Calibration Gas Blending by Partial Pressure

Concentration of a calibration gas blended by partial pressures in a cylinder, and the component fill pressure for a target concentration.

Method: Dalton's law of partial pressures (definitions)

Input parameters

Unit system: SI

Parameter	Value	Unit
Final cylinder pressure (absolute)	150.00	bar
Component concentration in the source (parent) gas	1,000,000	ppm
Target concentration	500.00	ppm
Component fill pressure actually used (absolute partial pressure)	7.5000	kPa

Calculated results

Parameter	Value	Unit
Fill pressure for the target	7.5000	kPa
Concentration achieved with p_c	500.00	ppm

Notes for this case

- Ideal-gas partial pressures; at high pressure, compressibility differences give errors of a few per cent. Gravimetric blending (by mass) is the accurate method for certified standards.

Formula and method

$$p_{c,req} = p_t \frac{c_t}{c_s}, \quad c = c_s \frac{p_c}{p_t}$$

Variables

p_t	Final cylinder pressure (absolute)	Pa
c_s	Component concentration in the source (parent) gas	-
c_t	Target concentration	-
p_c	Component fill pressure actually used (absolute partial pressure)	Pa
$p_{c,req}$	Fill pressure for the target	Pa
C	Concentration achieved with p_c	-

Method and standards

Dalton's law.

Assumptions and limits

- Ideal gases.
- Absolute pressures: the partial pressure is the rise from an evacuated cylinder. Gauge readings must have the atmospheric pressure added.

References

- Dalton's law of partial pressures (definitions)

Report details

Report reference	FCC-1TDB-KMJH (the same inputs always give the same reference)
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Software release	FireCAD Calc, release of 17 November 2026
Release checks	2 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/calibration-gas-blend

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.