



FAO European Cooperative
Research Network



Recycling of Agricultural, Municipal and Industrial Residues in Agriculture

Network Coordinator: José Martinez, Cemagref, Rennes (France)

RAMIRAN 2002

**Proceedings of the 10th International Conference
of the RAMIRAN Network**

General Theme: Hygiene Safety

**Štrbské Pleso, High Tatras, Slovak Republic
May 14 - 18, 2002**

Edited by Ján Venglovský and Gertruda Gréserová

ISBN 80-88985-68-4



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AMMONIA REMOVAL FROM WASTE AIR PRODUCED IN THE AGRICULTURE

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OBJECTIVES

Significant sources of ammonia pollution are generated due to agricultural production. Ammonia is also a cause of a bothersome odour in the neighbourhood of animal breeding farms. On the other side, ammonia is an important source of nitrogen for crops production. For this reason there is a permanent interest in searching for ways to utilize the ammonia from animal breeding in crops farming. Conceivable processes to recover ammonia from air are first of all those based on adsorption. Suitable low cost adsorbents for this purpose can be found among natural zeolites as clinoptilolite.

EXPERIMENTAL DESIGN

The natural zeolite clinoptilolite from the deposit Nižný Hrabovec, Slovakia was tested for ammonia removal from the waste air. Measurements of breakthrough curves for ammonia was performed using fixed beds of clinoptilolite (i) in its natural form and (ii) on clinoptilolite samples pretreated with acids. The parameters of the experiments were selected to simulate the conditions ruling in animal breeding farms. The pretreatment of clinoptilolite with acids was expected to increase sorption capacity of clinoptilolite for ammonia.

RESULTS AND CONCLUSIONS

Table 1 exemplifies the overall useful sorption capacities of clinoptilolite in its natural and pre-treated form.

Table 1 Texture characteristics of sorbents and their sorption capacity for NH₃

Sorbent	BET-surface Area	Volume of pores	Sorption capacity for NH ₃
clinoptilolite (natural form)	26.0 m ² /g	0.093 cm ³ /g	10.8 mg/g
clinoptilolite (treated with H ₂ SO ₄)	9.7 m ² /g	0.047 cm ³ /g	22,5 mg/g
clinoptilolite (treated with H ₃ PO ₄)	10.1 m ² /g	0.060 cm ³ /g	20.0 mg/g
clinoptilolite (treated with HNO ₃)	20,3 m ² /g	0.081 cm ³ /g	27.1 mg/g

ACKNOWLEDGEMENTS

The financial support of the work by the Grant Agency of the Czech Republic via Grant No 104/00/1007 is gratefully acknowledged.