Chromatography: Internal Standard Response Factor and Concentration

Relative response factor from a calibration mix and the analyte concentration in a sample from analyte and internal standard peak areas.

Method: Internal standard method

Input parameters

Unit system: SI

Parameter	Value	Unit
Calibration analyte peak area	15,400	
Calibration analyte concentration	50.000	mg/L
Calibration internal standard area	12,100	
Calibration internal standard concentration	40.000	mg/L
Sample analyte area	9,800.0	
Sample internal standard area	11,500	
Internal standard added to sample	40.000	mg/L

Calculated results

Parameter	Value	Unit
Relative response factor	1.0182	
Analyte concentration in sample	33.478	mg/L

Notes for this case

• RRF = (A_s/C_s)/(A_is/C_is); C_x = (A_x/A_is,x)·C_is,x/RRF. The internal standard cancels injection volume and detector drift; choose one that elutes near the analyte but resolves from it, and check RRF is constant over the working range with several standards.

Formula and method

$$RRF = \frac{A_s/C_s}{A_{is,s}/C_{is,s}}, \quad C_x = \frac{A_x}{A_{is,x}}\frac{C_{is,x}}{RRF}$$

Variables

A_s	Calibration analyte peak area	-
C_s	Calibration analyte concentration	kg/m³
$A_{is,s}$	Calibration internal standard area	-
$C_{is,s}$	Calibration internal standard concentration	kg/m³
A_x	Sample analyte area	-
$A_{is,x}$	Sample internal standard area	-
$C_{is,x}$	Internal standard added to sample	kg/m³
RRF	Relative response factor	-
C_x	Analyte concentration in sample	kg/m³

Method and standards

Internal standard.

Assumptions and limits

- Linear detector response through the origin.

References
Internal standard method

Report details

Report reference	FCC-T8VA-WK9M (the same inputs always give the same reference)
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Release checks	3 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online
https://calc.firecad.com/instrumentation/analysers/internal-standard-quantitation

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.