# Standard Addition: Sample Concentration from Spiked Signals

Unknown concentration by the standard addition method from three to five signals at added concentrations, by linear regression extrapolated to zero signal.

**Method:** Standard addition method

## Input parameters

Unit system: SI

| Parameter | Value | Unit |
|---|---|---|
| Number of points | 4.0000 | |
| Dilution factor (final volume / sample volume) | 2.0000 | |
| Added 1 (usually 0) | 0 | mg/L |
| Signal 1 | 0.21500 | |
| Added 2 | 1.0000 | mg/L |
| Signal 2 | 0.31800 | |
| Added 3 | 2.0000 | mg/L |
| Signal 3 | 0.42400 | |
| Added 4 | 3.0000 | mg/L |
| Signal 4 | 0.52200 | |
| Added 5 | 4.0000 | mg/L |
| Signal 5 | 0.63000 | |

## Calculated results

| Parameter | Value | Unit |
|---|---|---|
| Slope (signal per concentration) | 102.70 | |
| Intercept | 0.21570 | |
| Concentration in measured solution | 2.1003 | mg/L |
| Concentration in original sample | 4.2006 | mg/L |
| Coefficient of determination | 0.99977 | |

**Notes for this case**

• Signal y = m(C_m + x): the x-intercept −b/m gives the concentration in the measured solution, C_m = b/m; multiply by the dilution factor for the original sample. Standard addition corrects matrix effects that change sensitivity, but not additive interferences or a non-zero blank.

## Formula and method

$$y = m(C_m + x) = b + mx, \quad C_m = \frac{b}{m}, \quad C_0 = f_d C_m$$

### Variables

| | | |
|---|---|---|
| $n$ | Number of points | - |
| $f_d$ | Dilution factor (final volume / sample volume) | - |
| $x_1$ | Added 1 (usually 0) | kg/m³ |
| $y_1$ | Signal 1 | - |
| $x_2$ | Added 2 | kg/m³ |
| $y_2$ | Signal 2 | - |

| | | |
|---|---|---|
| $x_3$ | Added 3 | kg/m³ |
| $y_3$ | Signal 3 | - |
| $x_4$ | Added 4 | kg/m³ |
| $y_4$ | Signal 4 | - |
| $x_5$ | Added 5 | kg/m³ |
| $y_5$ | Signal 5 | - |
| $m$ | Slope (signal per concentration) | - |
| $b$ | Intercept | - |
| $C_m$ | Concentration in measured solution | kg/m³ |
| $C_0$ | Concentration in original sample | kg/m³ |
| $R^2$ | Coefficient of determination | - |

### Method and standards

Standard addition.

### Assumptions and limits

- Linear response; no blank signal.

### References

Standard addition method

## Report details

| | |
|---|---|
| Report reference | FCC-HS5G-XZMC (the same inputs always give the same reference) |
| Generated | 23 November 2026, 18:08 UTC |
| Calculator | Standard Addition: Sample Concentration from Spiked Signals |
| Method last reviewed | 17 November 2026 |
| Software release | FireCAD Calc, release of 22 November 2026 |
| 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/standard-addition-concentration

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.