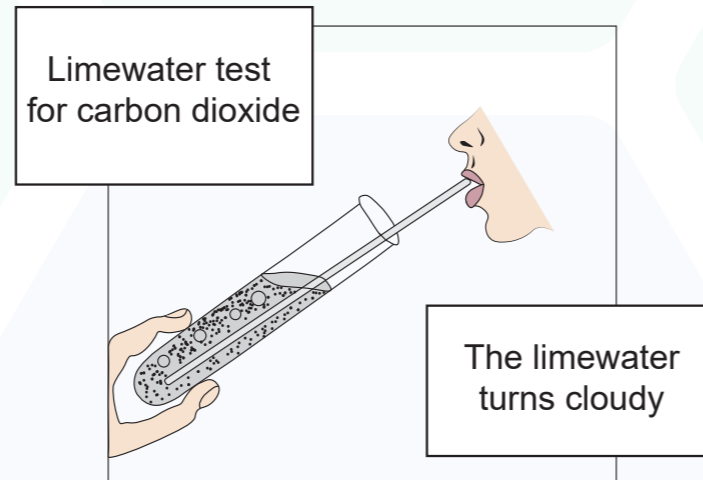


## The air we breathe

The air we breathe contains particles and bacteria that are potentially dangerous if they get into the delicate alveoli of the lungs.

The air we breathe in (inspired air) and out (expired air) contain different proportions of gases because we **use up oxygen** and **produce carbon dioxide and water**.

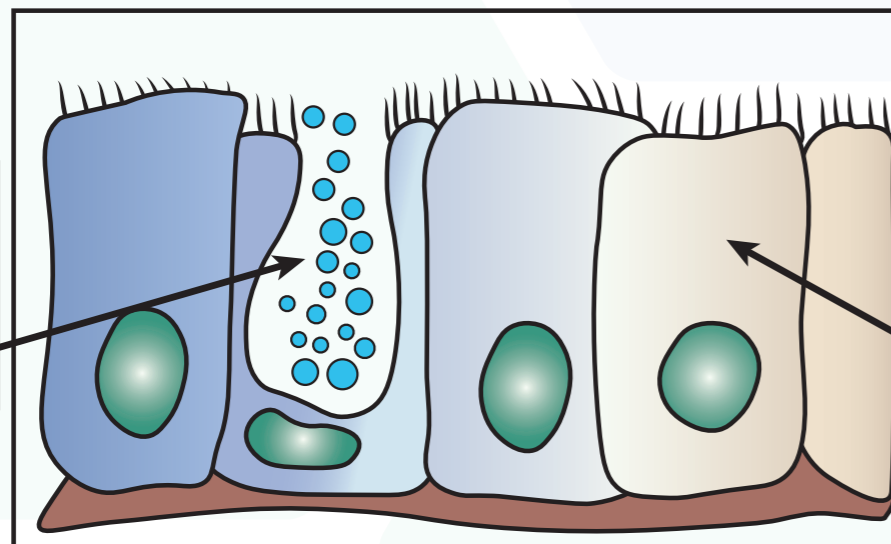
Proportion of gases in air (%)		
Gas	Inspired air	Expired air
Oxygen	21	16
Carbon dioxide	0.04	4
Water	Variable	Saturated
Nitrogen	78	78



We can test expired air for carbon dioxide using limewater:

## Keeping the lungs clean

Cilia beat and move mucus up trachea to be swallowed.



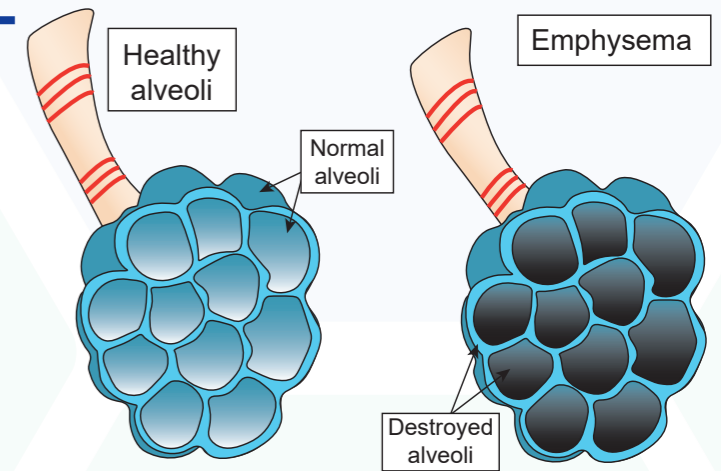
Goblet cells produce mucus which traps particles and bacteria.

Ciliated epithelial cells line airways.

As well as other things smoking paralyses the cilia and the smoke contains particles that clog mucus.

## Smoking

Chemical in cigarette smoke	Effect on the body
Tar	Contains carcinogens that cause lung cancer
Nicotine	Addictive



Smoking destroys lung tissue leading to:

## Emphysema

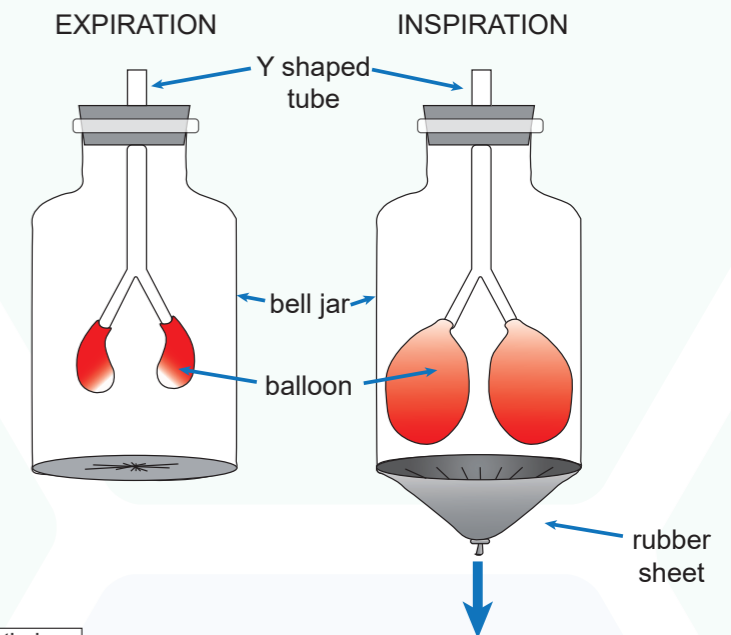
This disease is caused by the alveolar walls breaking down, reducing the surface area for gas exchange. A patient would struggle to get enough oxygen for normal activities.

## Modelling the respiratory system

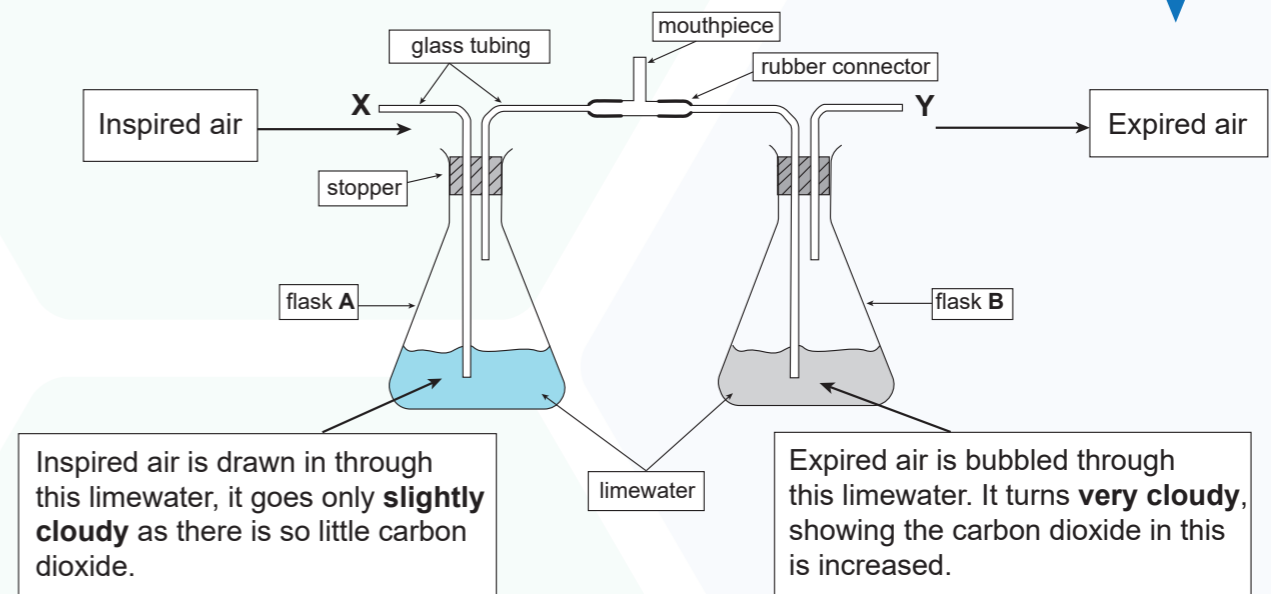
### 1. The bell jar model

limitations:

- Balloons for lungs but do not fill the jar
- Bell jar for ribs but does not move as ribs do
- Rubber sheet pulls down further than flat.



### 2. Huff and puff apparatus



Inspired air is drawn in through this limewater, it goes only **slightly cloudy** as there is so little carbon dioxide.

Expired air is bubbled through this limewater. It turns **very cloudy**, showing the carbon dioxide in this is increased.