Nitrogen Nutrient Dose: Urea and DAP

Urea and diammonium phosphate to supply a nitrogen dose to fermentation mash, by the nitrogen content from their formulae.

Method: Nitrogen content from formulae with IUPAC atomic masses: urea $CO(NH_2)_2$ 46.6 % N; DAP $(NH_4)_2HPO_4$ 21.2 % N

Input parameters

Unit system: SI

Parameter	Value	Unit
Mash	1,700.0	m³/d
Nitrogen dose	200.00	mg/L
Share of nitrogen from urea (rest from DAP)	70.000	%

Calculated results

Parameter	Value	Unit
Nitrogen	340.00	kg/d
Urea	510.22	kg/d
DAP	480.82	kg/d

Notes for this case

- Molasses already carries some nitrogen; dose to the deficit found by analysis.
- Quantities are for pure urea and DAP: divide by the purity of the commercial product.

Formula and method

$$\dot{m}_N = \dot{V}_m c_N, \quad \dot{m}_{urea} = \dot{m}_N f \frac{M_{urea}}{2M_N}, \quad \dot{m}_{DAP} = \dot{m}_N (1-f) \frac{M_{DAP}}{2M_N}$$

Variables

$\dot{V}_m$	Mash	m³/s
c_N	Nitrogen dose	kg/m³
f	Share of nitrogen from urea (rest from DAP)	-
$\dot{m}_N$	Nitrogen	kg/s
$\dot{m}_{urea}$	Urea	kg/s
$\dot{m}_{DAP}$	DAP	kg/s

Method and standards

Stoichiometry.

Assumptions and limits

- Pure chemicals. For commercial grades divide by the product's purity (or use its stated nitrogen content).

References

- Nitrogen content from formulae with IUPAC atomic masses: urea $CO(NH_2)_2$ 46.6 % N
- DAP $(NH_4)_2HPO_4$ 21.2 % N

Report details

Report reference	FCC-E5SZ-KGEV (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/sugar-ethanol/ethanol/nutrient-dose-fermentation

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.