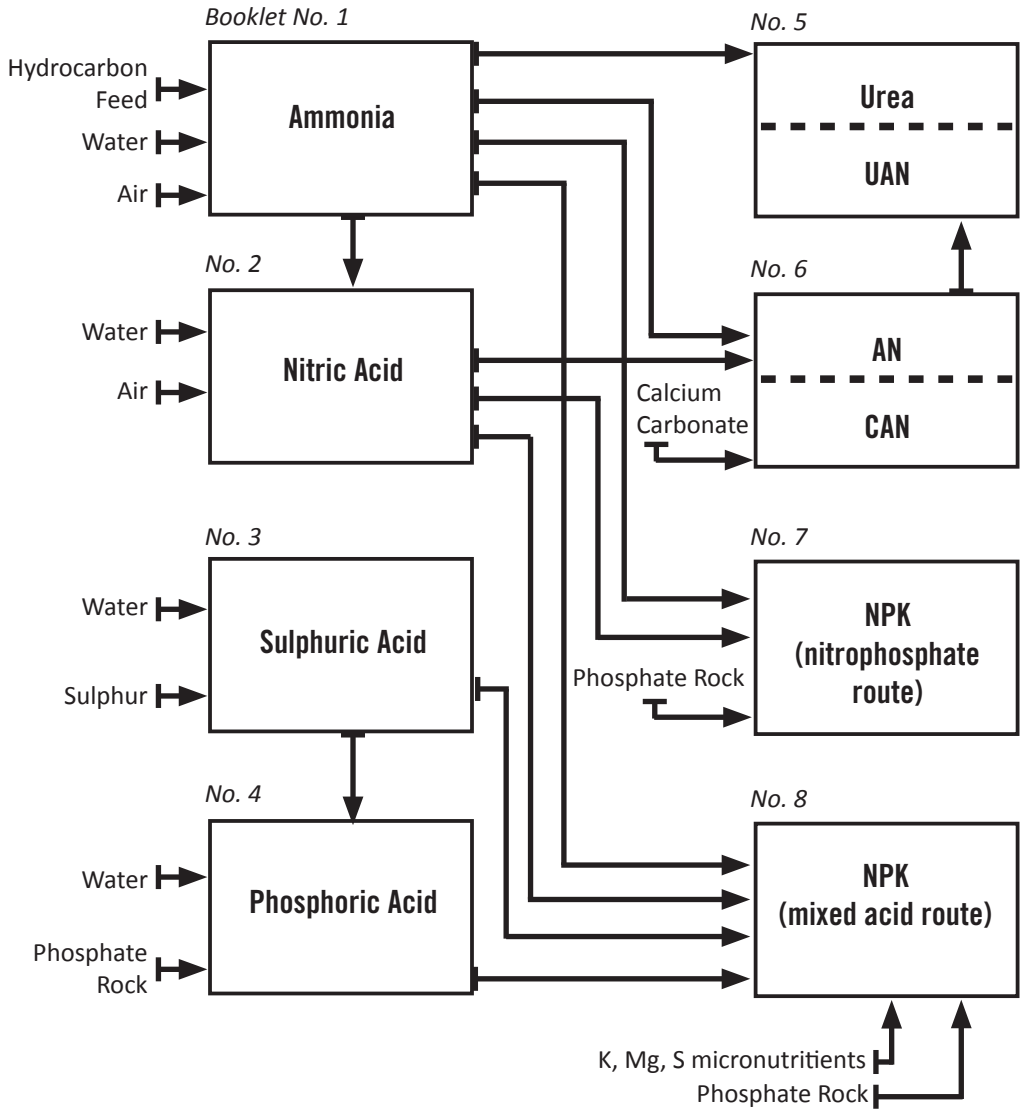
Fertilizers Europe BAT Booklets



2.2.3 Range of Methods Available

Method	Potential Interferences	Comments
Ammonia		
Chemiluminescence	NO_x	
IR	IR absorbing components	
Urea dust		
Double-Pass Transmissometer		Upper limit of 2,000mg.Nm^{-3} with a precision of around 2% of full scale deflection, lower limit of 10mg.Nm^{-3}
Double-Pass Density Monitor		
Beta Attenuation		Range of 2 to 2,000mg.Nm^{-3} depending on sampling rates, frequency and integrating levels
Light Scatter Measurement		Claimed to be accurate at low particulate concentrations down to 1mg.Nm^{-3}

2.3 Manual Methods

2.3.1 Ammonia

A sample of the gas is passed through a series of absorbers containing standard sulphuric acid solution. The ammonium ions in the absorber solution may be determined by using ion chromatography, ion selective electrode or by colormetric methods.

2.3.2 Urea dust

Samples of the gas are drawn into a sampling nozzle attached directly to the inlet of a small cyclone which is inserted bodily into a gas stream at the end of the probe. The particles of grit/dust are centrifuged out of this sample and driven into a hopper.

The cleaned gases are drawn from the cyclone through the probe tube, flexible hose, catchpot cooler and valve by a suction unit. The system collects substantially all dust and grit particles above 5-10 microns, when operated at sampling above 8.5Nm^3.h^{-1} at STP. The weight of dust is gravimetrically measured in the cyclone.

3. Emissions into Water

NH_3, urea or total Kjeldahl N, Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), oil and metal corrosion products.

3.1 Ammonia/Ammoniacal N

The spectrophotometric method for ammonia relies on the reaction in which mono-chloramine is reacted with phenol to form an indo-phenol blue compound. This method is particularly suitable for the determination of ammonia in cooling waters derived from saline sources (dock, estuarine or sea water) and may be used in continuous flow colorimetry.

Ion selective electrodes may also be used and are suitable for saline applications as well as pure water.

Note that free ammonia exists in equilibrium with NH_4^+ as follows:-

$$NH_4^+ + H_2O \longleftrightarrow NH_3 + H_3O^+$$

and that the equilibrium depends on pH. The above method determines the NH_4^+ ammonia. Free ammonia is particularly toxic to fish and should an incident occur, it may be more important to relate the result to free ammonia. Any suitable pH determination may be used and the free ammonia estimated as given in "Hampson B L, J Cons Int Explor, Mer, 1977,37. 11" and "Whitfield M, J Mar Biol. Ass UK, 1974,54, 562".

Manual laboratory based Kjeldahl methods may be used for spot checks for the determination of organic and ammoniacal nitrogen in a mineralised sample.

3.2 Urea (On-Line Method)

The urea in the sample is chlorinated under very slightly alkaline conditions using sodium hypochlorite, sodium hypobromite and hydrochloric acid/magnesium chloride reagents. The purpose of the sodium hypochlorite is to prevent the interference of ammonia. The presence of magnesium chloride in the acid reagent is to increase the sensitivity of the method and the potassium chloride and hydrogen peroxide are to increase the rate of colour development. The method is strongly pH sensitive and so after the initial mixing of the reagent and sample, the pH of the stream is raised with borate buffer to pH 9.4. The sample, is then allowed to react with an aqueous methanolic solution of phenol to form a yellow compound which is measured spectrophotometrically.

3.3 Oil

A visual inspection of the sample should be sufficient to show that no oil is present.

APPENDIX 2 GENERAL PRODUCT INFORMATION ON UREA

1. Identification

Chemical name	:	Carbamide
Commonly used synonyms	:	Urea
C.A.S. Registry number	:	57–13–6
EINECS Number	:	200–315–5
EINECS Name	:	Urea
Molecular formula	:	$CO(NH_2)_2$

2. Hazards to Man and the Environment

To man

Urea is basically harmless when handled correctly.

To the environment

Urea is basically harmless when handled correctly.

3. Physical and Chemical Properties

Appearance	:	White solid
Odour	:	Odourless
pH water solution (10%)	:	9-10
Melting point	:	133°C (decomposes)
Solubility in water	:	1,080g.l^{-1} at 20°C
Bulk density	:	700-780kg.m^{-3}

product stewardship
fertilizers

Best Available Techniques Booklets were first issued by Fertilizers Europe in 1995. Second revised edition 2000.

1. Production of Ammonia
2. Production of Nitric Acid
3. Production of Sulphuric Acid (in collaboration with ESA)
4. Production of Phosphoric Acid
5. Production of Urea and Urea-Ammonium Nitrate
6. Production of Ammonium Nitrate and Calcium Ammonium Nitrate
7. Production of NPK Compound Fertilizers by Nitrophosphate Route
8. Production of NPK Compound Fertilizers by Mixed Acid Route

fertilizers europe

Avenue E. van Nieuwenhuyse 4/6
B-1160, Brussels, Bélgica
Tel: +32 2 675 3550
Fax: +32 2 675 3961
main@fertilizerseurope.com

www.fertilizerseurope.com

twitter.com/FertilizersEuro
www.youtube.com/fertilizerseurope
www.facebook.com/fertilizerseuropepage
Group Fertilizers Europe