Urea and gaseous emissions

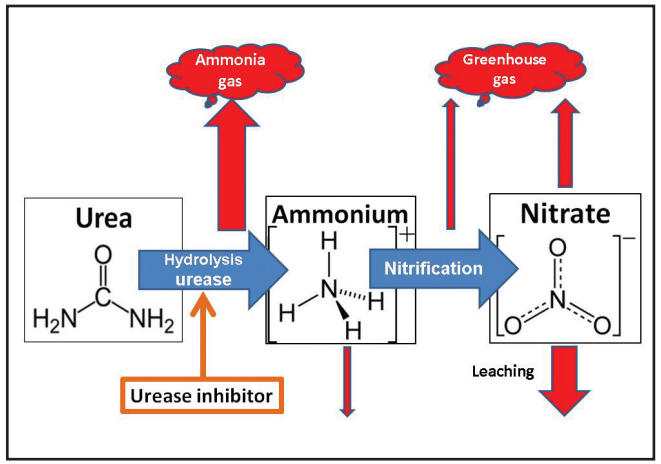
Greenhouse gas (GHG) emissions

- Urea and stabilised urea can reduce GHG emissions compared to CAN
- The EU has committed to reduce agricultural GHG emissions by 30% by 2030

Ammonia gas emissions

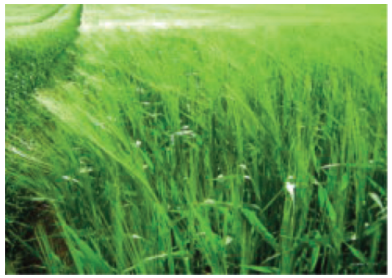
- Urea will increase ammonia emissions compared to CAN
- Urea can be stabilised with a urease inhibitor to minimise ammonia losses
- Ireland has committed to reduce ammonia emission by 5% by 2030

Major fertiliser N transformations and N loss pathways. Urease inhibitor (NBPT) reduces N loss by slowing urea hydrolysis.



Relative star rating of the different N fertilisers

	CAN	Urea	Urea + NBPT
Cost of N	★★★½	★★★★★	★★★★
Yield	★★★★★	★★★★½	★★★★★
N recovery efficiency	★★★★★	★★★½	★★★★★
Greenhouse gas	★★	★★★★★	★★★★★
Ammonia gas	★★★★★	★★	★★★★½



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Crops Environment & Land Use Programme

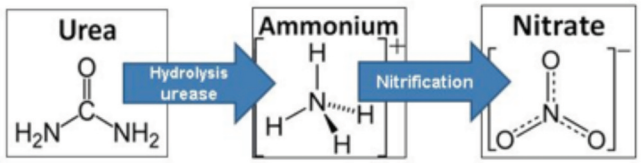
Johnstown Castle

Urea N Fertiliser

Teagasc
Agriculture and Food Development Authority

Urea compared to calcium ammonium nitrate (CAN)

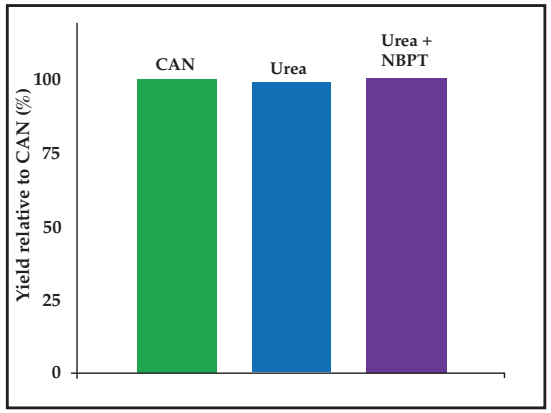
- Urea is 46% Nitrogen (N)
- CAN is c. 27% N
- Urea is converted to ammonium and nitrate in soil (see below)



- Plants take up mainly nitrate and ammonium but can take up urea too
- N loss by ammonia gas volatilisation (loss to air) occurs when urea converts to ammonium

Yield

Teagasc trials show that CAN, Urea and Urea stabilised with the urease inhibitor NBPT frequently give similar yields but Urea has the lowest N recovery



Average of 6 grassland sites, 5 N rates and 30 fertiliser applications dates

To minimise N (ammonia) loss from Urea

- **Rainfall:** best ammonia reductions from rain shortly after application, 7-14mm gives large reductions but be cautious of leaching and N runoff loss
- **Avoid** applying to wet soil/grass followed by windy, sunny conditions
- Urea applied into a crop **canopy** is more protected from wind and direct sun
- The proportion of N loss as ammonia tends to increase with increasing N rate e.g. grazing N rates (typically <40 kg N/ha) are potentially less risky than silage N rates (typically >80 kg/ha)
- Urea can be riskier on soils with pH >7.1

- Apply Urea before **lime** application (10 days)
- Wait at least 3 months after **liming** before applying Urea
- Wait 10 days after **slurry** application before applying Urea and *vice versa*
- **Incorporating** into soil will minimise ammonia losses but risk of toxicity to seedlings increases with rate, do not place urea with seed for this reason
- Use a **urease inhibitor** (e.g. NBPT reduced ammonia N loss in Teagasc trials by c. 79% on average)

Urea fertiliser spreading considerations

- Urea is less dense than CAN making it more difficult to spread evenly at wide bout widths
- Small prilled urea (50%<2mm) is particularly difficult to spread on bouts >10m. Larger particle sizes (80% 2-4mm) are available and suit wider bout widths

- Important to know size distribution, determine with hand-held sieve box
- Ensure the fertiliser spreader is set up correctly by consulting the spreader manufacturers recommendations for the specific product being spread

- Use trays to check the spread pattern
- Urea will have a narrower maximum bout width and a more wind prone spread pattern than CAN
- Urea has transport and work rate advantages over CAN because it has higher N content