Space Velocity and Space Time of a Reactor

Space velocity (GHSV or LHSV) and space time of a catalytic or other reactor from the feed volumetric flow at reference conditions and the bed volume.

Method: Definitions SV = $\dot{V}_0/V$; $\tau = V/\dot{V}_0$ (Fogler)

Input parameters

Unit system: SI

Parameter	Value	Unit
Feed flow at reference conditions Gas at the standard conditions your industry uses (GHSV), or liquid at 15 °C (LHSV).	5,000.0	m³/h
Catalyst bed (or reactor) volume	2.5000	m³

Calculated results

Parameter	Value	Unit
Space velocity	2,000.0	1/h
Space time $V/\dot{V}_0$	1.8000	s

Notes for this case

- Space time is not the true residence time unless the flow is at reactor conditions and the bed is empty volume.

Formula and method

$$SV = \frac{\dot{V}_0}{V}, \quad \tau_s = \frac{V}{\dot{V}_0}$$

Variables

$\dot{V}_0$	Feed flow at reference conditions	m³/s
V	Catalyst bed (or reactor) volume	m³
SV	Space velocity	1/s
τ_s	Space time $V/\dot{V}_0$	s

Method and standards

Definitions.

Assumptions and limits

- Uniform bed.
- With zero flow the space time is unbounded and is not shown.

References

- Definitions SV = $\dot{V}_0/V$
- $\tau = V/\dot{V}_0$ (Fogler)

Report details

Report reference	FCC-3A84-63NZ (the same inputs always give the same reference)
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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/reactors/space-velocity

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.