

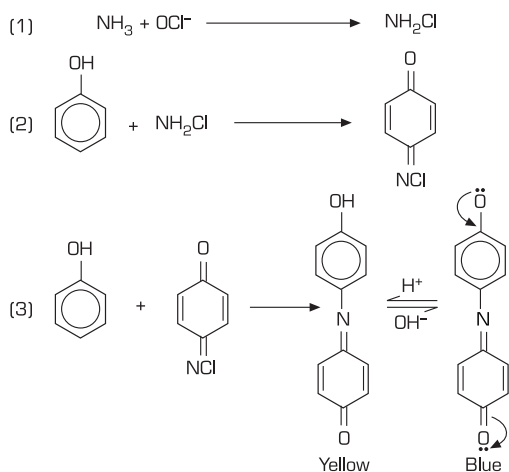
# DETERMINATION OF AMMONIA IN SOIL EXTRACTS USING "MICRORESP™"

Charles Shand, Berwyn Williams and Grace Coutts

Soils Group, The Macaulay Institute, Craigiebuckler, Aberdeen, AB15 8QH, UK • email: c.shand@macaulay.ac.uk

## INTRODUCTION

Ammonium in soil extracts is often determined by the Berthelot reaction:



The reaction is susceptible to interferences from amino acids found in soil extracts and the ammonia is isolated by diffusion prior to analysis. A typical macro-scale setup used at the Macaulay Institute for the diffusion of ammonia is shown in Fig. 1.



Figure 1

## EXPERIMENTAL

We have adapted the MicroResp™ double plate system<sup>1</sup>, which was designed for the measurement of CO<sub>2</sub> respiration from soils, for the diffusion and analysis of ammonia (Fig. 2).

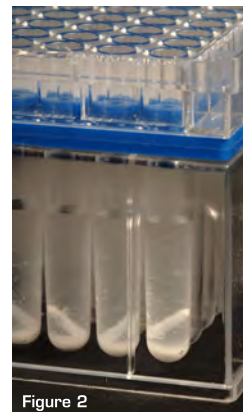
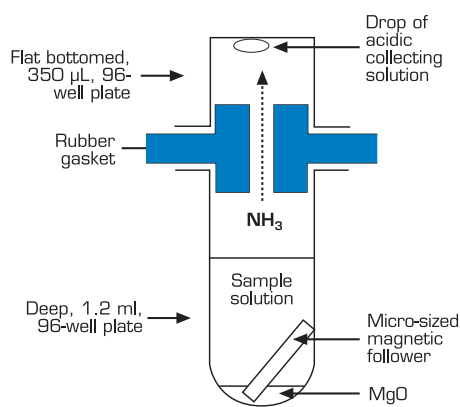
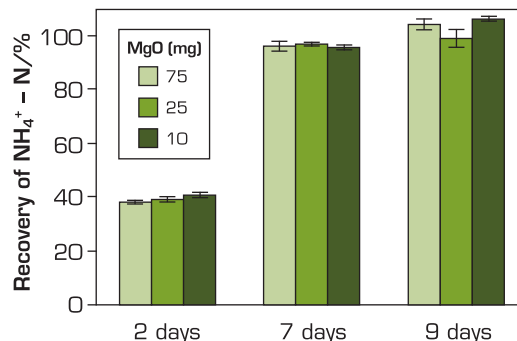


Figure 2

Effect of time and amount of MgO on the efficiency of collection. Bars represent the standard error.



## RESULTS

Soil type	Loss on ignition (%)	pH	Apparent NH <sub>4</sub> <sup>+</sup> -N diluted soil extract/mg L <sup>-1</sup>		Volumetric dilution of soil extract
			Before diffusion	After diffusion	
Brown forest soil	12.2	3.72	0.76	0.66	2 x
Brown ranker	13.1	3.66	0.82	0.77	10 x
Hill peat	58.6	4.12	0.76	0.73	10 x
Humus	93.0	4.52	0.68	0.69	10 x
Humus	26.1	4.36	0.95	0.91	5 x
Humus iron podzol	21.6	3.99	0.65	0.62	2 x
Humus iron podzol	9.8	4.60	0.91	0.90	2 x
Peaty podzol	37.6	4.04	0.42	0.43	None
Peaty podzol	91.3	3.86	0.93	0.99	2 x
Stony sandy loam	9.1	4.14	0.74	0.71	None

We have also developed microplate methods for:

- the determination of nitrate employing hydrazine for reduction of nitrate to nitrite and are currently investigating "green" alternatives to hydrazine.
- the oxidation of soil water extracts for the determination of total N. The sample is placed in a microplate made from PTFE (Fig. 3), treated with alkaline pesulphate and heated in an autoclave at 110°C for 2 h.

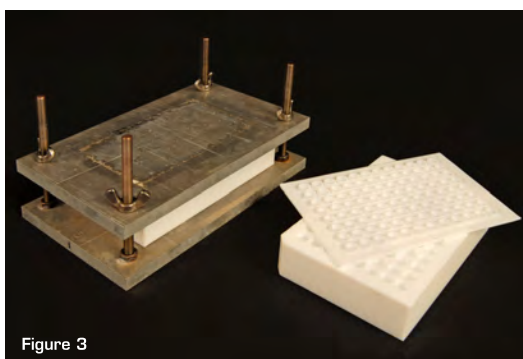


Figure 3



Plate reader

## FOOTNOTES

Other methods for the purification of ammonia include:

- filter paper soaked in acid and wrapped in PTFE "plumbers" tape
- on-line dialysis in flow-systems