (min)	Absorbance of different amounts of aluminum sulfate /Reagent			
	ECR ¹		CAS ²	
	10 µgAlum	30 µg Alum	10 µg Alum	30 µg Alum
0	0.030	0.116	0.034	0.117
5	0.030	0.117	0.034	0.117
10	0.031	0.117	0.034	0.117
15	0.030	0.117	0.034	0.117
20	0.030	0.117	0.034	0.117
25	0.031	0.117	0.034	0.117
30	0.030	0.117	0.034	0.117

1: at λ_{max} 535nm ,2 : at λ_{max} 610 nm

CAS

:

. ECR

3 0.5

ECR CAS

/ 10

ECR

535 CAS

610

.(3)

.....

()

: 3

. ECR CAS

ml of Alum 10ppm	Absorbance /Sample			
	Mishraq alum		Standard	
	ECR	CAS	ECR	CAS
0.5	0.016	0.016	0.016	0.017
1	0.032	0.034	0.034	0.036
1.5	0.048	0.051	0.051	0.054
2	0.070	0.072	0.072	0.074
2.5	0.094	0.096	0.096	0.098
3	0.116	0.116	0.116	0.118

3

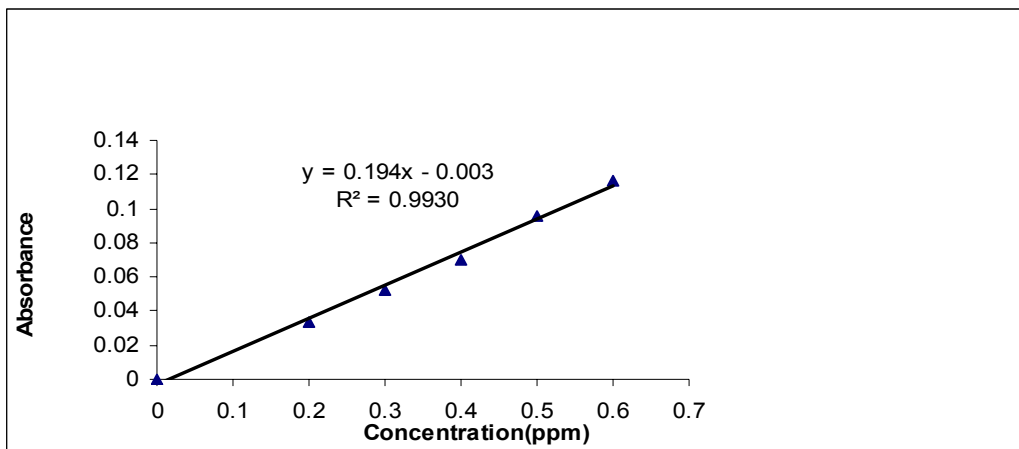
:

ECR CAS

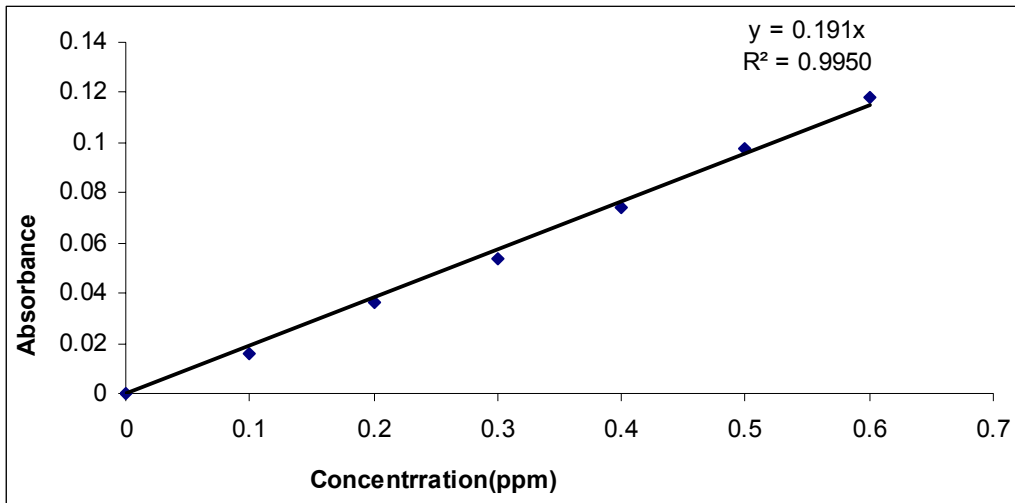
/ 10 3 0.5)

CAS .(:) (

(2) (1)



:1



:2

R²

. (Christian, 2004)

:

)

)

(

(5) (4)

(

: 4

Conc.ppm	Abs.of Aluminium using CAS		Recovery, *%	RSD,%**
	Unknown	Standard		
0.1	0.016	0.016	100	2.4
0.4	0.072	0.074	97.3	0.5
0.6	0.116	0.118	98.3	0.3

*Average of five determinations

Average of recovery % =98.5

**Average RSD%=1.1

.....

:5

Determination No	Al ₂ O ₃ **	Recovery,*% Accuracy	RSD, % Precision
1	16.3	94.8	0.9
2	16.3	94.8	0.9
3	16.3	94.8	0.9
4	16.4	95.03	1.2
5	16.5	95.9	1.2

*Average of five determinations

Average of recovery % = 98.12

**Average RSD%=1.00

.(5)

:

t

%95

(Christian, 2004)

t

(

) 1.73

2.306

:

(2007)

(Dixon ,1970 ; Einaga ,1981) CAS



:

/ 5 1

6

:6

Time, min .	0.0	10	20	30	40	50	60
*Abs./1ml of 5ppm of NaF present in 25 ml	0.106	0.108	0.108	0.108	0.108	0.108	0.108

*at: λ max 547nm ; pH=5.96; color of sample is violet

:

/ 5 %0.075 (CAS) 2 (/ 10)

0.5

.(7)

(Al- CAS)

: 7

ml of 0.5M H ₂ SO ₄	λ max (nm)	Absorbance		ΔA *
		Absent NaF	Present NaF	
0.0	545	0.284	0.252	0.032
1.0	547	0.301	0.200	0.1
2.0	547	0.251	0.184	0.067
3.0	547	0.200	0.164	0.036
4.0	547	0.160	0.140	0.02
5.0	547	0.110	0.100	0.01

* ΔA =F absent – F present

Δ A

547

610

0.5

1

(CAS)

:

.(8)

CAS

: 8

ml of 0.075% CAS	0.3	0.5	1.0	2.0	3.0	4.0
Absorbance	0.048	0.059	0.108	0.201	0.158	0.098

CAS

2

8

2

:

25

.9

547

: 9

ml of NaF(5ppm)	0.0	0.5	1.0	1.5	2.0	2.5	3.0	5.0
Absorbance	0.210	0.200	0.184	0.174	0.165	0.150	0.140	0.101

:

5

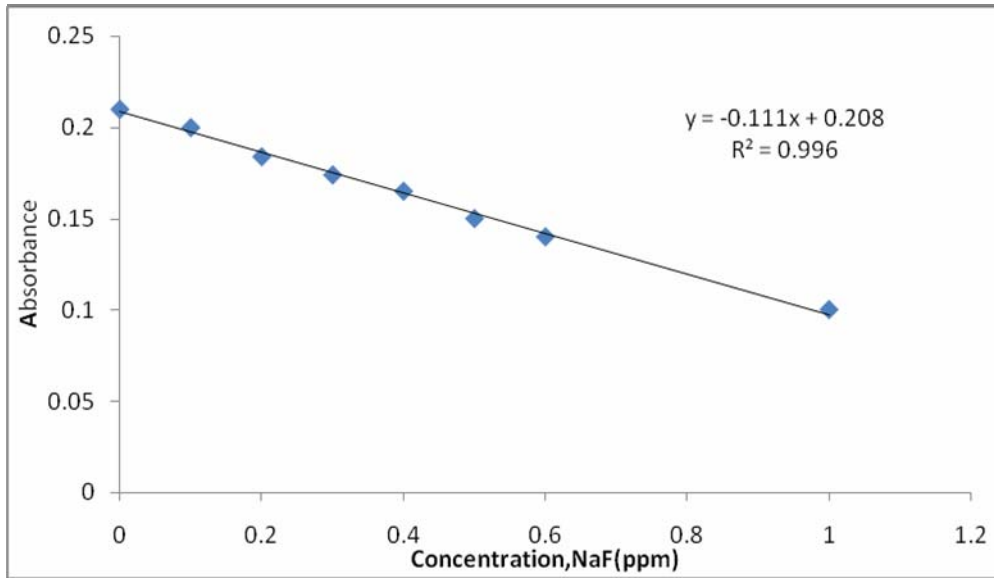
5 0

9

/

1 0.1 () (3)

.



:3

)

. 10

(Sinaflor

:10

ml of 5ppm NaF	Absorbance	Recovery%
0.0	0.211	100.4
0.5	0.201	100.5
1.0	0.185	98.9
1.5	0.174	98.8
2.0	0.165	99.3
2.5	0.150	100
3.0	0.138	98.5

.(Dixon, 1970)

.(1990)

. 15

.(2007)

.55-54 .

".(1991)

.43

."

Ahmad, F. K. (2002). Beneficiation of Kaolin, Alum-production , Ph. D. Thesis, Mosul University, Mosul, Iraq, pp.26-27.

Christian, G. D. (2004). "Analytical Chemistry". 6th edn., John Wiley and Sons, Inc. New York, pp.96.

Dixon, E. J. (1970). Determination of micro amounts of fluoride with zirconium and Eriochrome cyanine R. *Analyst*, **95** , 272-273.

Einaga, H.; Iwasak, I. (1981). Spectrophotometric study of the reaction of chrome azurol S and fluoride. *Talanta* , **28** (12), 889- 900.

(Internet), Aluminum Sulfate, (2002). [http:// Wikipedia](http://Wikipedia) , the Free Encyclopedia.

(Internet), Trivalent Aluminum (1992). [http:// en. Digital Object Identifier](http://en.DigitalObjectIdentifier) ,10, 1111/j.1365-2389.1992.DOI.

Marczenko, Z.; Balcerzak, M. (2000). "Separation, Preconcentration and Spectrophotometry in Inorganic Analysis". Elsevier Science. pp. 85-87.

Miyada, M.; Taniguchi, Y. (2001). Determination of aluminum in portland cement by spectrophotometric method with chrome azurol S. *Bunseki Kagaku*, **50** (1), 83-85.