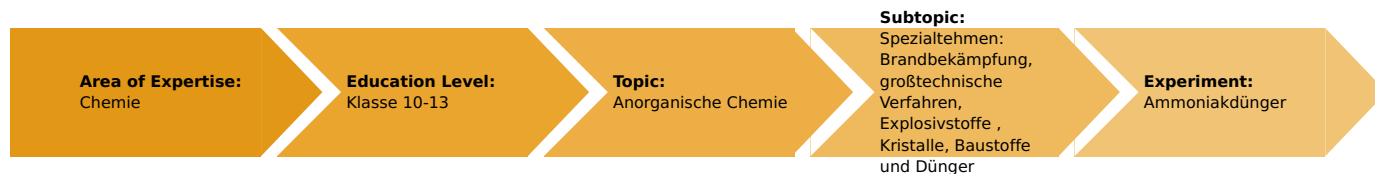


# Ammonia fertilizer (Item No.: P7156200)

## Curricular Relevance



### Difficulty



Easy

### Preparation Time



10 Minutes

### Execution Time



10 Minutes

### Recommended Group Size



2 Students

### Additional Requirements:

### Experiment Variations:

### Keywords:

ammonia, fertilizer

## Task and equipment

## Information for teachers

## Learning objectives

- A main constituent of fertilizers is nitrogen.
- Nitrogen is supplied to the soil for instance in the form of ammonia salts.

## Notes on set-up and procedure

### Preparations

Prepare a 10% sulphuric acid solution (6.3 ml of concentrated.  $\text{H}_2\text{SO}_4$  100 ml of water) and a 4% ammonia solution (22 ml of the 25% ammonia solution and 100 ml of water).

### Remarks on the students' experiments

Make sure not to add too much of the ammonia solution since otherwise the nasal nuisance during evaporation would be too hard. The evaporation can be stopped when the first salt crystals appear.



## Hazard and Precautionary statements

Sulphuric acid:

H314:	Causes severe skin burns and eye damage.
H290:	May be corrosive to metals.
P280:	Wear protective gloves/protective clothing/eye protection/face protection.
P301 + P330 + P331:	IF SWALLOWED: rinse mouth. Do NOT induce vomiting.
P309:	IF exposed or if you feel unwell:
P310:	Immediately call a POISON CENTER or doctor/physician
P305 + P351 + P338:	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

**Ammonia:**

H314:	Causes severe skin burns and eye damage.
H335:	May cause respiratory irritation.
H400:	Very toxic to aquatic life.
P280:	Wear protective gloves/protective clothing/eye protection/face protection.
P273:	Avoid release to the environment.
P301 + P330 + P331:	IF SWALLOWED: rinse mouth. Do NOT induce vomiting.
P305 + P351 + P338:	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P309:	IF exposed or if you feel unwell:
P310:	Immediately call a POISON CENTER or doctor/physician.

**Hazards**

- Sulphuric acid is highly corrosive. Splashes on skin and clothes must be washed out immediately with a lot of water! Wear protective glasses!
- Ammonia solution has an irritating effect. Do not inhale it! Keep the laboratory well aerated!

**Notes**

Ammonia fertilizers are available on the market in many different forms. The main constituents are ammonium sulphate (obtained from gypsum), ammonium carbonate (passing in of CO<sub>2</sub> in ammonia) and ammonium phosphate.

**Remarks on the method**

Discuss the necessity of fertilizers and the problems caused by the production of fertilizers as well as the problem of overfertilization. Draw the students' attention to the universal physiological importance of nitrogen.

**Waste disposal**

- Keep the ammonium sulphate for the next experiment.

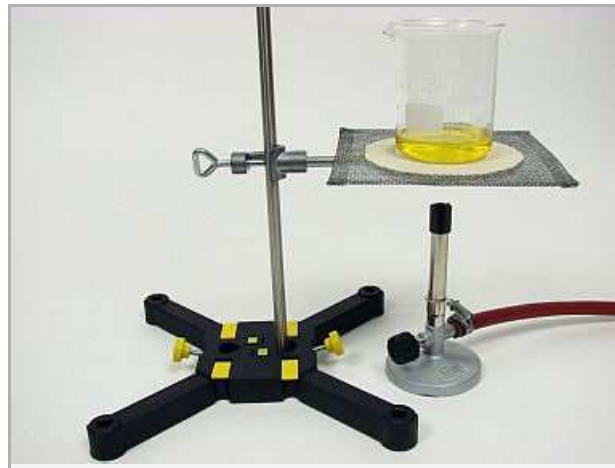
# Ammonia fertilizer (Item No.: P7156200)

## Task and equipment

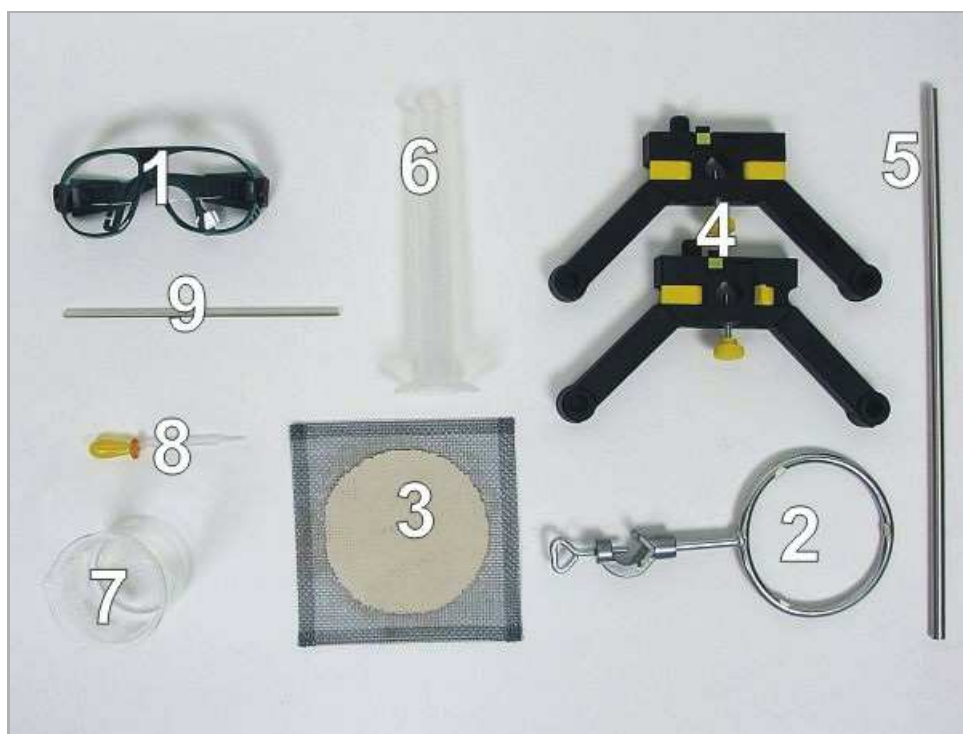
### Task

#### What are fertilizers produced from? (1)

Produce an ammonia fertilizer.



## Equipment



Position No.	Material	Order No.	Quantity
1	Protecting glasses, clear glass	39316-00	1
2	Ring with boss head, i. d. = 10 cm	37701-01	1
3	Wire gauze with ceramic, 160 x 160 mm	33287-01	1
4	Support base, variable	02001-00	1
5	Support rod, stainless steel, l=370 mm, d=10 mm	02059-00	1
6	Grad.cylinder,high,PP,50ml	46287-01	1
7	Glass beaker DURAN®, short, 250 ml	36013-00	1
8	Pipette with rubber bulb	64701-00	1
9	Glass rod,boro 3.3,l=200mm, d=5mm	40485-03	1
	Butane burner f.cartridge 270+470	47536-00	1
	Butane cartridge CV 300 Plus, 240 g	47538-01	1
	Sulphuric acid, 95-98% 500 ml	30219-50	
	Ammonia solution, 25% 1000 ml	30933-70	
	Methyl orange soln., 0.1% 250 ml	31573-25	
	Boiling beads, 200 g	36937-20	

## Set-up and procedure

### Set-up

### Hazards

- Sulphuric acid is highly corrosive. Splashes on skin and clothes must be washed out immediately with a lot of water! Wear protective glasses!
- Ammonia solution has an irritating effect. Do not inhale it! Keep the laboratory well aerated!



### Set-up

Set-up the support system according Fig. 1 + Fig. 2 with the support ring (Fig. 3) and the wire gauze square (Fig. 4).

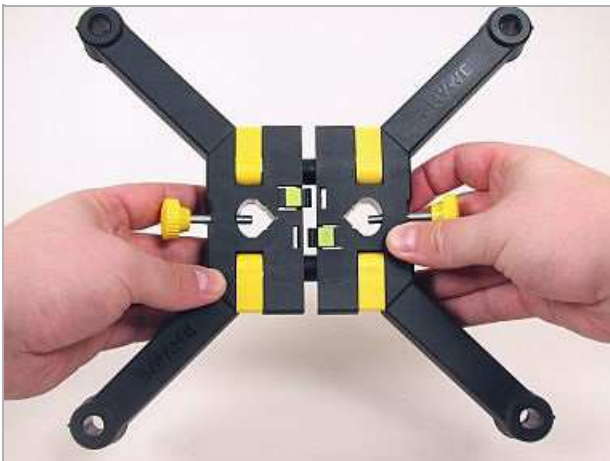


Fig. 1

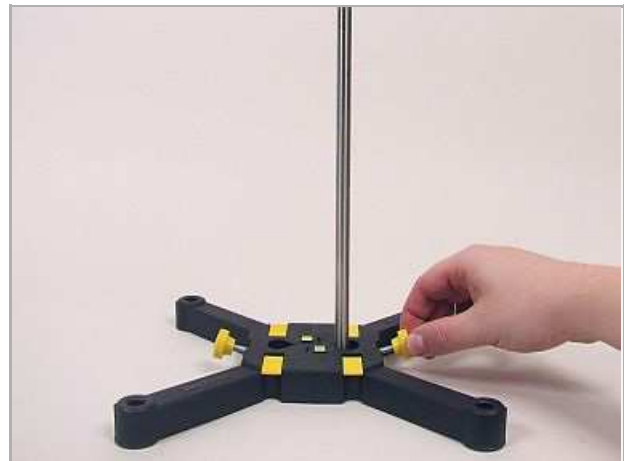


Fig. 2



Fig. 3

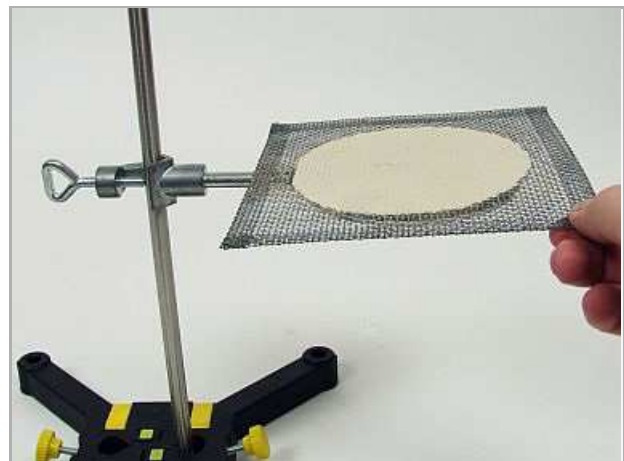


Fig. 4

Place the burner under the support ring (Fig. 5) which must be slid upwards or downwards so that the burner can heat the wire gauze square.

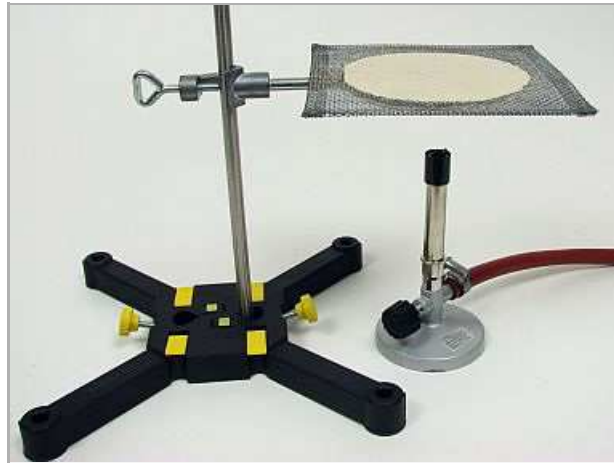


Fig. 5

## Procedure

## Procedure

Fill 20 ml of sulphuric acid into the glass beaker (Fig. 6). Start stirring and add about 5 drops of methyl orange solution (Fig. 7) so that the acid is now slightly coloured (Fig. 8).



Fig. 6

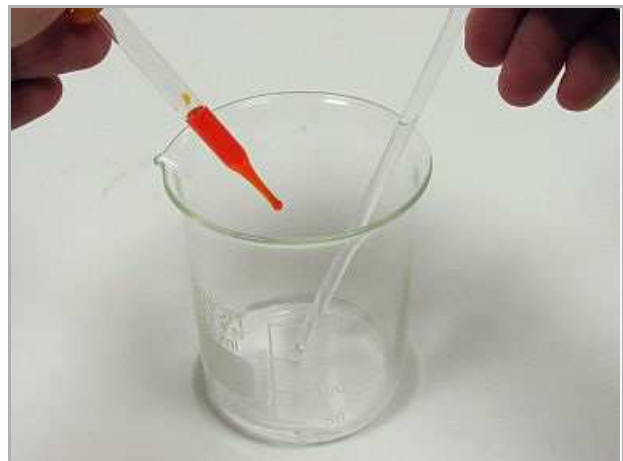


Fig. 7



Fig. 8

Continue stirring and add small portions of ammonia solution (Fig. 9) until the indicator changes permanently.



Fig. 9

Place the beaker onto the wire gauze square and ignite the burner. Add three boiling stones to the solution and boil it down to 1/5 of the initial volume (Fig. 10). Allow the solution to cool down.

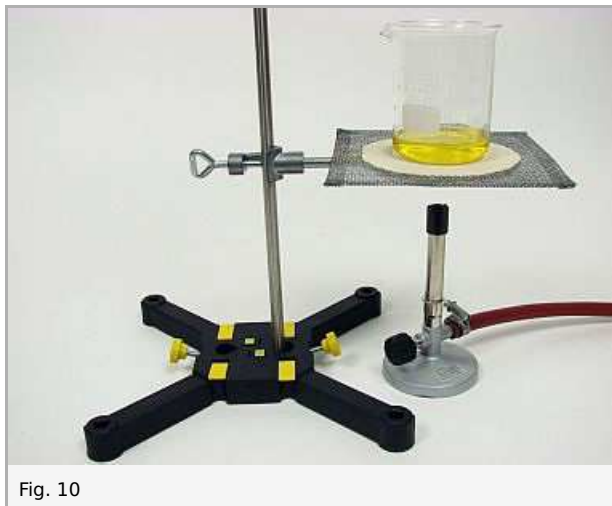


Fig. 10

## Waste disposal

- Keep the crystallised salt and the solution for the next experiment ("burnt lime").

## Report: Ammonia fertilizer

### Result - Observations

Note your observations.

.....

.....

.....

.....

### Evaluation - Question 1

Draw the conclusions from your observations.

.....

.....

.....

.....



### Evaluation - Question 2

What is the process that has been taken place referred to? State a reaction equation for this process.

.....

.....

.....

.....

### Evaluation - Question 3

In what other form could nitrogen be used as a fertilizer? Why is nitrogen so important?

.....

.....

.....

.....