Drying Rate from Weighings: Moisture and Flux

Dry-basis moisture at two weighings and the drying rate and flux between them, from the dry solids mass, sample masses, times and drying area.

Method: Gravimetric drying-rate measurement

Input parameters

Unit system: SI

Parameter	Value	Unit
Dry solids mass (oven-dry)	0.50000	kg
Sample mass at the first weighing	0.85000	kg
Time of the first weighing	10.000	min
Sample mass at the second weighing	0.78000	kg
Time of the second weighing	20.000	min
Drying surface area	500.00	cm²

Calculated results

Parameter	Value	Unit
Moisture at the first weighing (dry basis)	70.000	%
Moisture at the second weighing (dry basis)	56.000	%
Drying rate (kg water per kg dry solids per hour)	0.84000	
Drying flux	8.4000	kg/(m²·h)

Notes for this case

• Weighing a sample during drying and drying it fully at the end gives its moisture on a dry basis, X = (m − m_d)/m_d. The mass lost between weighings divided by the time and the exposed area is the drying flux; constant flux means constant-rate drying, falling flux the falling-rate period. Plotting the rate against X gives the drying-rate curve used to size dryers.

Formula and method

The formula is shown on the calculator page: https://calc.firecad.com/chemical/drying/drying-rate-from-weighings

Variables

m_d	Dry solids mass (oven-dry)	kg
m_1	Sample mass at the first weighing	kg
t_1	Time of the first weighing	s
m_2	Sample mass at the second weighing	kg
t_2	Time of the second weighing	s
A	Drying surface area	m²
X_1	Moisture at the first weighing (dry basis)	-
X_2	Moisture at the second weighing (dry basis)	-
$-dX/dt$	Drying rate (kg water per kg dry solids per hour)	-
N	Drying flux	kg/(m²·s)

Method and standards

Drying rate.

Assumptions and limits

- Constant air conditions between weighings.

References

Gravimetric drying-rate measurement

Report details

Report reference	FCC-DTKT-0493 (the same inputs always give the same reference)
Generated	23 November 2026, 17:34 UTC
Calculator	Drying Rate from Weighings: Moisture and Flux
Method last reviewed	17 November 2026
Software release	FireCAD Calc, release of 22 November 2026
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/drying/drying-rate-from-weighings

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.