

## 5.4 Burnt lime serving as a fertilizer

Experiment by: Phywe

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interTESS (Version 13.06 B200, Export 2000)

### Task

## Task

### What are fertilizers produced from? (2)

Find out why there is often burnt lime added to ammonia fertilizers.



Use the space below for your own notes.

Logged in as a teacher you will find a button below for additional information.

## Additional information

### Learning objectives

- Heavy soils are not only treated with ammonia fertilizers but in addition to that with burnt lime.
- Burnt lime loosens and neutralises such soils and has an accelerating effect on the decomposition of the ammonia fertilizers.

### Notes on set-up and procedure

#### Preparations

Use the ammonium sulphate produced in the course of the preceding experiment.

#### Remarks on the students' experiments

Make sure that only very few drops of water are added to the mixture of ammonium sulphate and burnt lime. The experiment should be carried out under the fume hood in order to keep the nasal nuisance on a minimum level. In each case, the time required for the experiment should be as short as possible.



### Hazard and Precautionary statements

Burnt lime:

- |                     |  |
|---------------------|--|
| H318:               | Causes serious eye damage.   |
| P260:               | Do not breathe dust.   |
| P280:               | Wear protective gloves and eye/face protection.  |
| P305 + P351 + P338: | IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. |

### Hazards

- Burnt lime is highly corrosive. Avoid skin contact!
- Wear protective glasses!
- During the experiment, evil smelling substances are formed which are hazardous to health. Do not inhale the gases!

### Notes

This experiment only shows one effect of burnt lime added to ammonia fertilizers. The release of the actually toxic ammonia in the soil has an accelerating effect on the

action of the industrial fertilizer and thus promotes the plant growth which is due to the rapid conversion of ammonia into nitrate caused by bacteria included in the soil.

### Remarks on the method

The interpretation which results directly from this experiment can be extended to the additional effects of the addition of lime by means of Question 3. The fertilizing effect of the lime itself should be worked out.

### Waste disposal

- Put the content of the evaporating dish into the collecting tank for acids and alkalis.

## Material

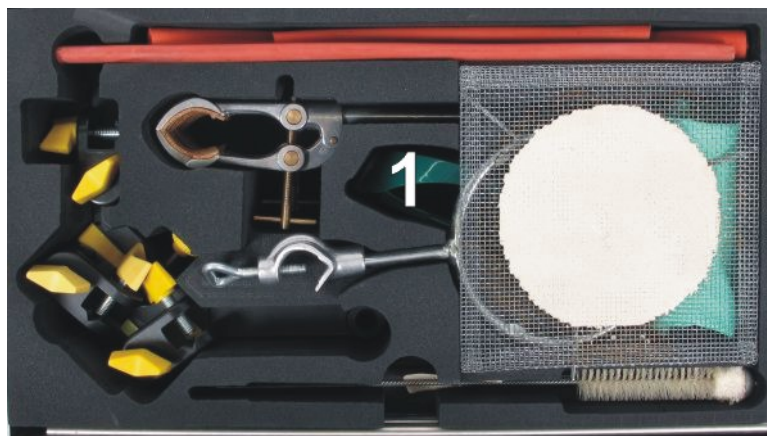
Material from "TESS Chemistry Set Inorganic Chemistry" (Order No. 13301-88)

Position No.	Material	Order No.	Quantity
1	Protective glasses, clear glass	39316-00	1
2	Spatulas, double bladed, $l = 150$ mm, bent	47560-00	1
3	Litmus paper, red, 1 roll	30678-02	1
4	Porcelain dish 75 ml, $d = 80$ mm	32516-00	1
5	Pipette with rubber bulb	64701-00	1
6	Glass rod, boro 3.3, $l = 200$ mm, $d = 5$ mm	40485-03	1

## Chemicals, additional material

Position No.	Material	Order No.	Quantity
	Ammonium sulphate, 250 g	30027-25	
	Calcium oxide, powder, 500 g	30055-50	
	Litmus paper, red, 1 roll	30678-02	
	Water		

## Material required for the experiment





## Set-up

### Hazards

- Burnt lime is highly corrosive. Avoid any skin contact!
- Wear protective glasses!
- During the experiment, evil smelling substances are formed which are hazardous to health. Do not inhale the gases!



## Action

### Procedure

Put three spatula-tipfuls of ammonium sulphate into the evaporating dish. Add one spatulaful of burnt lime and mix both substances thoroughly with the aid of the glass rod.



Fig. 1

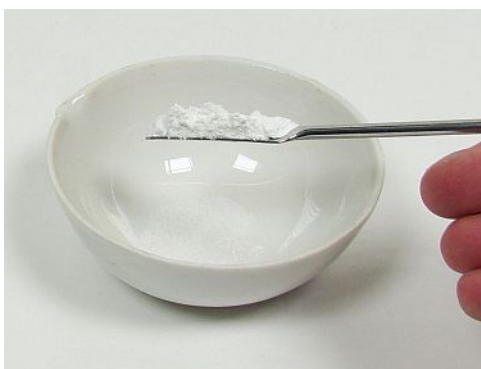


Fig. 2



Fig. 3

Use the pipette to add some drops of water (Fig. 4) and mix everything with the aid of the glass rod (Fig. 5). Hold a piece of humidified lackmus paper over the mixture (Fig. 6) and carefully carry out a smelling test (Fig. 7).



Fig. 4



Fig. 5



Fig. 6



Fig. 7

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### Waste disposal

- Put the content of the evaporating dish into the collecting tank for acids and alkalis.



## Evaluation

### Question 1:

Note your observations.

When water is added to the mixture of burnt lime and ammonium sulphate, a gas smelling like a horse stable is released which causes the red litmus paper to turn blue.

## Questions and exercises

### Question 1:

Draw the conclusions from your observations.

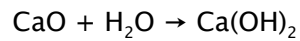
Since the litmus paper turns blue, an alkali must have been formed. This alkali is in fact ammonia which is indicated by the specific smell. It combines with water to form ammonium hydroxide.

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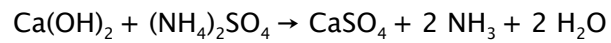
### Question 2:

Describe the process that has taken place in the form of the corresponding reaction equation.

Calcium oxide (burnt lime) reacts with water and forms calcium hydroxide:



Calcium hydroxide as the stronger alkali releases ammonia from the ammonium sulphate:



### Question 3:

Why is burnt lime especially added in the case of heavy soil, i.e. soil which is in general humid and acidic?

Heavy and acidic soils are loosened and neutralised by the burnt lime that is added. Ammonia is released from the ammonium fertilizers which means that the conversion of these fertilizers in the soil is accelerated.