SO_3 from SO_2 Conversion

SO_3 in flue gas from the SO_2 concentration and the share converted to SO_3, by mass and by volume, for acid dew point and ammonium bisulphate checks.

Method: Mass balance with IUPAC molar masses; ppm on the molar volume at 0 °C; 1 atm

Input parameters

Unit system: SI

Parameter	Value	Unit
SO_2 (dry, normal)	1,500.0	mg/Nm³
Share of SO_2 converted to SO_3	1.5000	%

Calculated results

Parameter	Value	Unit
SO_3 (dry, normal)	28.120	mg/Nm³
SO_3 by volume (dry)	7.8728	ppm
SO_2 by volume (dry, as entered, before conversion)	524.85	ppm

Notes for this case

- A few ppm of SO_3 raise the acid dew point sharply: use the SO_3 by volume in the acid dew point calculator, converted to a wet basis first (dry value × (1 − water vapour fraction)), because that calculator works on wet gas.

Formula and method

$$c_{SO_3} = c_{SO_2} f \frac{M_{SO_3}}{M_{SO_2}}, \quad y = \frac{c}{M} V_m$$

Variables

c_{SO_2}	SO_2 (dry, normal)	kg/m³
f	Share of SO_2 converted to SO_3	-
c_{SO_3}	SO_3 (dry, normal)	kg/m³
y_{SO_3}	SO_3 by volume (dry)	-
y_{SO_2}	SO_2 by volume (dry, as entered, before conversion)	-

Method and standards

Mass balance with IUPAC molar masses: the SO_3 formed is the converted share of the SO_2 entered; volume fractions on the molar volume at 0 °C and 1 atm.

Assumptions and limits

- Dry, normal basis. The SO_2 entered is taken as the SO_2 before conversion; its volume fraction is not reduced by the share converted.
- For the acid dew point calculator, which works on wet gas, multiply the dry SO_3 fraction by (1 − water vapour fraction).

References

- Mass balance with IUPAC molar masses; ppm on the molar volume at 0 °C
- 1 atm

Report details

Report reference	FCC-BT6W-7W7K (the same inputs always give the same reference)
Generated	17 November 2026, 19:46 UTC
Calculator	SO_3 from SO_2 Conversion
Method last reviewed	13 November 2026
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/boilers-power-plant/emissions-stacks/so3-from-so2-conversion

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.