

Thermo Scientific iCE FIOS AAS

5 mg·L⁻¹ copper performance



The Thermo Scientific™ iCE™ FIOS™ AAS incorporates a flame atomizer combined with high light transmission double beam optics for high precision and accuracy.

This study using the iCE FIOS AAS system demonstrates instrument perform and illustrates the best response which can be achieved depending on the conditions employed.

Analysis 1

Analysis was carried out using the iCE FIOS AAS with the optimized conditions detailed in Table 1.

Table 1. Parameters used for the analysis.

Parameter	Setting
Wavelength	324.88 nm
Bandpass	0.5 nm
Burner type	100 mm
Fuel ratio	0.9 ml·min ⁻¹
Burner horizontal	0.7
Burner height	0 mm
Burner angle	0
Sample uptake rate	6 mm·min ⁻¹
Integration time	3 sec

Standards of 1, 3 and 5 mg·L⁻¹ of copper were analyzed to construct a calibration plot and a 5 mg·L⁻¹ copper sample was analyzed with 10 replicates.

Results of analysis 1

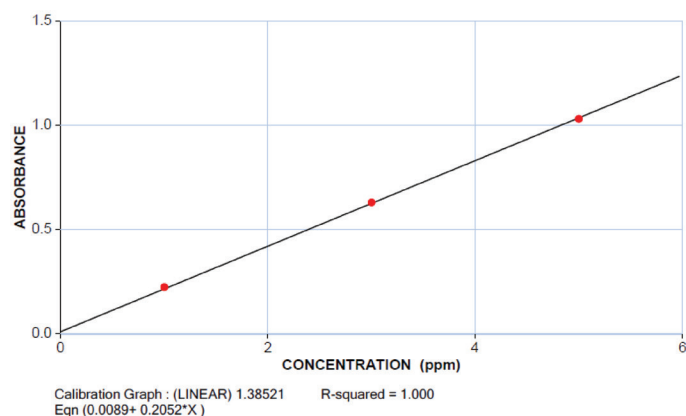


Figure 1. Analysis 1 calibration plot for copper from 1 to 5 mg·L⁻¹.

Table 2. Analysis 1 results of a ten replicate analysis of a 5 mg·L⁻¹ copper solution.

Name	Sample 1									
Abs	1.027	1.028	1.024	1.032	1.030	1.027	1.032	1.026	1.029	1.027
Conc	4.96	4.97	4.95	4.99	4.98	4.96	4.99	4.96	4.97	4.96

Table 3. Analysis 1 statistical observations of the ten replicate analysis of 5 mg·L⁻¹ copper solution based on absorption.

Statistics on Abs	
Valid observation	10
Process mean	1.02822
Standard deviation	0.00256
Variance	0.00001
Coeff. of variance	0.24908
Minimum value	1.02400
Maximum value	1.03208
Range	0.00808

Mean absorbance of analysis 1 is 1.03 and Coefficient of Variance, also known as Relative Standard Deviation, is 0.24% as shown in Table 3.

Analysis 2

Further analysis was carried out on a second iCE FIOS AAS with optimized conditions shown in Table 4, the same samples were analyzed as in analysis 1.

Table 4. Parameters used for the analysis.

Parameter	Setting
Wavelength	324.700 nm
Bandpass	0.5 nm
Burner type	100 mm
Fuel ratio	0.8 mm·min ⁻¹
Burner horizontal	0.2
Burner height	1 mm
Burner angle	0
Sample uptake rate	7.1 mm·min ⁻¹
Integration time	3 sec

Results of analysis 2

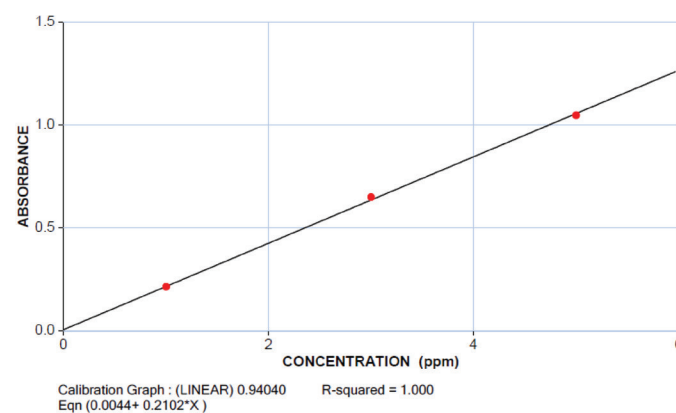


Figure 2. Analysis 2 calibration plot for copper from 1 to 5 mg·L⁻¹.

Table 5. Analysis 2 results of a ten replicate analysis of a 5 mg·L⁻¹ copper solution.

Name	Sample 1									
Abs	1.049	1.050	1.056	1.058	1.050	1.046	1.052	1.051	1.049	1.045
Conc	4.97	4.98	5.00	5.01	4.98	4.96	4.98	4.98	4.97	4.95

Table 6. Analysis 2 statistical observations of the ten replicate analysis of 5 ppm copper solution based on absorption.

Statistics on Abs	
Valid observation	10
Process mean	1.05070
Standard deviation	0.00406
Variance	0.00002
Coeff. of variance	0.38671
Minimum value	1.04458
Maximum value	1.05792
Range	0.01333

The mean absorbance of analysis 2 is 1.05 and Coefficient of Variance, also known as Relative Standard Deviation, is 0.39% as shown in Table 6.

Summary

Based on the study carried out; the iCE FIOS AAS system can achieve absorbance of > 0.95 for 5 mg·L⁻¹ copper solution. Also, in terms of precision the performance is < 0.5% (RSD) depending on the conditions employed. These performance specifications have been demonstrated across a number of instruments.

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