Limiting Oxygen Concentration from LFL (Inerting Target)

Limiting oxygen concentration of a fuel from its lower flammability limit and stoichiometric oxygen (LOC = z·LFL), with an inerting target.

Method: Perry's Chemical Engineers' Handbook; 9th ed. (McGraw-Hill, 2019); ...

Input parameters

Unit system: SI

Parameter	Value	Unit
Lower flammability limit	5.0000	%
Carbon atoms in the fuel	1.0000	
Hydrogen atoms	4.0000	
Oxygen atoms	0	
Safety margin below LOC (percentage points) A fixed 2-point margin is a common screening figure. Inerting standards such as NFPA 69 set the margin by how the oxygen is monitored, in some cases as a percentage of the LOC; follow the edition you work to.	2.0000	%

Calculated results

Parameter	Value	Unit
Moles of O_2 per mole of fuel	2.0000	
Limiting oxygen concentration	10.000	%
Maximum O_2 to operate at	8.0000	%

Notes for this case

- Perry's notes this estimate is approximate; measured LOC values (ASTM E2079) govern. Screening estimate only, not a safety study or a basis for protective design.

Formula and method

$$z = m + \frac{x}{4} - \frac{y}{2} \ (C_m H_x O_y), \quad LOC = z \cdot LFL$$

Variables

LFL	Lower flammability limit	-
m	Carbon atoms in the fuel	-
x	Hydrogen atoms	-
y	Oxygen atoms	-
Δ	Safety margin below LOC (percentage points)	-
z	Moles of O_2 per mole of fuel	-
LOC	Limiting oxygen concentration	-
$O_{2,max}$	Maximum O_2 to operate at	-

Method and standards

Perry's Eq. (23-8).

Assumptions and limits

- Approximate; measured data (ASTM E2079) govern. The estimate can be non-conservative for some fuels whose measured LOC is lower than z·LFL.
- Only C, H and O atoms are handled; fuels with N, S or halogens need measured values.
- The operating target subtracts a fixed margin in percentage points; inerting standards may set it as a percentage of the LOC depending on monitoring.

References

- Perry's Chemical Engineers' Handbook
- 9th ed. (McGraw-Hill, 2019)
- sec. 23
- Eq. (23-8): LOC = z·LFL

Report details

Report reference	FCC-MSR7-P2VN (the same inputs always give the same reference)
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Calculator	Limiting Oxygen Concentration from LFL (Inerting Target)
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/chemical/process-safety/limiting-oxygen-concentration

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.