Limiting Reagent and Excess for a Two-Reactant Reaction

Limiting reactant, maximum extent of reaction and percentage excess of the other reactant for aA + bB → products, from the moles fed and coefficients.

Method: Stoichiometry: extent ξ = n_i/v_i; limiting reactant has the smaller ratio; excess = (fed − needed)/needed

Input parameters

Unit system: SI

Parameter	Value	Unit
Moles of A fed	0.10000	kmol
Moles of B fed	0.40000	kmol
Coefficient of A	1.0000	
Coefficient of B	3.0000	

Calculated results

Parameter	Value	Unit
Limiting reactant (1 = A, 2 = B, 0 = exact ratio)	1.0000	
Maximum extent	0.10000	kmol
Excess of the other reactant	33.333	%
Excess reactant left at full conversion	0.10000	kmol

Formula and method

$$\xi_{max} = \min\left(\frac{n_A}{a}, \frac{n_B}{b}\right), \quad E = \frac{n_{excess} - \nu\xi_{max}}{\nu\xi_{max}}$$

Variables

n_A	Moles of A fed	mol
n_B	Moles of B fed	mol
a	Coefficient of A	-
b	Coefficient of B	-
$\mathrm{limiting}$	Limiting reactant (1 = A, 2 = B, 0 = exact ratio)	-
ξ_{max}	Maximum extent	mol
E	Excess of the other reactant	-
n_{left}	Excess reactant left at full conversion	mol

Method and standards

Stoichiometry.

Assumptions and limits

- Single reaction.

References

- Stoichiometry: extent ξ = n_i/v_i
- limiting reactant has the smaller ratio; excess = (fed − needed)/needed

Report details

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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/chemical/reactors/limiting-reagent

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.