Wolfener Analytik GmbH
Griesheimstraße Geb. 10.28.0
06749 Bitterfeld
Tel. (0 3493) 7 22 28
Fax (0 3493) 7 21 39

RESEARCHING THE ABSORPTION OF IONS OF HEAVY METALS ON CLINOPTILOLITH MAC

SIMULATION OF PROCEDURES
IN MAN'S DIGESTIVE SYSTEM

1. Introduction

Science has know for a long time that certain ions of heavy metals, **with the help** of Zeolite, can be selectively removed from man's digestive system, which means that Zeolite can be used as a substance for detoxification of heavy metals.

The company ASTRA Ltd. from Schlanstedt has noticed the alleged detoxification of the organism and stabilization of the immune system with several hundred consumers, which consumed a natural food supplement, called Froximun. ASTRA Ltd. has made this material available in written form.

The real absorption capabilities of heavy metals and connecting ammonia for the unburdening of the metabolism could have only been assumed until now. Furthermore, this has remained open to see if the alleged detoxification of the human organism would pull with it important things such as zinc and thus the body would have a deficit of these things after a consuming for a longer period of time.

The goal of the attached studies was to place the *in-vivo* systems to *in vitro* and to punitively investigate the described interactions of heavy metals with Zeolite Clinoptilolith. Chemical solutions close to the stomach acids or the environment of the intestine were chosen as model systems. The observed metal ions were made of the following elements: mercury (Hg^{2+}), lead (Pb^{2+}), zinc (Zn^{2+}), cadmium (Cd^{2+}), iron (Fe^{3+}), and additional ammonia (NH^{+})

The implemented Clinoptilolith, which was subject to a special and registered form of processing, activation and modeling for the patent by the company HTB Ltd. Their basic product is Froximum, a series of food supplements of the company ASTRA Ltd. from Schlanstedt and there it is briefly labeled as MAC

2. Recapitulation of results

Research with pH 1,5 (imitating the stomach environment) shows excellent absorption capabilities of Clinoptilolith for lead (32%) and lead (57%) while cadmium (1%), zinc (1%), and ammonia (1%) had no effect. Lead can record a slight growth of concentration in synthetic stomach acid and this cause must be searched for in excreting lead from Clinoptilolith.

Wolfener Analytik GmbH
Griesheimstraße Geb. 10.28.0
06749 Bitterfeld
Tel. (0 3493) 7 22 28
Fax (0 3493) 7 21 39

With pH 1,5 (the imitated stomach flora) is also able to absorb lead (86%) and lead (45%), while zinc and cadminium do not show any reactions. The absorption of ammonia (36%) is impressive in this environment. Small traces of iron can also be absorbed is small traces.

It is possible that several mechanisms affect the absorption of metals. It seems that other roles take part in the reaction of creating complexes such as conquering reactions to absorption other then the solutional existing salts. In this way the „Inertness" of cadminium could lead to the complex Cd^{2+} ion with NH_3. An exact explanation of these processes would demand further research.

Determining the actions of Clinoptilolith towards HCI did not product a capacity of connection acids that is worth mentioning. Additions studies with final products of Froximun cama, where additional amounts of magnesium and calcium carbonates were added, a capacity of connecting acids 3,1 mol HCL by a g of Froximun cama was able to be determined. This value is plausible and comes from the ratio in $CACO_3$ or $MGCO_3$.The MAC itself, as it was mentioned, is completely indifferent.

It has been shown, as if it has already been noticed and proven by the producer, this specially processed Clinoptilolith possesses enormous capabilities of connection heavy metals and getting them out of the human body. The capabilities of absorption for an important element such as zinc cannot be implemented.

The good absorption capabilities of Clinoptilolith in the gastrointestinal tract can be connected by redundant ammonia and thus unburden the pancreas. For this to be scientifically proved, it is necessary to make an additional, but very interesting study.

Possible detoxification of the body and the unburdening of the organs for metabolism could lead to causality that is before you.

MAC would therefore be a food supplement, which can, while taking in the food, filter unwanted matter and even get it out of the body.

3. Implementing the experiment

3.1. Synthetic stomach acid

Synthetic stomach acid[1], similar to stomach acid, was created as an output solution:

1,16 g pepsin
2,24 g KH_2PO_4
0,69 g $CaCl_2 * 2 H_2O$
0,42 g $MgSO_4 * 7 H_2O$
4,00 g NaCl

it is supplemented with HCl on 1 l, pH value for HCl was set to pH 1,5.

3.2. Synthetic liquid of the twelve-finger length intestine

The same components were used as in 3.1. with an exception of KH_2PO_4 because this, in an alkaloid environment, would lead to an uncontrollable fallout, or Co-precipitation of phosphate or hydroxide of heavy metals.

pH-value is set at pH 8,1 for NaOH.

3.3. Salt solutions of heavy metals and ammonia

The synthetic stomach acid with a ratio of 3.1 and the synthetic solution of the duodenum according to 3.2 have added heavy metals which should be researched or ammonia from standard solutions[2], so the following structure was achieved:

10 mg/l Fe
9 mg/l Zn
0,9 mg/l Pb
0,9 mg/l Cd
0,9 mg/l Hg
20 mg/l NH_4

In 100 ml of synthetic stomach acid or in 100 ml of synthetic solution of the duodenum.

3.4. Absorption of clinoptilolith

After a certain period of time, 100 ml of this solution according to 3.3. is relocated with clinoptilolith without further conditions in 0 g / 0,1 g / 0,2 g / 0,3 g / 0,4 g / 0,5 g. Suspensions last from

[1] Pschyrembel, Clinical dictionary, 259. published, De Gruyter Verlag, S. 1010 ff.
[2] Standard individual elements 1,0 g/l, for example. von Merck

90 minutes mixed in a PTFE bowl. When the mixing is finished, the suspensions are centrifuged, and the remaining clear liquid serves as a measurable solution for certain determinations.

3.5. Determining metals

Determining the concentration of metals was followed by solutions according to 3.4 with the help of ICP-OES (Varian VISTA Pro for Fe, Cd, Zn, Pb, and with the help of cold gases - AAS (MWS DMA 80) with Hg.

3.6. Determining ammonia

Determining ammonia was due to the help of a photometric with 55 nm (filter photometer LP2W)

3.7. Connective capacity of acids

Treated were 0,5 g of clinoptilolith with 100 ml of stomach acids under conditions described in 3.4 and the released acid after separating from clinoptilolith was treated with 0,1 n NaOH. The untreated stomach acid is treated analogically.

Wolfener Analytik GmbH
Griesheimstraße Geb. 10.28.0
06749 Bitterfeld
Tel. (0 3493) 7 22 28
Fax (0 3493) 7 21 39

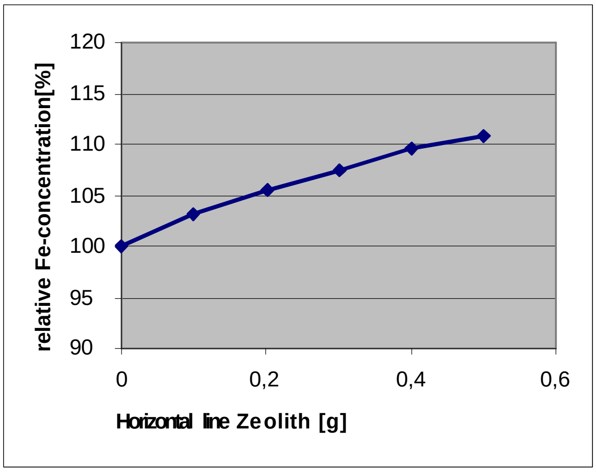
4. The analysis of measured series

4.1. Absorption behavior of Iron

4.1.1. pH 1,5

Table 1. Measured values of Fe with pH 1,5

Horizontal line clinoptilolith [g]	Conc. of Fe in solution [mg/l]	Relative Conc. Fe [%]
0,0	8,38	100
0,1005	8,64	103
0,2013	8,84	105
0,3008	9,00	107
0,4006	9,19	110
0,5006	9,29	111



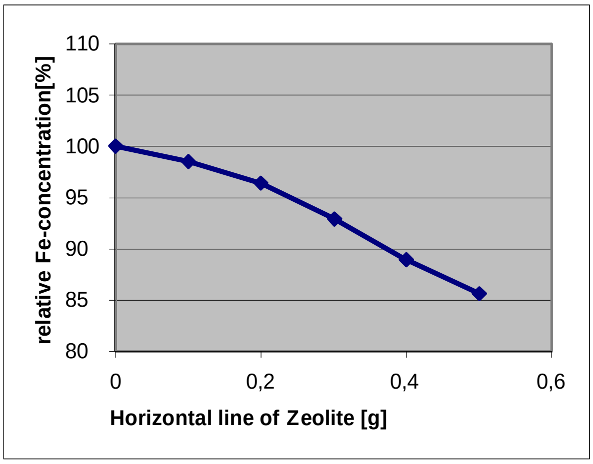
Picture 1. Absorption of iron with pH 1,5

Tests show that with pH 1,5 the iron from clinoptilolith is separated to a measured solution. Adding concentrations of iron depending on the used amount of clinoptilolith is clearly recognizable. With 0,5 g of used clinoptilolith the accretion is 11% concerning the output concentration.

4.1.2. pH 8,1

Table 2. Measured values Fe with pH 8,1

Horizontal line clinoptilolith [g]	Conc. Fe in solution [mg/l]	Relative Conc. Fe [%]
0,0	8,05	100
0,1007	7,93	99
0,2002	7,76	96
0,3013	7,48	93
0,4000	7,16	89
0,5006	6,89	86



Picture 2. Absorption of iron with pH 8,1

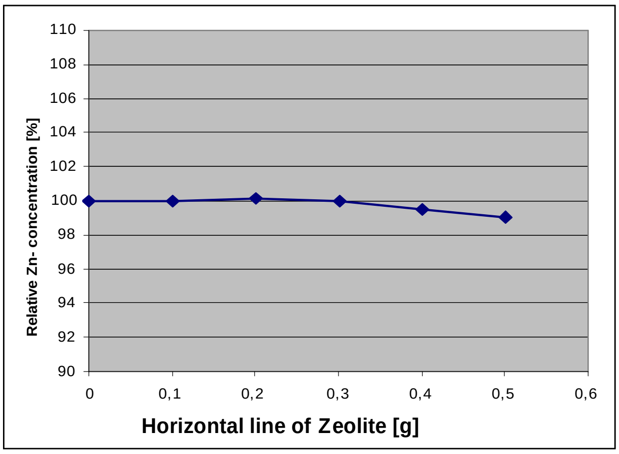
Tests show that with pH 8,1 iron is absorbed from clinoptilolith. The real absorption of Fe^{2+} or Fe^{3+} with pH 8,1 is not possible; more likely is aggregation of hydroxyl complex iron to clinoptilolith. With 0,5 g implemented clinoptilolith deductions amount to 14% of the output

4.2. Absorption behavior of Zinc

4.2.1. pH 1,5

Table 3. Measured values of Zn with pH 1,5

Horizontal line clinoptilolith [g]	Conc. of Zn in solution [mg/l]	Relative Conc. Zn [%]
0,0	8,20	100
0,1005	8,20	100
0,2013	8,21	100
0,3008	8,20	100
0,4006	8,16	100
0,5006	8,12	99



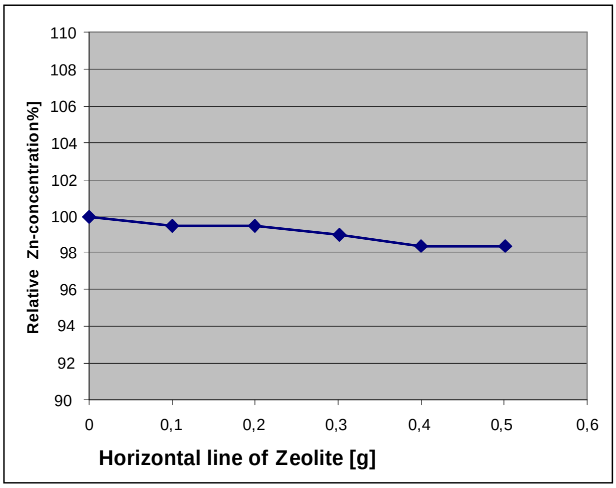
Picture 3. Absorption of Zinc with pH 1,5

Tests show that with pH 1,5 the measured absorption occurs only with greater amounts. With 0,5 g of clinoptilolith about 1% of zinc is absorbed.

4.2.2. pH 8,1

Table 4. Measured values Zn with pH 8,1

Horizontal line clinoptilolith [g]	Conc. of Zn in solution [mg/l]	Relative Conc. Zn [%]
0	8,15	100
0,1007	8,11	100
0,2002	8,11	100
0,3013	8,07	99
0,4000	8,02	98
0,5006	8,02	98



Picture 4. Absorption of zinc with pH 8,1

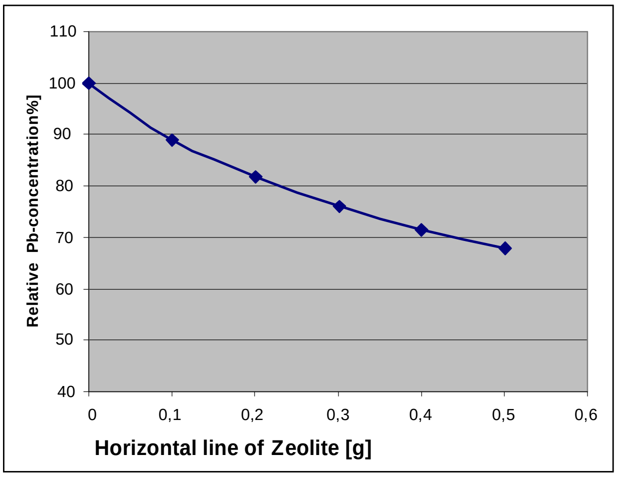
Tests show that with pH 8,1 only a slight absorption of zinc occurs. With 0,5 of used clinoptilolith 1,6 % of the zinc is absorbed. A possible cause could be subsiding with iron.

4.3. Absorption behavior of Lead

4.3.1. pH 1,5

Table 5. Measured values of Pb for pH 1,5

Horizontal line clinoptilolith [g]	Conc. of Pb in solution [mg/l]	Relative Conc. Zn [%]
0,0	0,756	100
0,1005	0,672	89
0,2013	0,618	82
0,3008	0,575	76
0,4006	0,539	71
0,5006	0,512	68



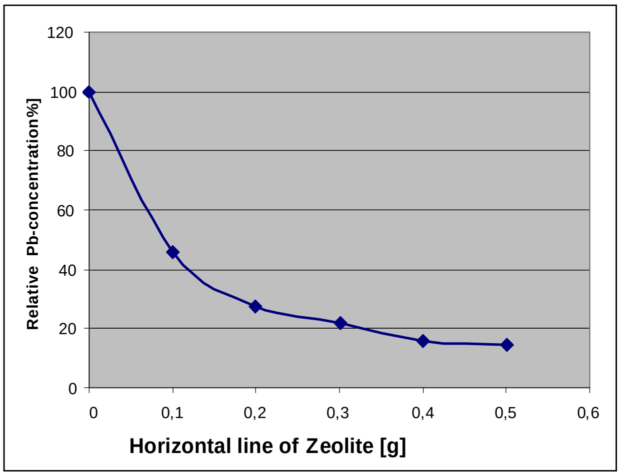
Picture 5. Absorption of lead with pH 1,5

Tests show that with pH 1,5 an expressed absorption to lead is done. With 0,5 of used clinoptilolith 32 % of used lead is absorbed.

4.3.2. pH 8.1

Table 6. Measured values of Pb for pH 8,1

Horizontal line clinoptilolith [g]	Conc. of Pb in solution [mg/l]	Relative Conc. Zn [%]
0	0,754	100
0,1007	0,345	46
0,2002	0,208	28
0,3013	0,164	22
0,4000	0,118	16
0,5006	0,109	14



Picture 4. Absorption of zinc with pH 8,1

Tests show that with pH 8,1 a very strong absorption of lead is done. With 0,5 g of prepared clinoptilolithm 86 % of used lead was done. Other than real absorption, for very good separations, descending of Hydroxide with complexes of iron hydroxide could be responsible.

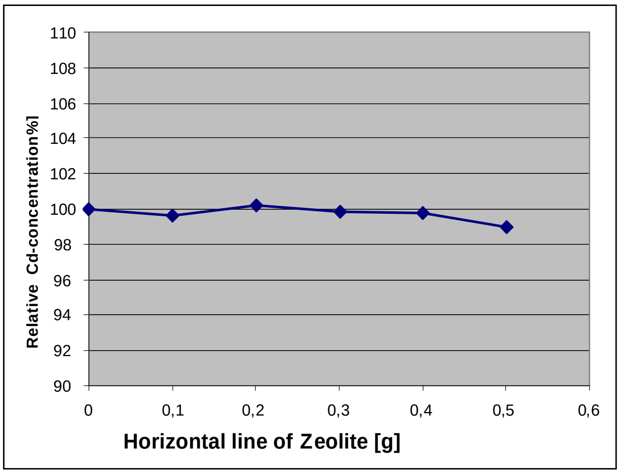
Wolfener Analytik GmbH
Griesheimstraße Geb. 10.28.0
06749 Bitterfeld
Tel. (0 3493) 7 22 28
Fax (0 3493) 7 21 39

4.4. Absorption behavior of cadmium

4.3.1. pH 1,5

Table 7. Measured values Cd for pH 1,5

Horizontal line clinoptilolith [g]	Conc. of Cd in solution [mg/l]	Relative Conc. Cd [%]
0,0	0,800	100
0,1005	0,797	100
0,2013	0,802	100
0,3008	0,799	100
0,4006	0,798	100
0,5006	0,792	99



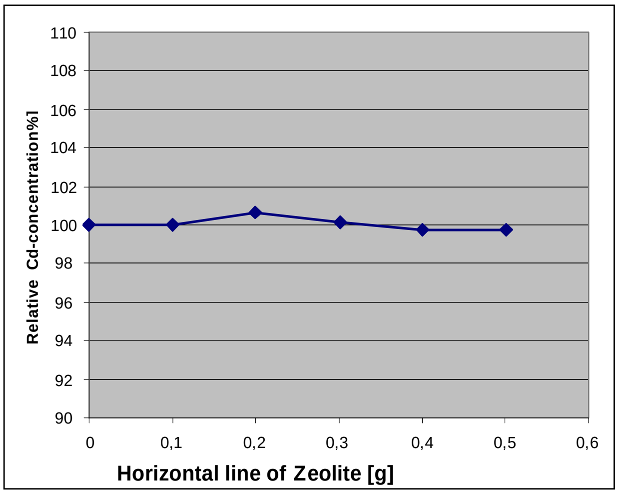
Picture 7. Absorption of cadmium with pH 1,5

Tests show that with pH 1,5 practically no absorption of cadmium occurs. With 0,5 g of implemented clinoptilolith only 1% of the implemented cadmium is released. It is possible that cadmium is connected in another way and therefore its affinity towards clinoptilolith is significantly decreased.

4.3.2. pH 8,1

Table 8. Measured values Cd for pH 8,1

Horizontal line clinoptilolith [g]	Conc. of Cd in solution [mg/l]	Relative Conc. Cd [%]
0	0,797	100
0,1007	0,797	100
0,2002	0,802	101
0,3013	0,798	100
0,4000	0,795	100
0,5006	0,795	100



Picture 8 Absorption of cadmium with pH 8,1**.**

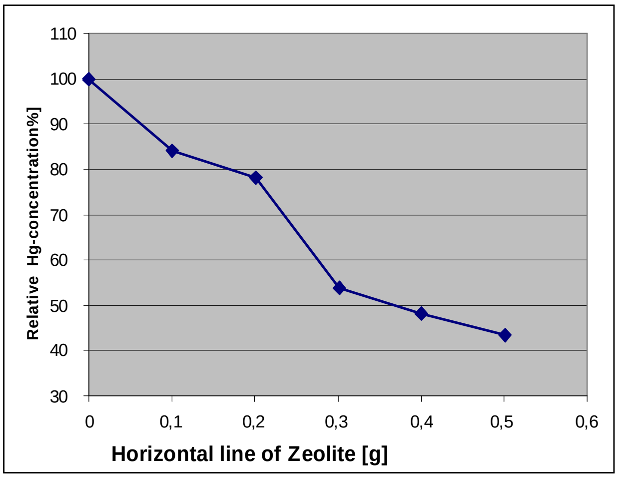
Tests show that with pH 8,1 there is practically no absorption of cadmium. With 0,5 g of implemented clinoptilolith only 0,25% of the implemented cadmium is released. This value is within the error limit of this.

4.4. Absorption behavior of Mercury

4.4.1. pH 1,5

Table 9. Measured values Hg for pH 1,5

Horizontal line clinoptilolith [g]	Conc. of Hg in solution [mg/l]	Relative Conc. Hg [%]
0,0	0,100	100
0,1005	0,084	84
0,2013	0,078	78
0,3008	0,054	54
0,4006	0,048	48
0,5006	0,043	43



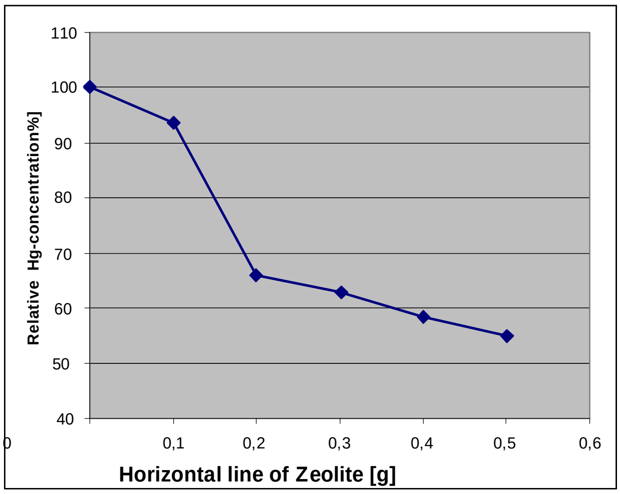
Picture 9. Absorption of Mercury with pH 1,5

Tests show a good absorption of Mercury with pH 1,5. With 0.5 g of implemented clinoptilolith 57% of Mercury is released.

4.4.2. pH 8,1

Table 10. Measured values Hg for pH 8,1

Horizontal line clinoptilolith [g]	Conc. of Hg in solution [mg/l]	Relative Conc. Hg [%]
0,0	0,100	100
0,1007	0,093	94
0,2002	0,066	66
0,3013	0,063	63
0,4000	0,058	59
0,5006	0,055	55



Picture 10. Absorption of Mercury with pH 8,1

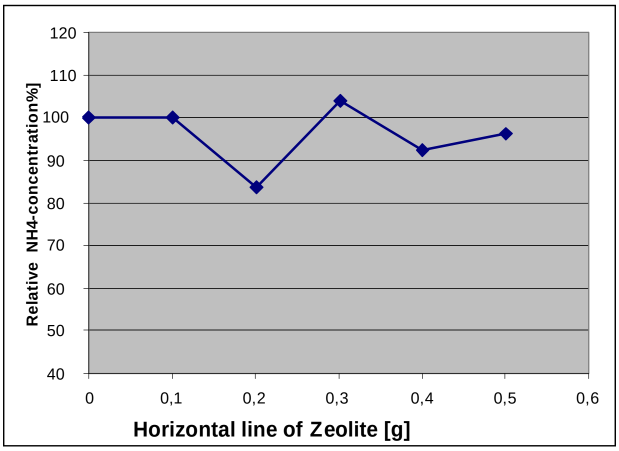
Tests showed that with pH 8,1 parallel to pH 1,5 the absorption of Mercury deteriorated. With 0,5 g of used clinoptilolith 45% of Mercury is released.

4.5. Absorption behavior of ammonia

4.5.1. pH 1.5

Table 11. Measured values NH_4 for pH 1,5

Klinoptilolith [g]	Conc. of NH_4 in solution [mg/l]	Relative conc. NH_4 [%]
0,0	18,3	100
0,1005	18,3	100
0,2013	15,3	84
0,3008	19,0	104
0,4006	16,9	92
0,5006	17,6	96



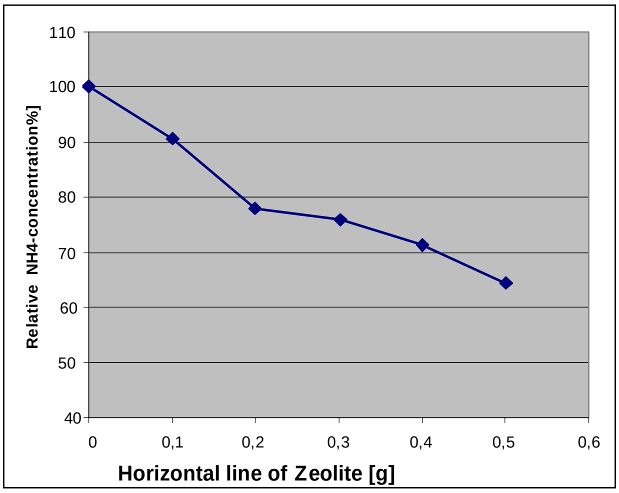
Picture 11. Absorption of ammonia with pH 1,5

Tests with pH 1,5 show an absorption which does not depend on the amount of implemented clinoptilolith.

4.5.2. pH 8.1

Table 12. Measured values NH_4 for pH 8,1

Klinoptilolith [g]	Conc. of NH_4 in solution [mg/l]	Relative conc. NH_4 [%]
0,0	19,1	100
0,1007	17,3	91
0,2002	14,9	78
0,3013	14,5	76
0,4000	13,6	71
0,5006	12,3	64



***Picture* 12.** Absorption of ammonia with pH 8,1

Tests with pH 8,1 show a significant absorption of ammonia. With 0.5 g of implemented clinoptilolith, 36% of ammonia is released. The cause of this could be that ammonia with pH 8,1 is mostly present as an ammoniac NH_3, and as such is beset by clinoptilolith.

Wolfener Analytik GmbH
Griesheimstraße Geb. 10.28.0
06749 Bitterfeld
Tel. (0 3493) 7 22 28
Fax (0 3493) 7 21 39

4.5. Absorption behavior of hydrochloric acid

For determining connective capacities of acids, a solution of artificial stomach acids was mixed with 0,5 g of clinoptilolith and treated released acids after separating clinoptilolith with 0,1n NaOH. The untreated stomach acid was analyzed for comparison.

Untreated stomach acids:	57,1 mol HCl
Stomach acids treated with 0,5 g of clinoptilolith:	55,9 mol HCl

For the verification of this result, clean hydrochloric acid was tested analogically.

Untreated HCl:	93,7 mol HCl
HCl treated with 0,5 g clinoptilolith:	91,8 mol HCl

These results allow the closure the clinoptilolith does not show note worthy connective material for acids.

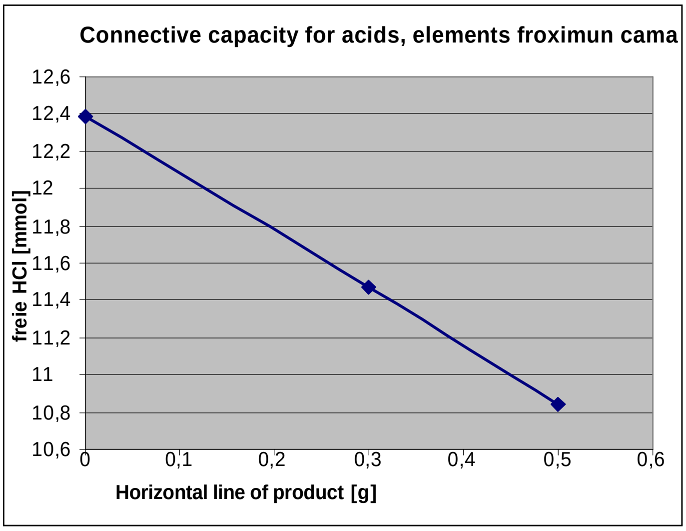
4.6. Absorption behavior of hydrochloric acid through the almost finished product Froximum cama.

Two tests were done with various implementations of clinoptilolith (0,3 g, 0,5 g) as well as an overview of the untreated stomach acid.

Table 13. Measuring values of connective material for acids

Horizontal line Clinoptilolith [g]	Concentration HCl [mmol]
0,0	12,39
0,30	11,47
0,50	10,84

Connective capacity for acids is directly proportional with the horizontal line from froximum cama and amounts to 3,1 mmol HCl per g.
This value comes from the ratio in Mg- and Ca carbonates.



Picture 13. Connective capacity for acids from froximun cama

Bitterfeld, 15.12.2004.

....

Dr. Martin