



Beschreibende Grafik  
- oder Bildunter-  
schrift.

**Yeast cells  
are able to  
produce  
energy with  
and without  
oxygen!**

## Germany: Energy and Metabolism – Fermentation - easy experiment with yeast cells.

In this laboratory exploration, you know what makes the bread dough go.

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### Materials and tools

- Baker's yeast
- a spoon of sugar
- Water
- Erlenmeyer-flask
- thermometer,
- beaker,
- Heater
- fermentation glass tube
- calcium hydroxide solution,



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### The process of the experiment

#### Step 1

We put a spoonful of sugar into the Erlenmeyer-flask.

#### Step 2

Then 10 g of dry yeast is suspended in 200 ml of warm water (35-40°C) and mixed thoroughly.

#### Step 3

After this we add the suspension into the Erlenmeyer-flask and dissolve the sugar.

#### Step 4

We fill the fermentation glass tube with calcium hydroxide so-

lution (lime water) and close the Erlenmeyer-flask with the glass tube.

#### Step 5

Check the reaction every 10 minutes.

## Observation

After about 20 minutes, the base begins to ferment. Gas bubbles are rising. After approximately 40 minutes, a white precipitation settles at the edge of the fermentation tube. After about two hours, the fermentation stops. There are no more gas bubbles

to be observed. The liquid in the flask smells of alcohol.



## Explanation and Conclusion

The gas reacted with calcium hydroxide. This resulted in the white lime. Thus, the gas is carbon dioxide. If the yeasts do not have oxygen for their energy metabolism, they ferment sugar into ethanol and carbon dioxide. The yeast dies when

a lot of alcohol is produced. That's the end of the fermentation.

***Eat bread —  
it will give  
energy to  
you!***

## Context

Already 6,000 years ago, people used the yeast to make bread.

In addition to the alcoholic fermentation by yeast, also the lactic fermentation by bacteria used for bread baking. For example, with the typical German „Sauerteigbrot“.

