Isolation of Nitrogen Compounds by Ion Exchange

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Hydrolysates from humus contain a complex mixture of organic nitrogen components, since up to fifty ninhydrin-postive compounds have been reported,[1] and also dark-coloured neutral and acid "humic" substances which interfere with the chromatographic determination.

Dry hydrolysed humus material (5 g), released from a highly organic raw humus by boiling with 6 N hydrochloric acid for 5 h, was dissolved in 250 ml water and 50 ml aliquots were passed through a bed of 50 ml ion exchange resin in 2 cm i.d. column. After rinsing with water to a neutral and colourless eluate the columns were successively eluted with 1. 500 ml 6 % HCl, 2. 500 ml 6 N HCl, 3. 500 ml 6 N HCl at a flow rate of 100 ml/h.

The total nitrogen content in each of the three fractions was determined according to Kjeldahl, and ammonia by magnesium oxide distillations.

Table 1 shows the nitrogen content of each fraction as percent of the total added to each coloumn.

Table 1.

Dow 50 W / Fraction	X-1		X-8		X-16	
	Total N	NH_3-N	Total N	NH_3-N	Total N	NH_3-N
Fraction washed through	1.36		1.36		1.83	
Eluted with 6 % HCl	95.01	98.58	70.16	94.04	63.24	88.09
Eluted with 6 N HCl I	3.89	0	27.42	5.51	23.75	12.64
Eluted with 6 N HCl II	1.46		4.18		9.93	

In connection with our work on humic hydrolysates there has been a need for concentrating and purifying nitrogen compounds by ion exchange.

The use of resins crosslinked with the usual 8 % of divinylbenzene gives rise to losses of nitrogen compounds from humus hydrolysates and the process is rather time consuming.

We wish to report that these losses can be reduced by using a more porous ion exchange resin.

The resin used was Dow 50W in hydrogen form with crosslinking and particle size of the following specifications: X-1 50/100 mesh, X-8 50/100 mesh, and X-16 20/50 mesh.

The results clearly show the dependence of degree of crosslinking in the ion exchange resin and the speed of exchange of the nitrogen compounds. The higher exchange with the more porous resin could partly be a result of faster ion diffusion and perhaps less physical adsorption.

Since the main purpose of this experiment was to concentrate and to a certain extent purify nitrogen compounds from humic hydrolysates with minimum losses, the most porous ion exchange resin seems to give the best results.

1. Waldron, A. C. and Mortenson, J. L. *Soil Sci.* **93** (1962) 286.

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