Neutron Flux from Foil Activation Measurement

Neutron flux from the measured activity of an activation foil (for example gold) from its mass, cross-section, half-life, irradiation and decay times.

Method: Activation-foil flux measurement

Input parameters

Unit system: SI

Parameter	Value	Unit
Measured foil activity at counting	3,000.0	kBq
Foil mass	0.10000	mg
Molar mass	196.97	kg/kmol
Isotopic abundance	100.00	%
Activation cross-section (spectrum-averaged)	98.650	b
Product half-life	2.6941	d
Irradiation time	1.0000	h
Time from end of irradiation to counting	2.0000	h

Calculated results

Parameter	Value	Unit
Target atoms	3.0574e+17	
Saturation activity	287,447	kBq
Neutron flux	9.5302e+12	1/(cm²·s)

Notes for this case

• Inverting A = Nσφ(1 − e^(−λt_i))e^(−λt_d). Thin foils avoid self-shielding; bare and cadmium-covered foils separate thermal and epithermal flux. Correct the measured activity for detector efficiency first.

Formula and method

$$\phi = \frac{A e^{\lambda t_d}}{N\sigma\left(1 - e^{-\lambda t_i}\right)}$$

Variables

A	Measured foil activity at counting	Bq
m	Foil mass	kg
M	Molar mass	kg/kmol
θ	Isotopic abundance	-
σ	Activation cross-section (spectrum-averaged)	m²
$T_{1/2}$	Product half-life	s
t_i	Irradiation time	s
t_d	Time from end of irradiation to counting	s
N	Target atoms	-
A_{sat}	Saturation activity	Bq
ϕ	Neutron flux	1/(m²·s)

Method and standards

Foil flux measurement.

Assumptions and limits

- Constant flux; thin foil; detector efficiency already applied.

References

Activation-foil flux measurement

Report details

Report reference	FCC-TWTX-SG1X (the same inputs always give the same reference)
Generated	23 November 2026, 17:35 UTC
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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/boilers-power-plant/nuclear-power/flux-from-foil-activation

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.