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University of Veterinary Medicine
Research Institute of Veterinary Medicine
Hlinkova 1/A
040 01 Košice
Slovak Republic

AMMONIA REMOVAL FROM WASTE AIR PRODUCED IN THE AGRICULTURE

Karel Ciahotný¹, Lenka Melenová¹, Hana Jirglová¹, Pavel Ruzek², Helena Kusá²

¹ *Institute of Chemical Technology, Prague, Czech Republic*

² *Research Institute of Crop Production, Prague, Czech Republic*

Corresponding author: Karel Ciahotný, VŠCHT/216, Technická 5, 166 28 Praha 6

phone: + 420-2-2435-4228; fax: +420-2-24310682

e-mail: karel.ciahotny@vscht.cz

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

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