

# **Coal and Petroleum**

- **Fuels**
- **Calorific value of fuels**

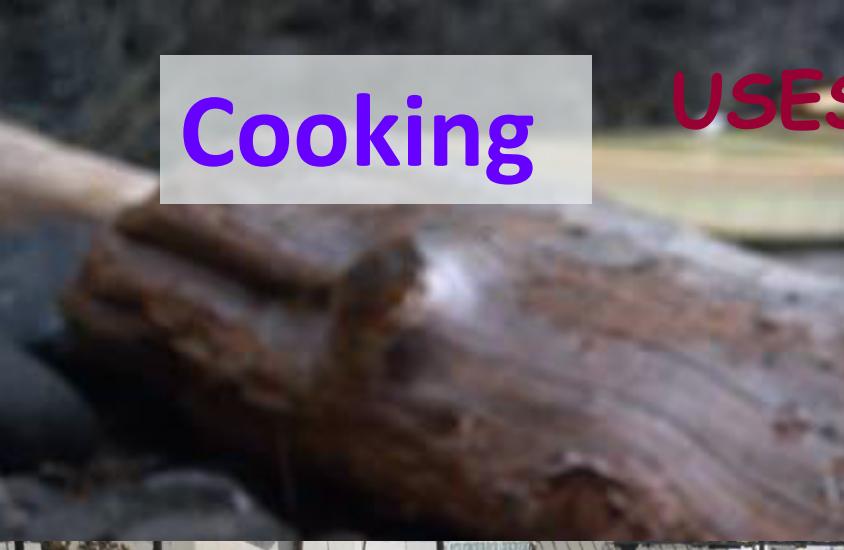


# FUELS

# FUELS

**Substances that produce  
heat**   
**and**  
**light energy**   
**on burning are called fuels.**





Cooking

# USES OF FUELS



Industry



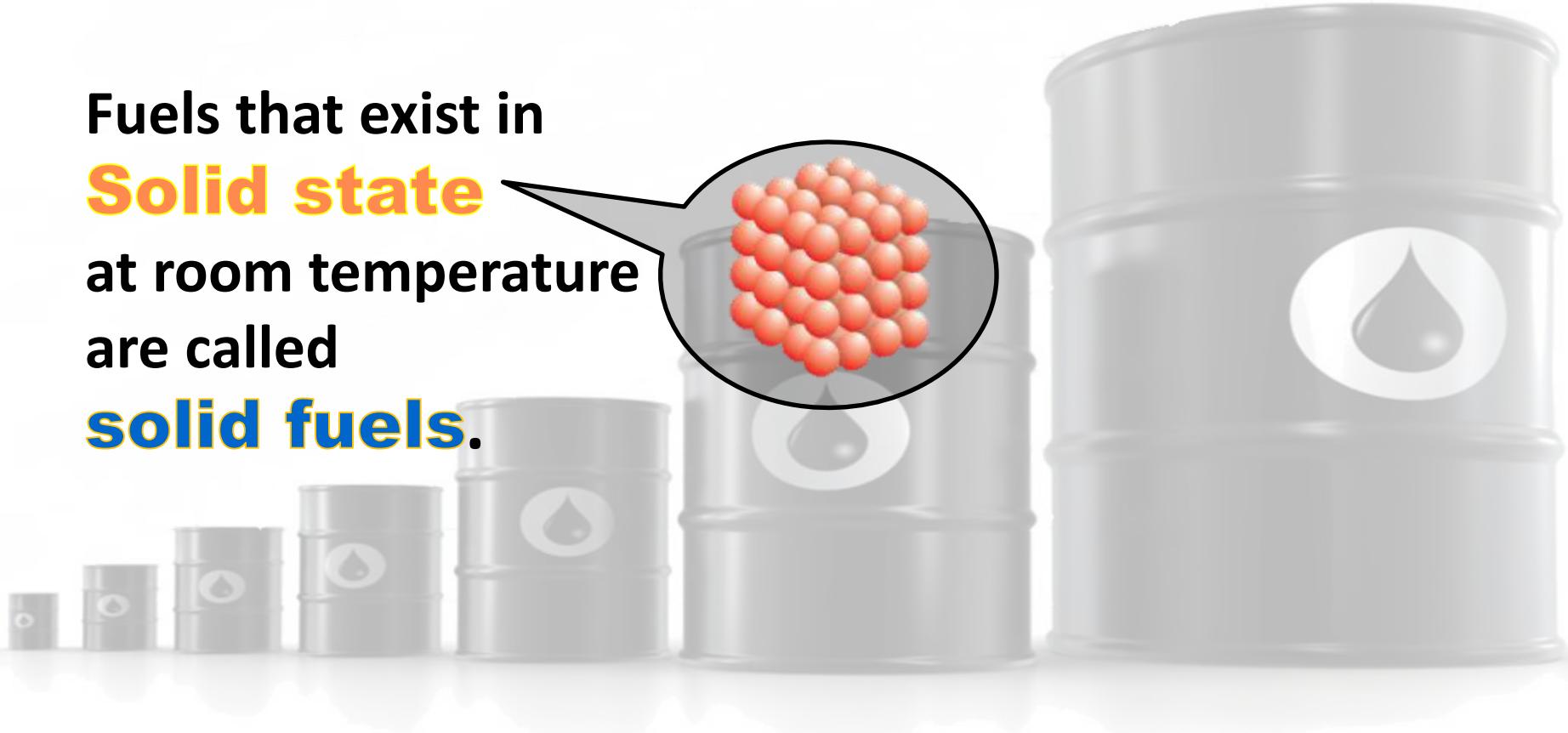
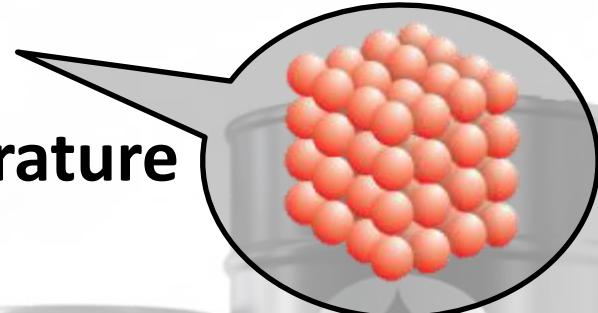
Automobiles



Heating

# SOLID FUELS

Fuels that exist in  
**Solid state**  
at room temperature  
are called  
**solid fuels.**





Wood is used for cooking.



**Coal was used for running steam engines**

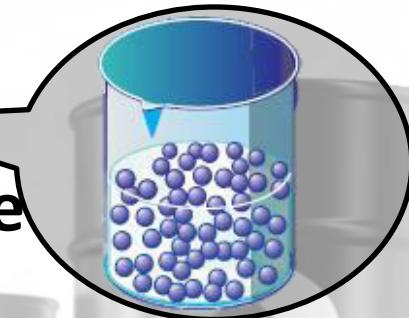




**Coke is used as a fuel in industry.**

# LIQUID FUELS

Fuels that exist in  
**liquid state**  
at room temperature  
are called  
**liquid fuels.**





**Kerosene is used in lantern.**



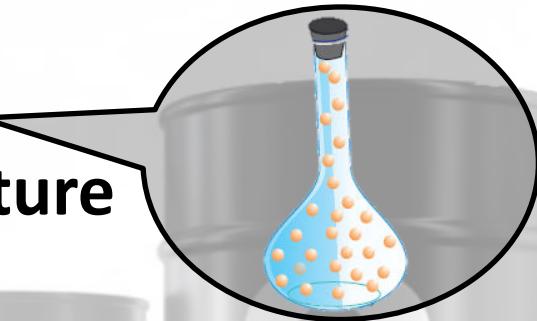


Petrol is used as fuels in  
automobiles



# GASEOUS FUELS

Fuels that exist in  
**gaseous state**  
at room temperature  
are called  
**gaseous fuels.**





**CNG is used as fuels in autorikshaws.**



# CALORIFIC VALUE OF FUEL

Suppose

Which produces more  
heat??

Definitely  
not!!!

1 kg of coal



are burnt

It depends on the calorific value  
of the fuel to produce the same  
amount of heat, because  
they are of same  
quantity??



1 kg of cow dung

# CALORIFIC VALUE OF FUEL



Calorific value of a fuel  
is defined as the amount of  
**heat produced**  
in kilojoules when

**One gram**

**Of a fuel**

**Is Completely  
burned.**

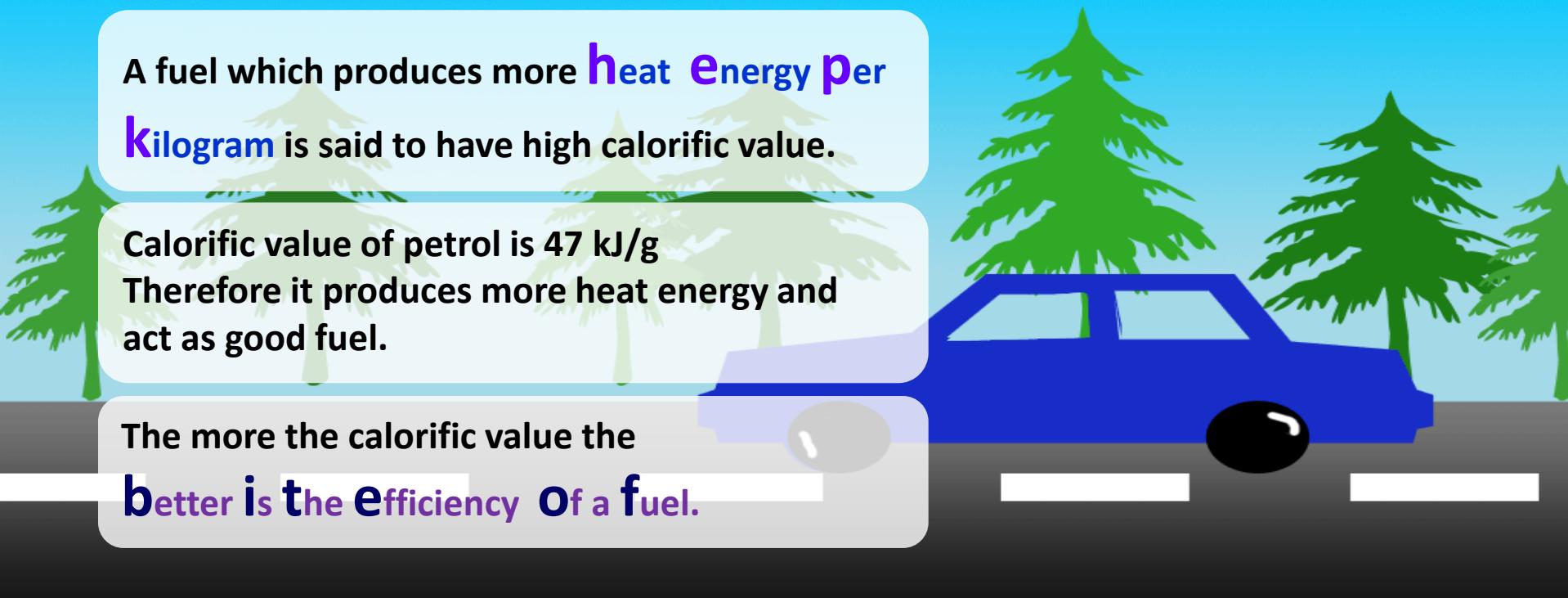


# CALORIFIC VALUE OF FUEL

A fuel which produces more heat energy per Kilogram is said to have high calorific value.

Calorific value of petrol is 47 kJ/g  
Therefore it produces more heat energy and act as good fuel.

The more the calorific value the better is the efficiency of a fuel.



# CALORIFIC VALUE OF FUEL

Fuel

Common Fuels



Calorific value

(kJ/g)

32500

- 
- # Questions
1. Define fuel.
  2. Give 2 examples of liquid fuel.
  3. What is the unit of the calorific value of a fuel?

# **Coal and Petroleum**

- **Characteristics of good fuel**
- **Advantages of gaseous fuel**
- **Fossil fuels**

# CHARACTERISTICS OF GOOD FUEL

For Example :

1

It should have a high calorific value.

**Hydrogen** is considered  **THE BEST** fuel as it has the highest calorific value.

# CHARACTERISTICS OF GOOD FUEL

For Example :

**It is used as a  
fuel in rocket.**



# CHARACTERISTICS OF GOOD FUEL

2

Its ignition temperature should be **low** but well above the room temperature.

If the ignition temperature is **too low**, the fuel will catch fire very easily (which could be dangerous)

If ignition temperature is **very high**, the fuel has to be heated for a long time before it can catch fire.

# **CHARACTERISTICS OF GOOD FUEL**

**For Example :**

**Fuels like petrol, LPG have  
low ignition temperature  
and easily catch fire.**

# CHARACTERISTICS OF GOOD FUEL

3

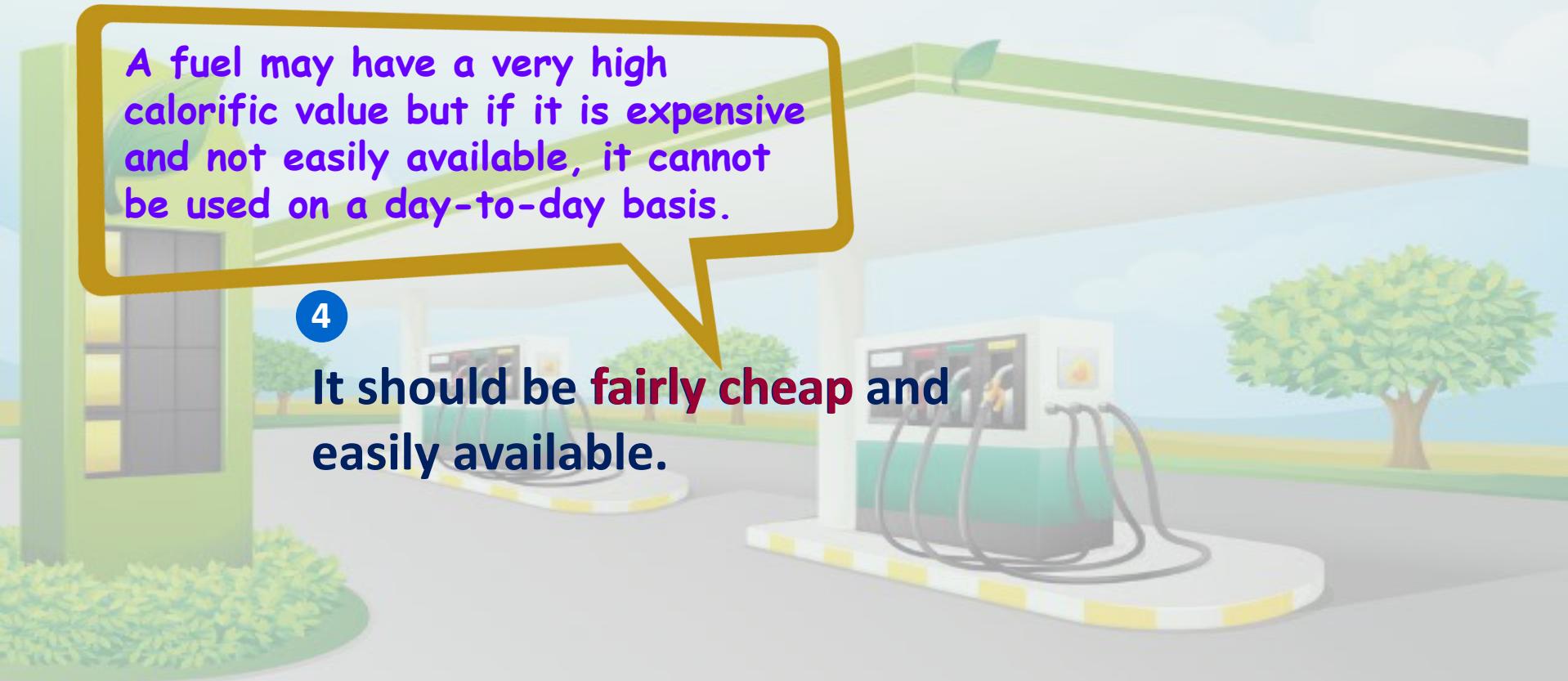
**It should have a moderate rate of combustion and should release heat in a controlled manner.**

# CHARACTERISTICS OF GOOD FUEL

A fuel may have a very high calorific value but if it is expensive and not easily available, it cannot be used on a day-to-day basis.

4

It should be **fairly cheap** and easily available.



# CHARACTERISTICS OF GOOD FUEL

5

**It should be safe to handle,  
store, and **transport**.**



# CHARACTERISTICS OF GOOD FUEL

6

**It should not cause pollution  
on burning.**

# CHARACTERISTICS OF GOOD FUEL

7

**It should undergo complete combustion and should be controllable.**

# ADVANTAGES OF GASEOUS FUELS

Analyze the physical state of fuels,  
the gaseous state are the best  
through pipeline, So the transportation  
cost is lower.



- 1 Gaseous fuels release large amount of energy and do not leave behind any ash or solid residue on combustion.

Using gaseous fuel food gets cooked faster.



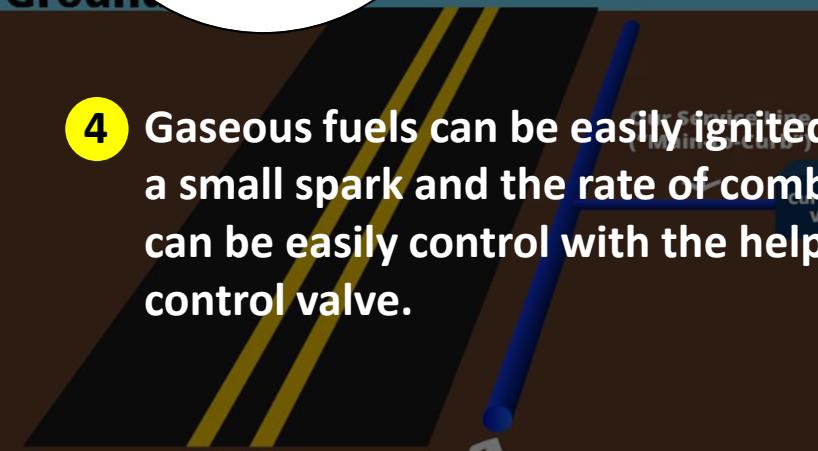
# ADVANTAGES OF GASEOUS FUELS



3 Gaseous fuels produce least amount of harmful gases as compared to solid and liquid fuels.

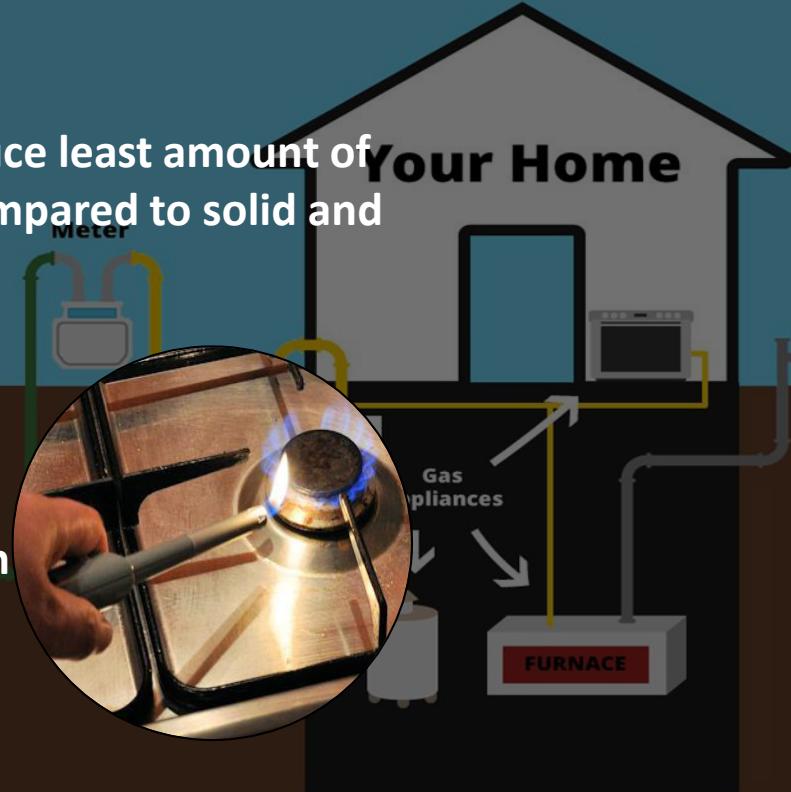
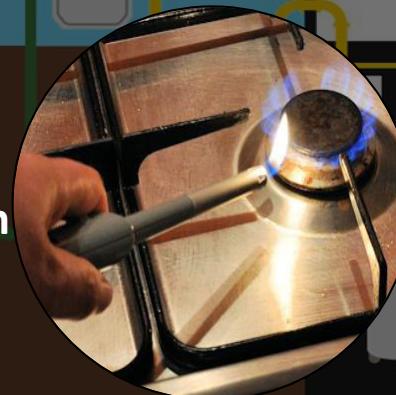
Ground

4 Gaseous fuels can be easily ignited with a small spark and the rate of combustion can be easily control with the help of a control valve.



Road

Main Line



# FOSSIL FUELS

Fossil fuels are formed from the buried remains of plants and animals

Coal, petroleum, and natural gas are examples of fossil fuels.

Fossil fuels are obtained from nature, they are referred to as natural resources



- 
- # Questions
1. State few characteristics of a good fuel.
  2. State 2 advantages of gaseous fuels.
  3. Can coal, petroleum and natural gas be prepared in the laboratory from dead organisms?
  4. Why fossil fuels are referred to as natural resources?

# **Coal and Petroleum**

- **Natural resources**
- **Coal**



# NATURAL RESOURCES

Exhaustible

These are resources whose supply is limited! The overuse of these resources should be avoided.

Such as

Exhaustible

Wildlife

# COAL

Coal is graded on the basis of heat obtained from them

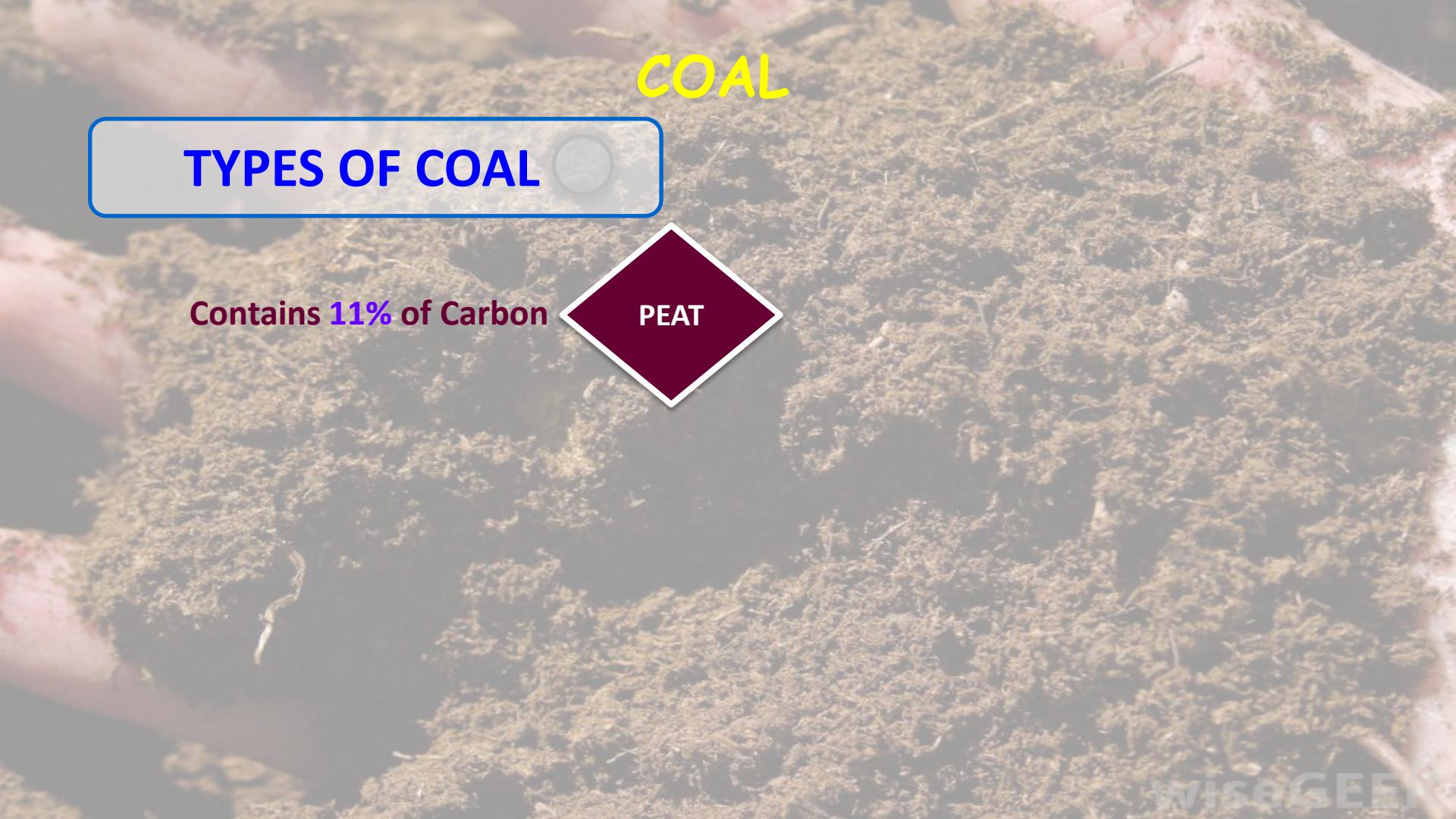
## TYPES OF COAL

PEAT

LIGNITE

BITUMINOUS  
COAL

ANTHRACITE



COAL

## TYPES OF COAL

Contains 11% of Carbon

PEAT

# COAL

Coal is graded on the basis of heat obtained from them

## TYPES OF COAL

PEAT

LIGNITE

BITUMINOUS  
COAL

ANTHRACITE

**COAL**

## **TYPES OF COAL**

LIGNITE

Contains 22% of Carbon

# COAL

Coal is graded on the basis of heat obtained from them

## TYPES OF COAL

PEAT

LIGNITE

BITUMINOUS  
COAL

ANTHRACITE



COAL

**TYPES OF COAL**

Contains 60% of Carbon

BITUMINOUS  
COAL

# COAL

Coal is graded on the basis of heat obtained from them

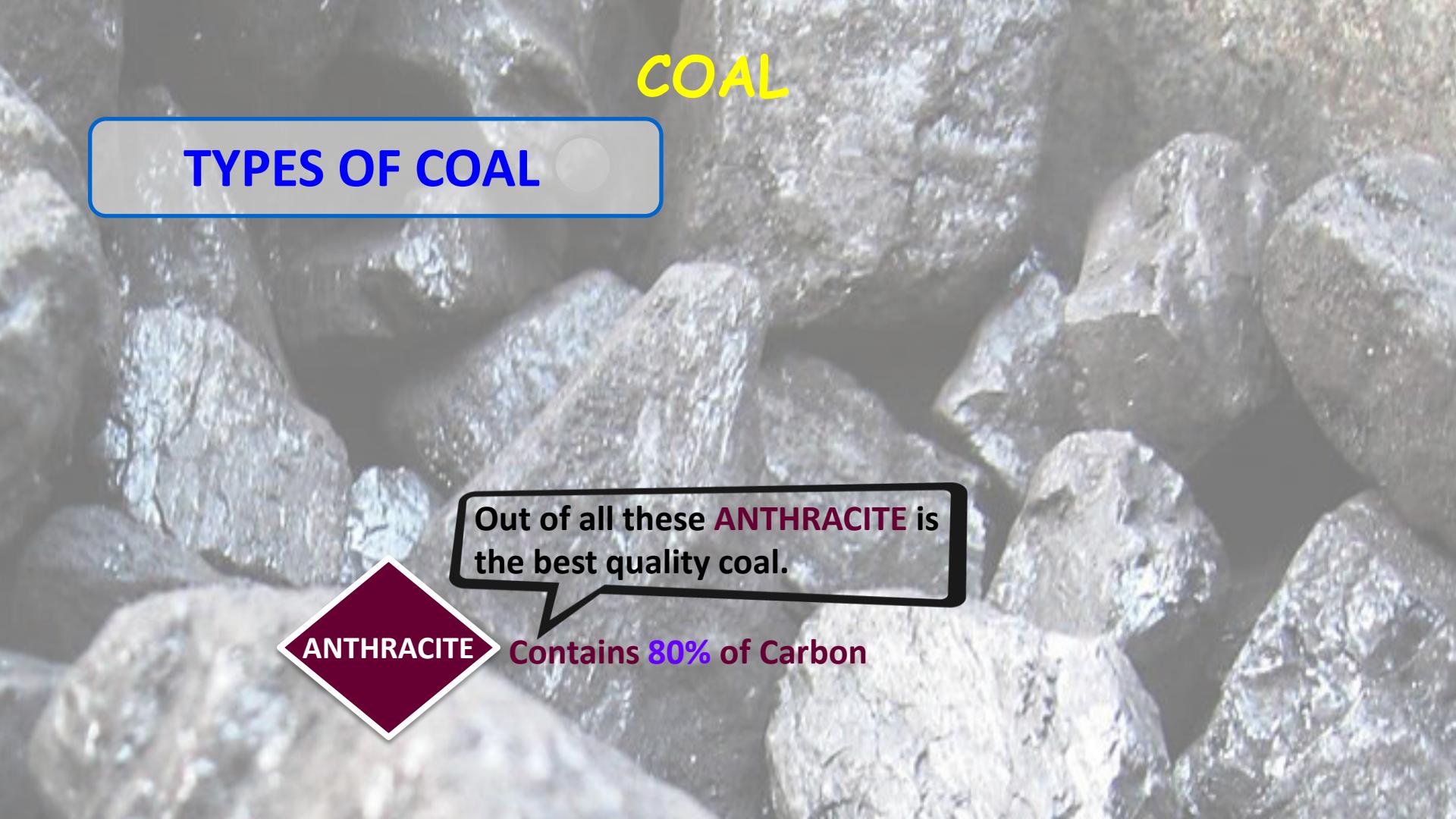
## TYPES OF COAL

PEAT

LIGNITE

BITUMINOUS  
COAL

ANTHRACITE



COAL

## TYPES OF COAL

Out of all these ANTHRACITE is  
the best quality coal.



ANTHRACITE

Contains 80% of Carbon

# FORMATION OF COAL

Over time the plants that grew and got their remains got buried and heated in shallow lakes for over 100 millions years. Compressed swamp gas,  $\text{CH}_4$  or methane. When gas bubbles up through sediments and formed lignite.



1. Explain why fossil fuels are exhaustible

natural resources.

2. Define natural resource.

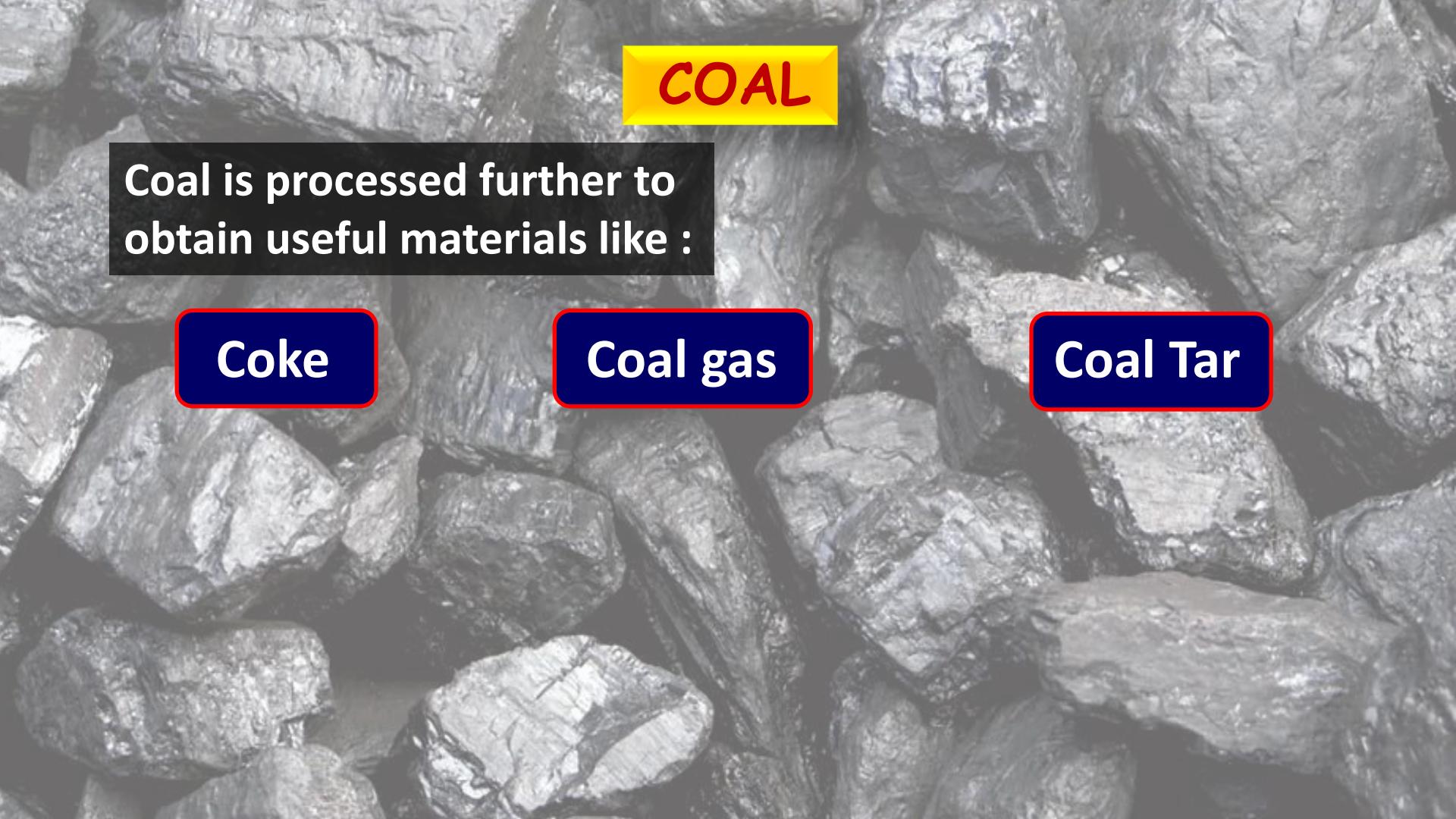
3. Name the best quality coal.

4. Explain the formation of coal.

# Questions

# **Coal and Petroleum**

- **Coke**
- **Coal gas**
- **Coal tar**
- **Formation of petroleum**



**COAL**

Coal is processed further to obtain useful materials like :

Coke

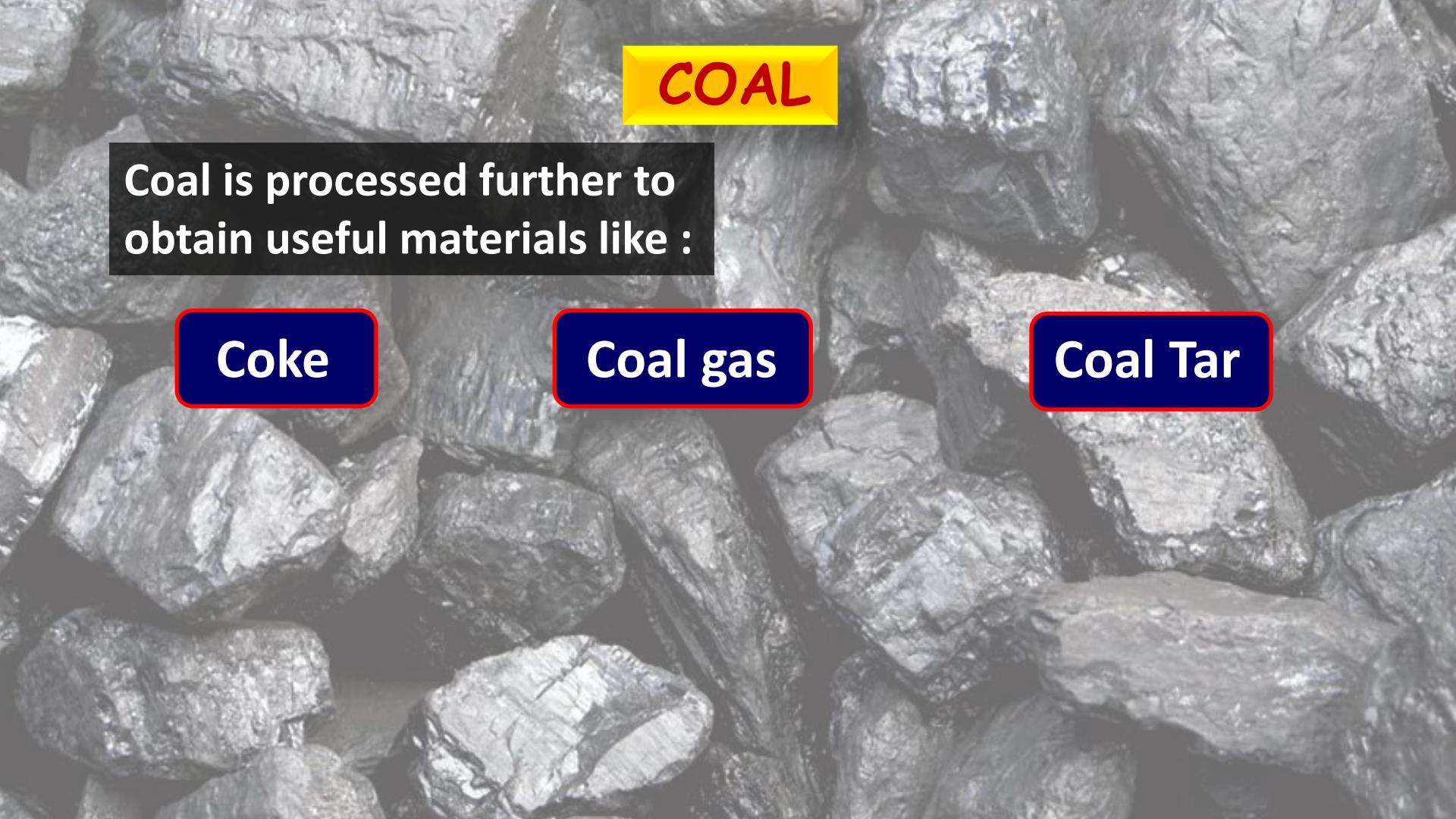
Coal gas

Coal Tar

# Coke

Coke is used in the manufacture of steel and in the extraction of many metals in almost pure form of carbon.





**COAL**

Coal is processed further to obtain useful materials like :

Coke

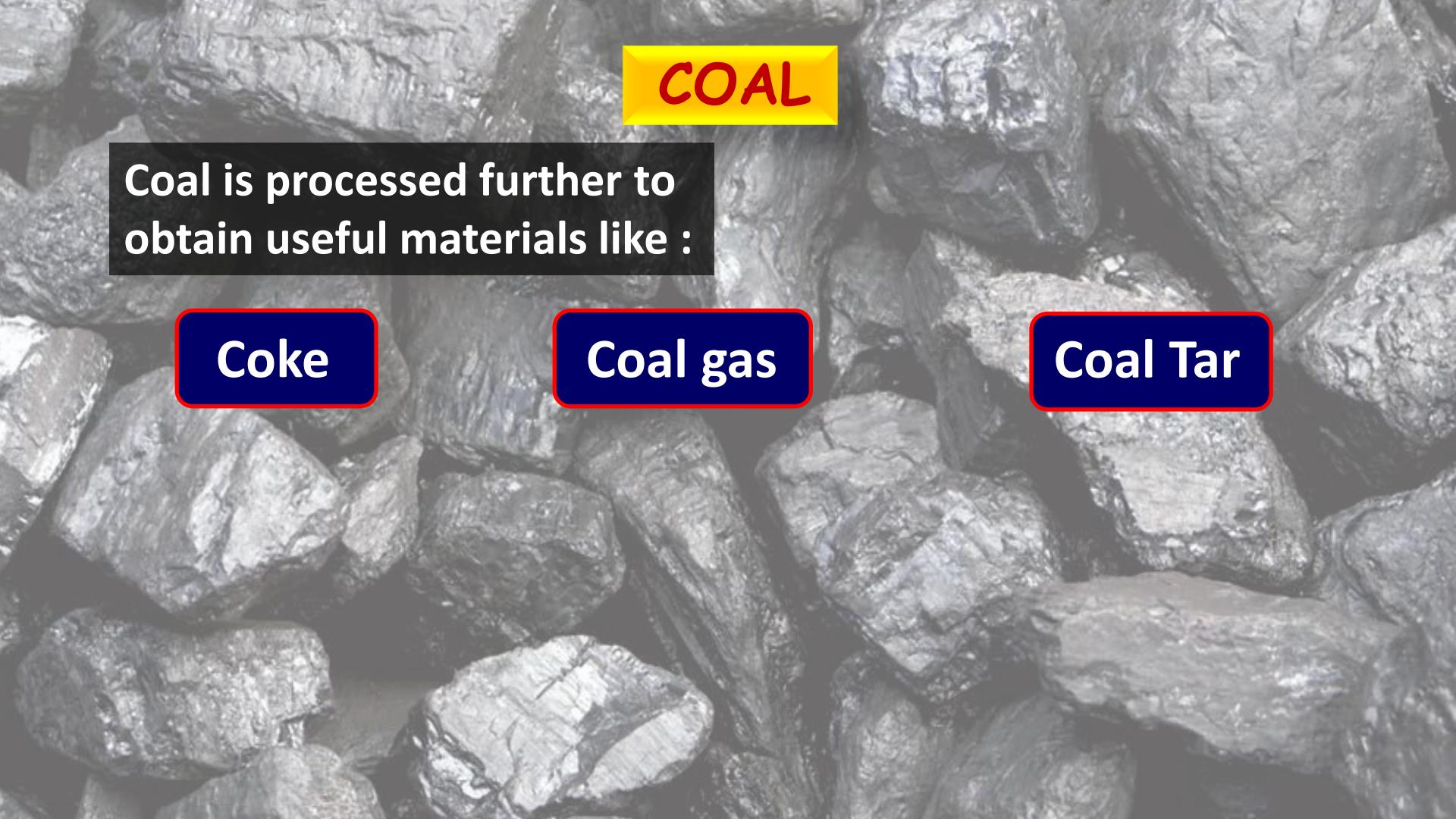
Coal gas

Coal Tar

## Coal gas

**Coal gas was used for street lighting for the first time in London in 1810 and in New York around 1820.**





**COAL**

Coal is processed further to obtain useful materials like :

Coke

Coal gas

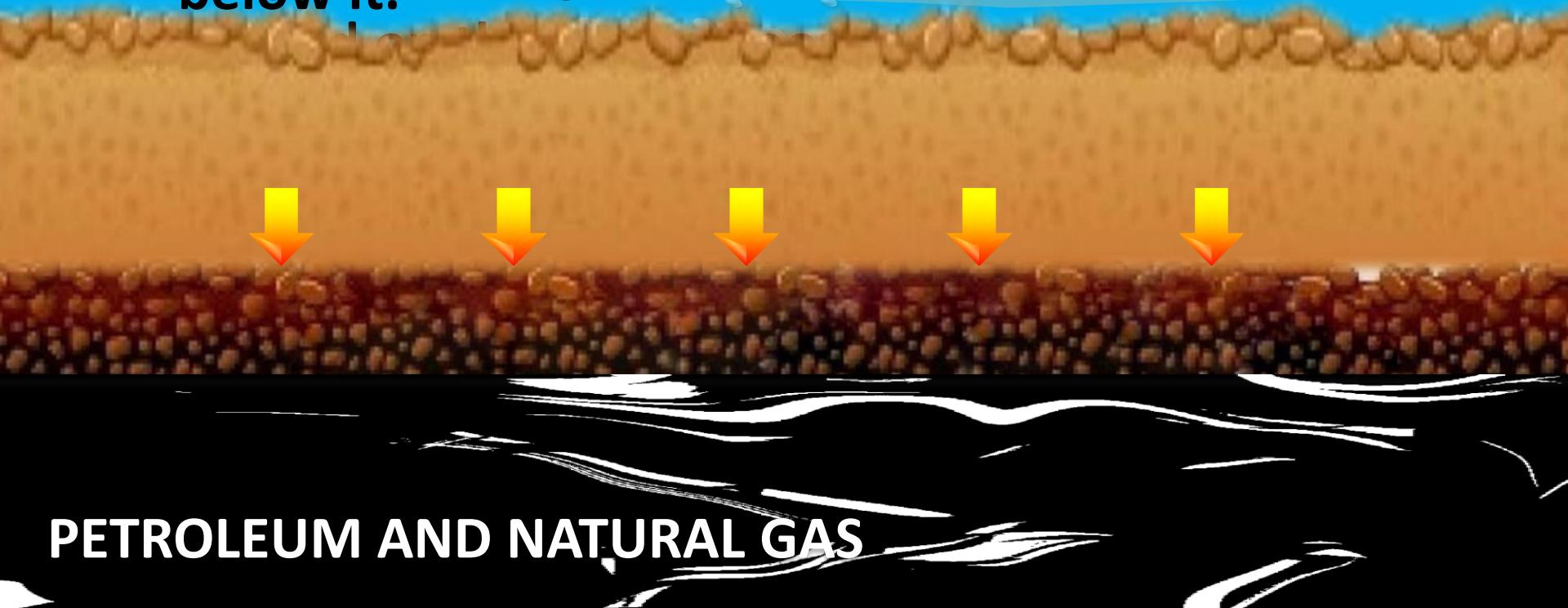
Coal Tar

# Coal Tar

Products obtained from tar are used as starting materials for manufacturing various substances such as:

- Drugs
- Synthetic dyes
- Naphthalene balls
- Explosives
- Paints

Rising through porous rocks like sandstone,  
petroleum and natural gas reached a layer  
of impermeable rock and were trapped  
below it.



- 
1. Which is the purest form of carbon?
  2. What is coal gas? What are its uses?
  3. What is the difference between coke and coal?
  4. Explain the process of formation of petroleum.

# Questions

# **Coal and Petroleum**

- **Refining of petroleum**

# REFINING OF PETROLEUM

Petroleum and natural gas are extracted by drilling through the impermeable rocks.



# REFINING OF PETROLEUM

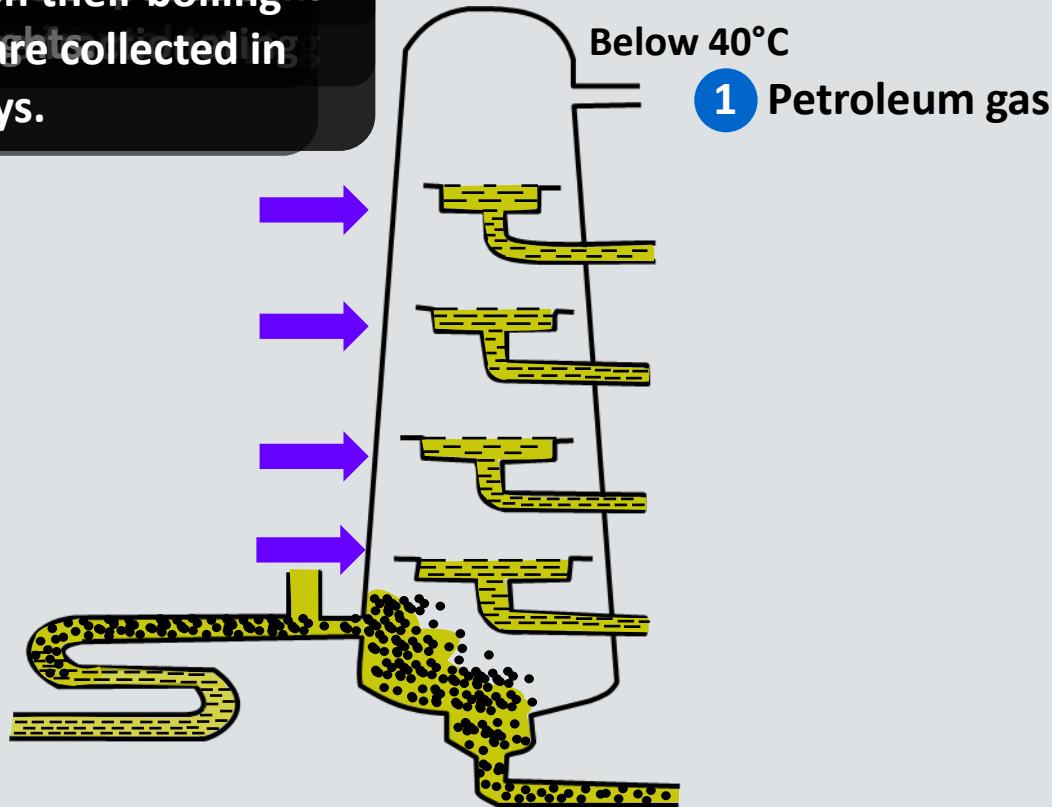
The process of separating the various fractions of petroleum is known as refining.

It is carried out in a petroleum refinery.



# REFINING OF PETROLEUM

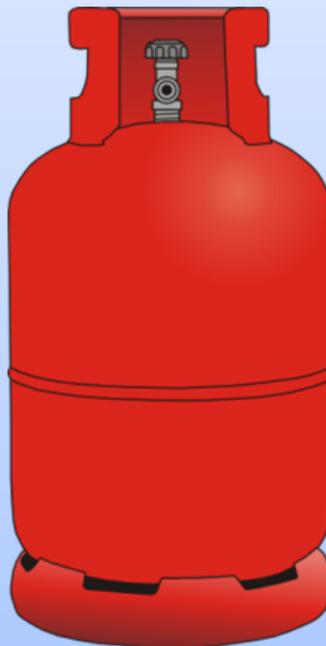
Depending on their boiling points, and are collected in different trays.



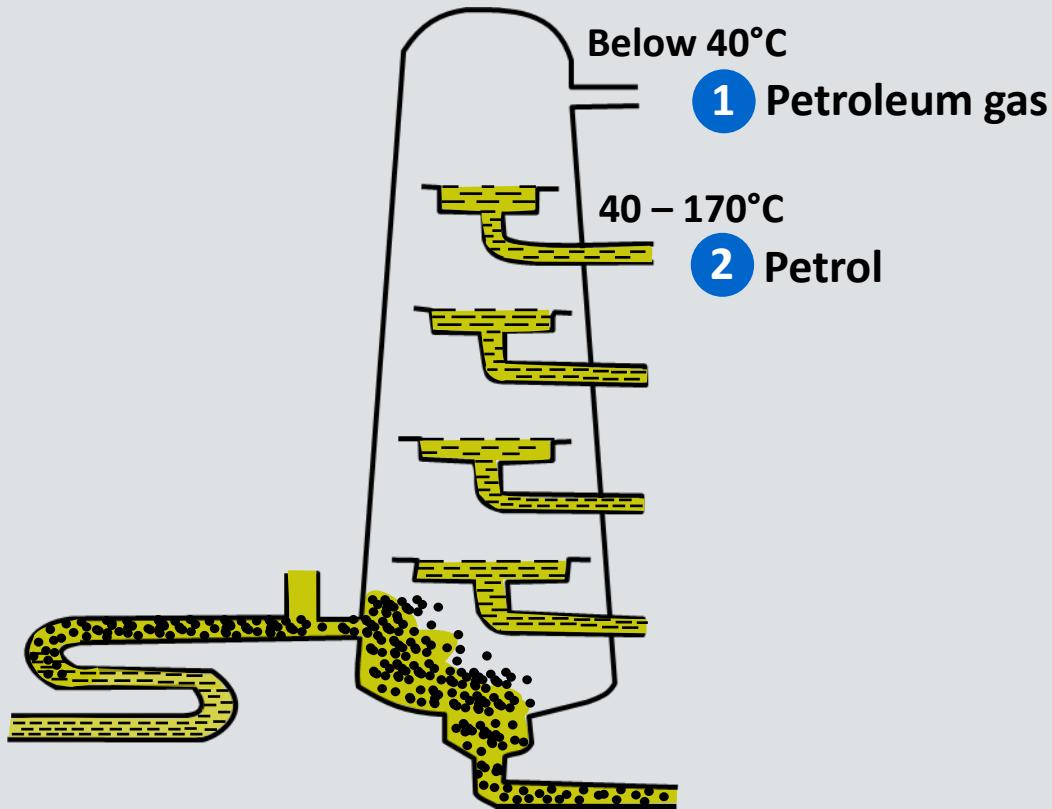
# REFINING OF PETROLEUM

## 1 Petroleum gas

Used as a domestic fuel in its liquefied form. LPG



# REFINING OF PETROLEUM



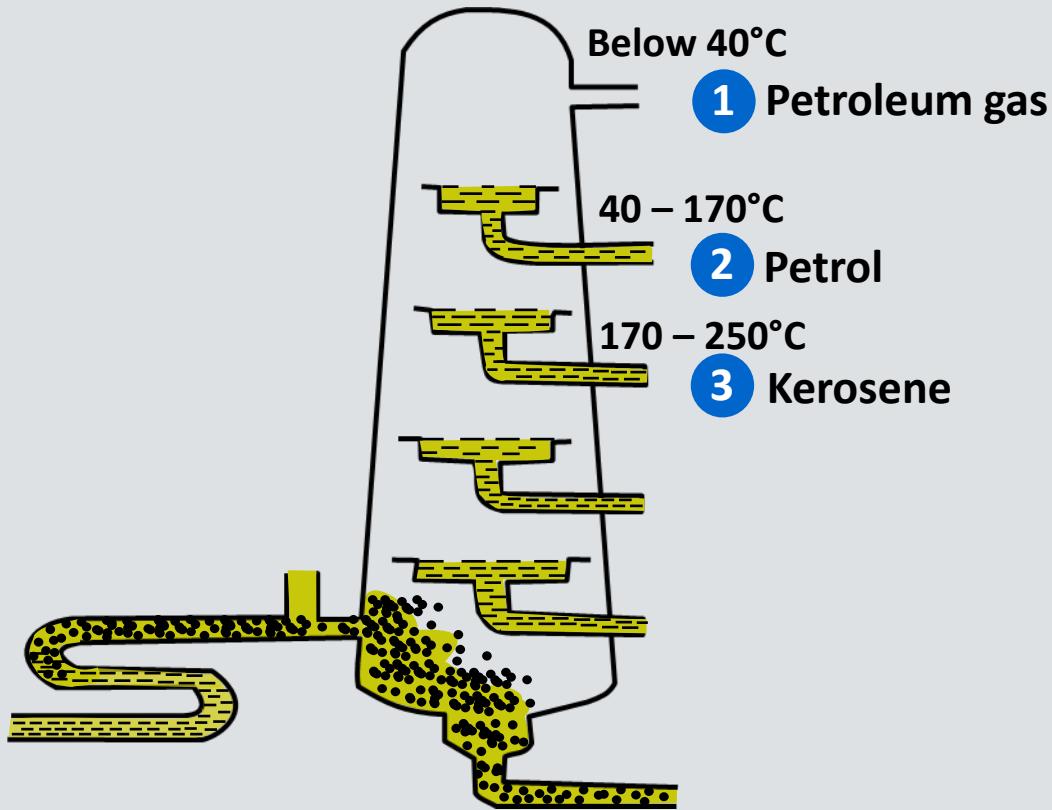
# REFINING OF PETROLEUM

## 2 Petrol

Used as a fuel in automobiles, in dry cleaning, etc. and various chemicals



# REFINING OF PETROLEUM



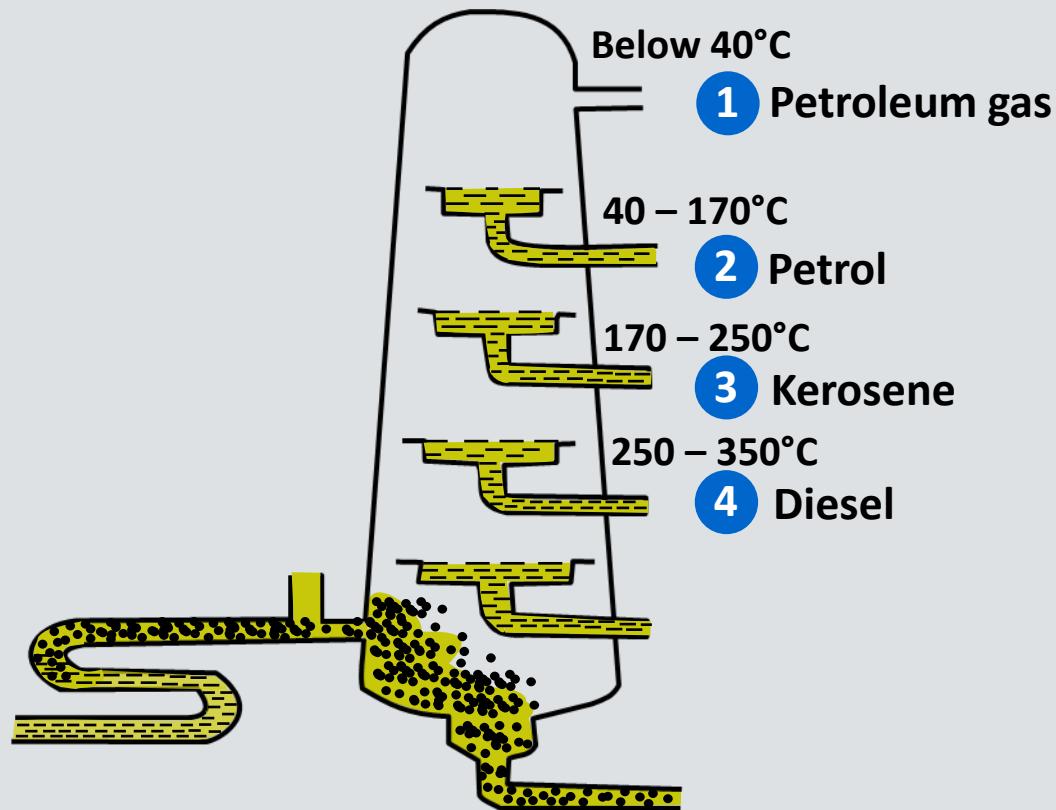
# REFINING OF PETROLEUM

3 Kerosene

Used as a fuel in lamps and stoves



# REFINING OF PETROLEUM



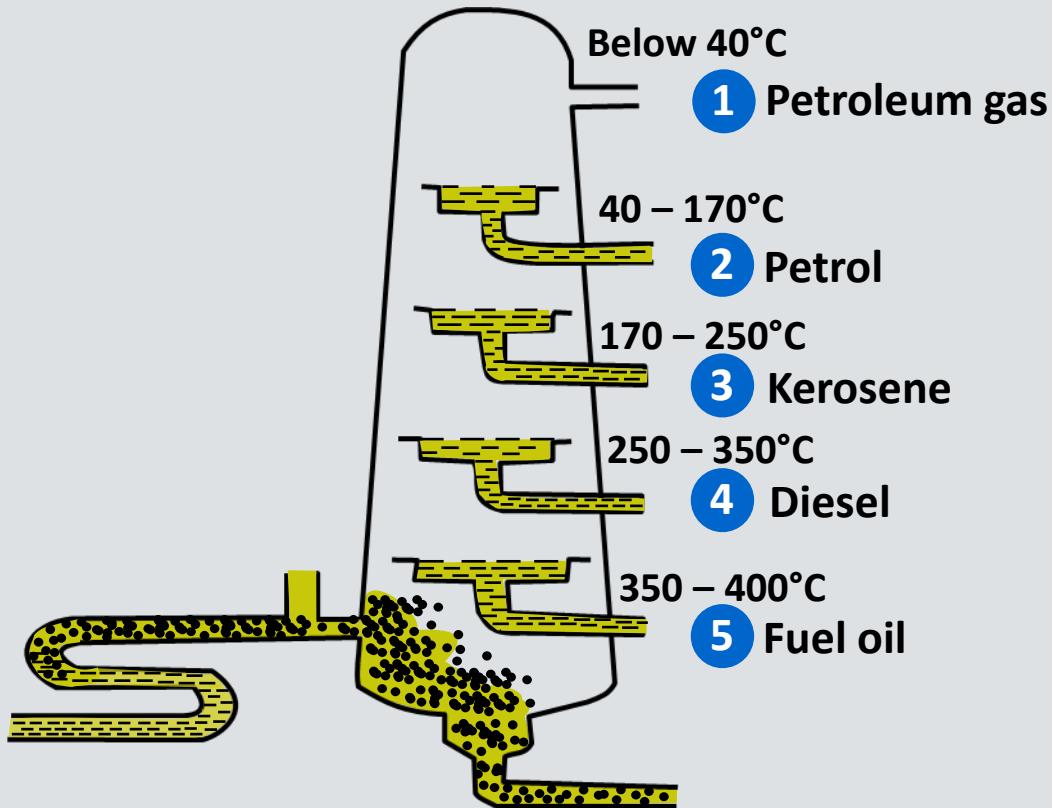
# REFINING OF PETROLEUM

4 Diesel

used as a fuel in heavy motor vehicles and generators



# REFINING OF PETROLEUM



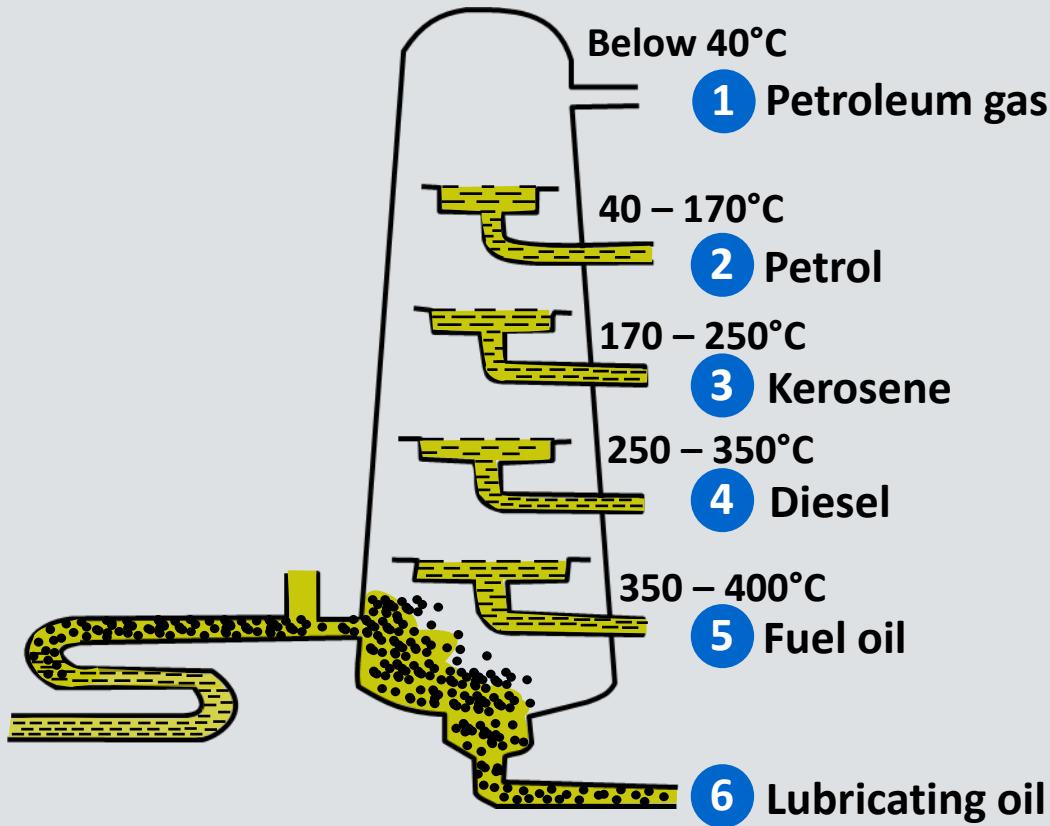
# REFINING OF PETROLEUM

5 Fuel oil

Fuel oil for power stations and ships



# REFINING OF PETROLEUM



# REFINING OF PETROLEUM

## 6 Lubricating oil

Used for:

- Lubrication
- in candles
- Vaseline
- ointments
- making roads etc.





1. What do you mean by refining of petroleum?

- Name various components of petroleum and their uses.

3. Where is the process of refining of petroleum carried out?

# Questions

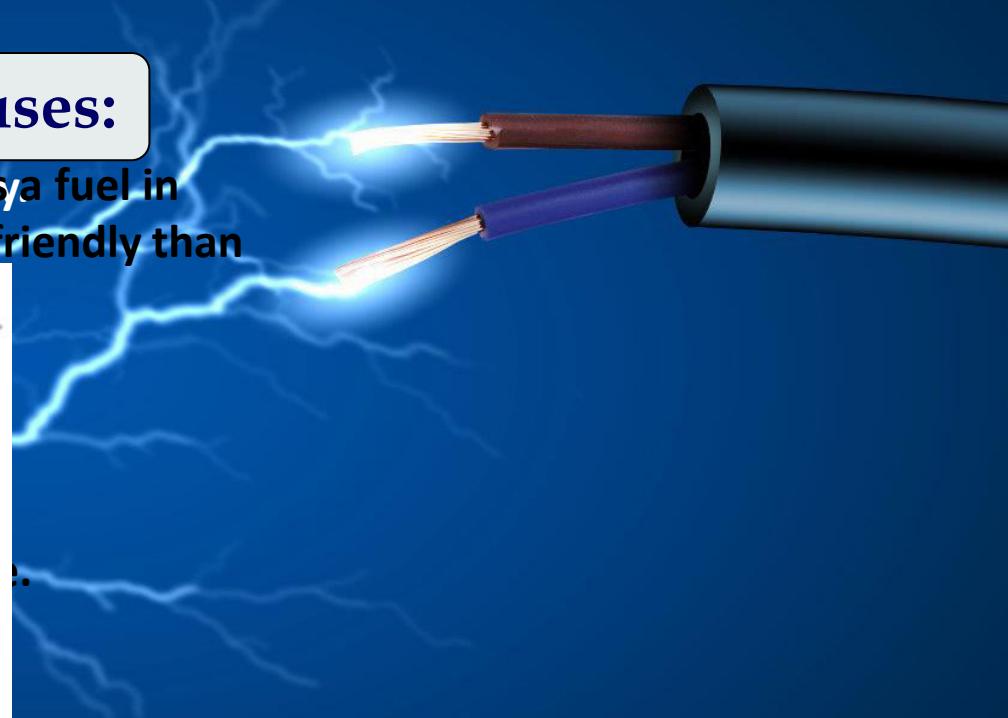
# **Coal and Petroleum**

- **Natural gas**
- **Limitations of fossil fuels**
- **Air pollutants**
- **Conservation of fossil fuel**

# NATURAL GAS

It has the following main uses:

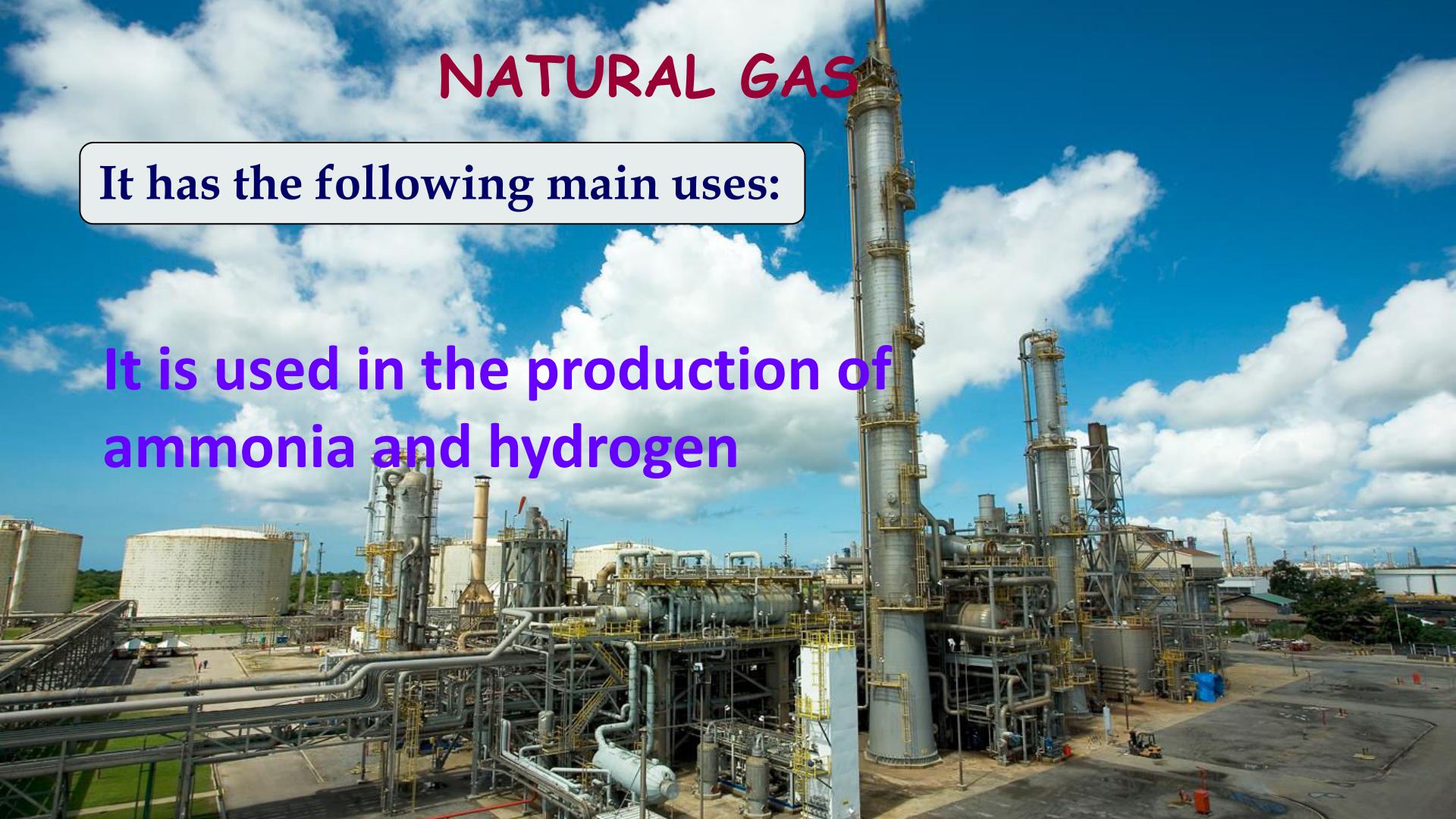
Compressed natural gas (CNG) is used as a fuel in automobiles. It is more environment-friendly than petroleum.



# NATURAL GAS

It has the following main uses:

It is used in the production of ammonia and hydrogen



# NATURAL GAS

It has the following main uses:

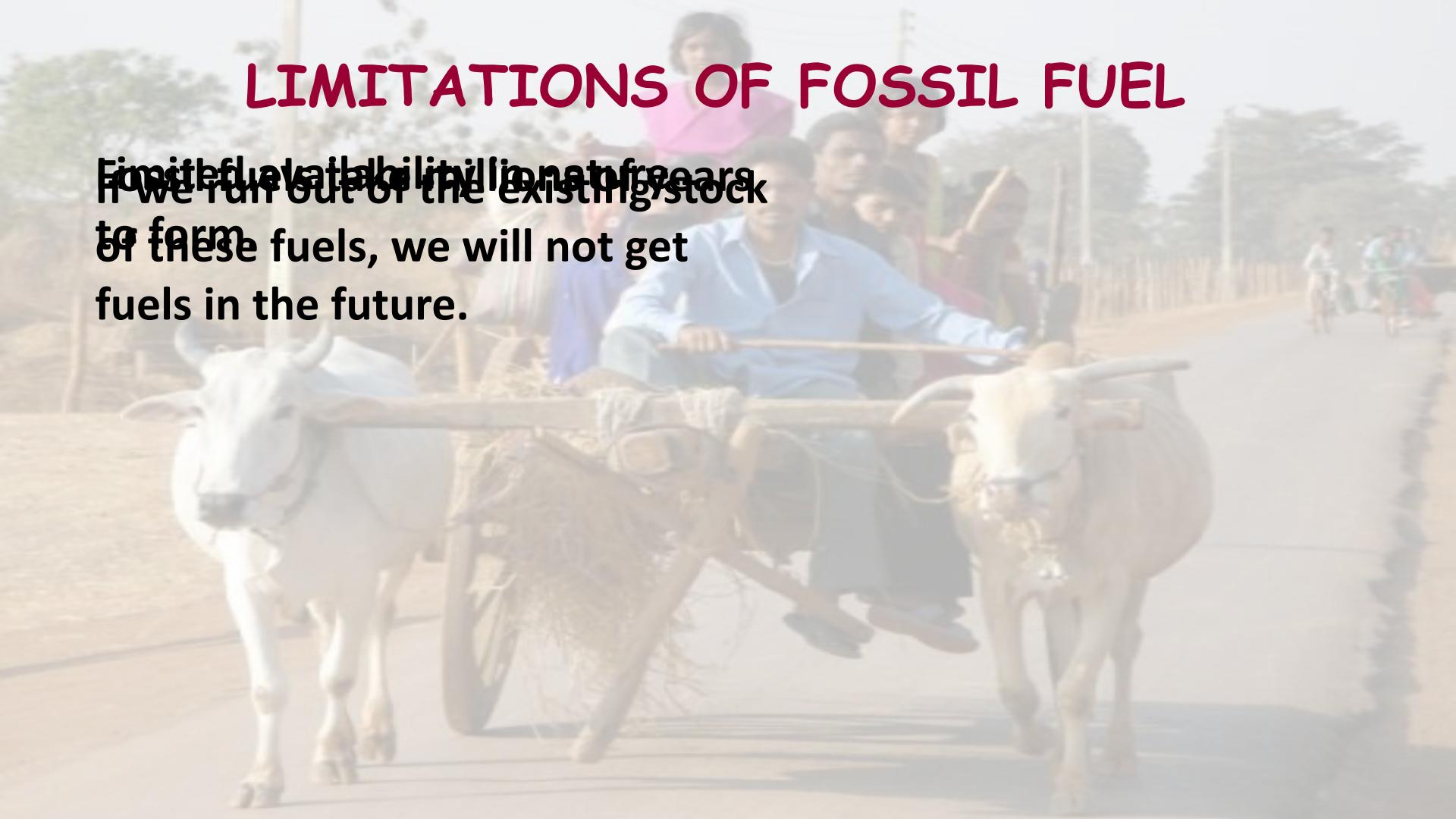
It is used in the manufacture of :

Plastics and other products.



# LIMITATIONS OF FOSSIL FUEL

Fossil fuel availability will not last forever.  
If we run out of the existing stock  
of these fuels, we will not get  
fuels in the future.



# LIMITATIONS OF FOSSIL FUEL

These fossil fuels have adverse effects on environment.  
Air pollution is caused due to their  
use. It is a group of substances called  
**Pollutants**, can be in the form of  
particles or gases.



# AIR POLLUTANTS

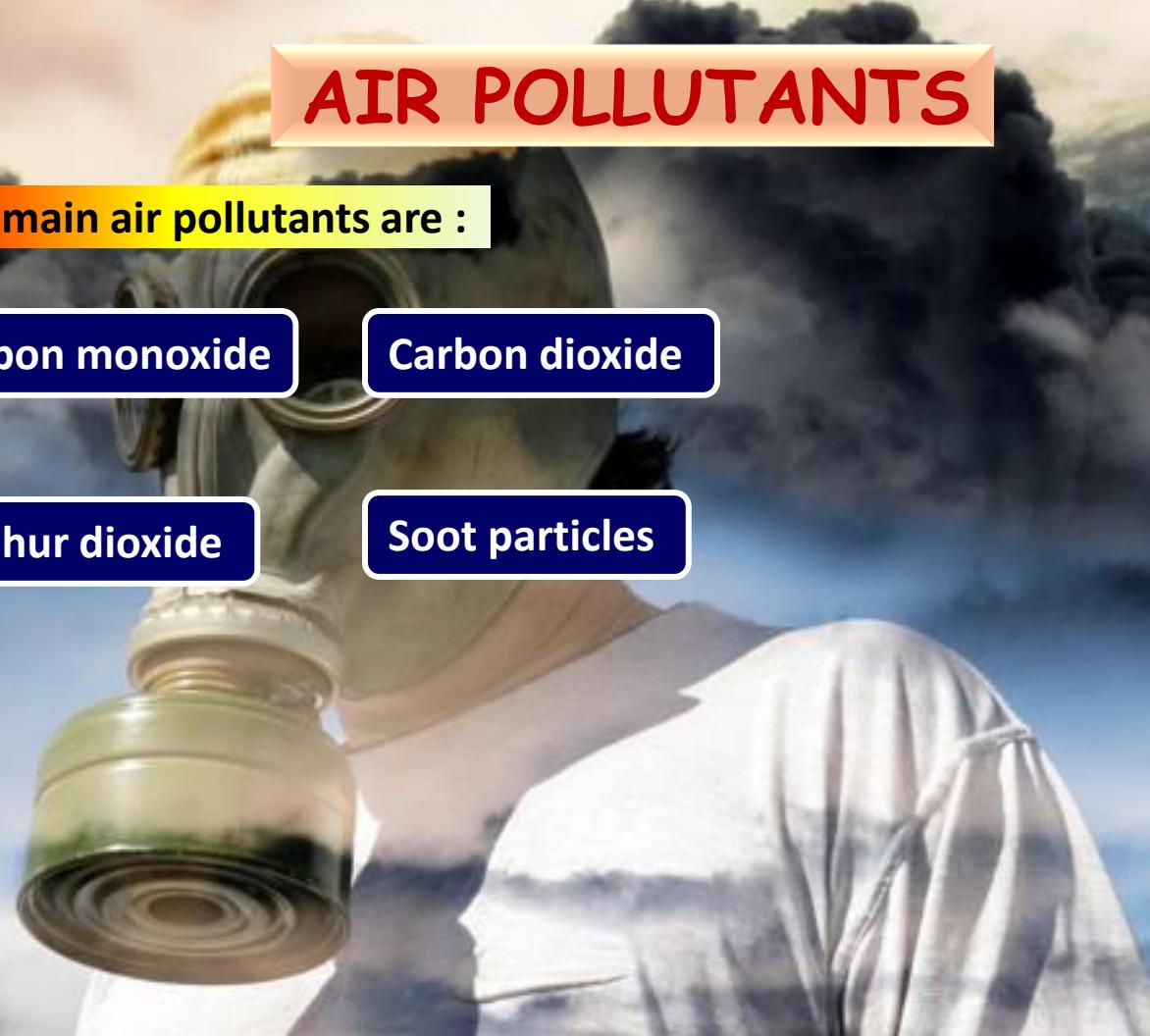
The main air pollutants are :

Carbon monoxide

Carbon dioxide

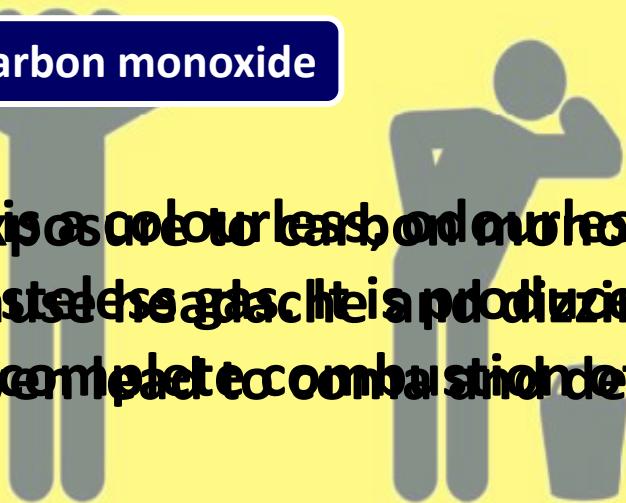
Sulphur dioxide

Soot particles



## Carbon monoxide

Exposes our bodies and our environment to a gas that is produced by incomplete combustion of fossil fuels.



HEADACHES

NAUSEA



DIZZINESS



BREATHLESSNESS



COLLAPSE



LOSS OF CONSCIOUSNESS

# AIR POLLUTANTS

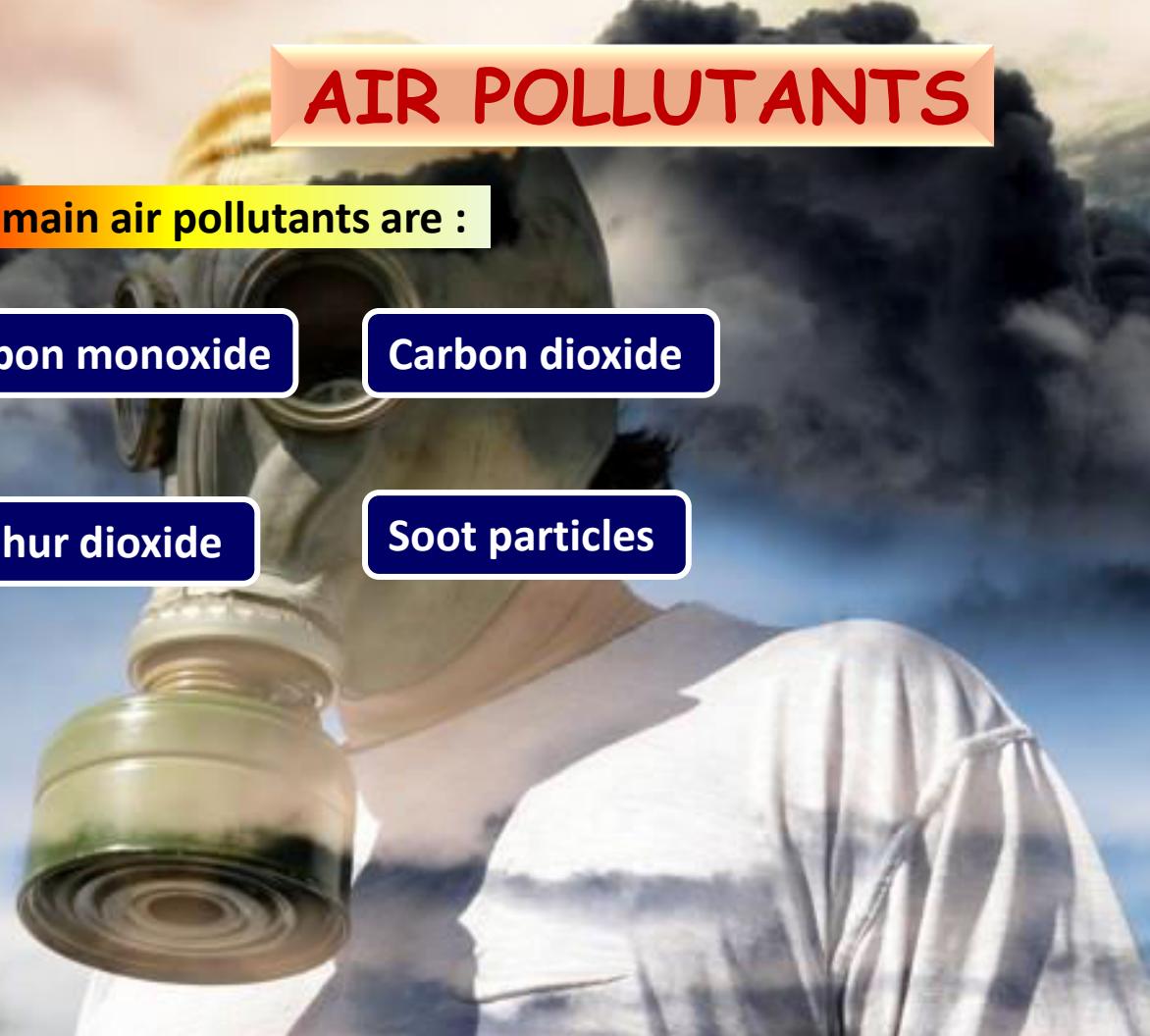
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Carbon monoxide

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Soot particles



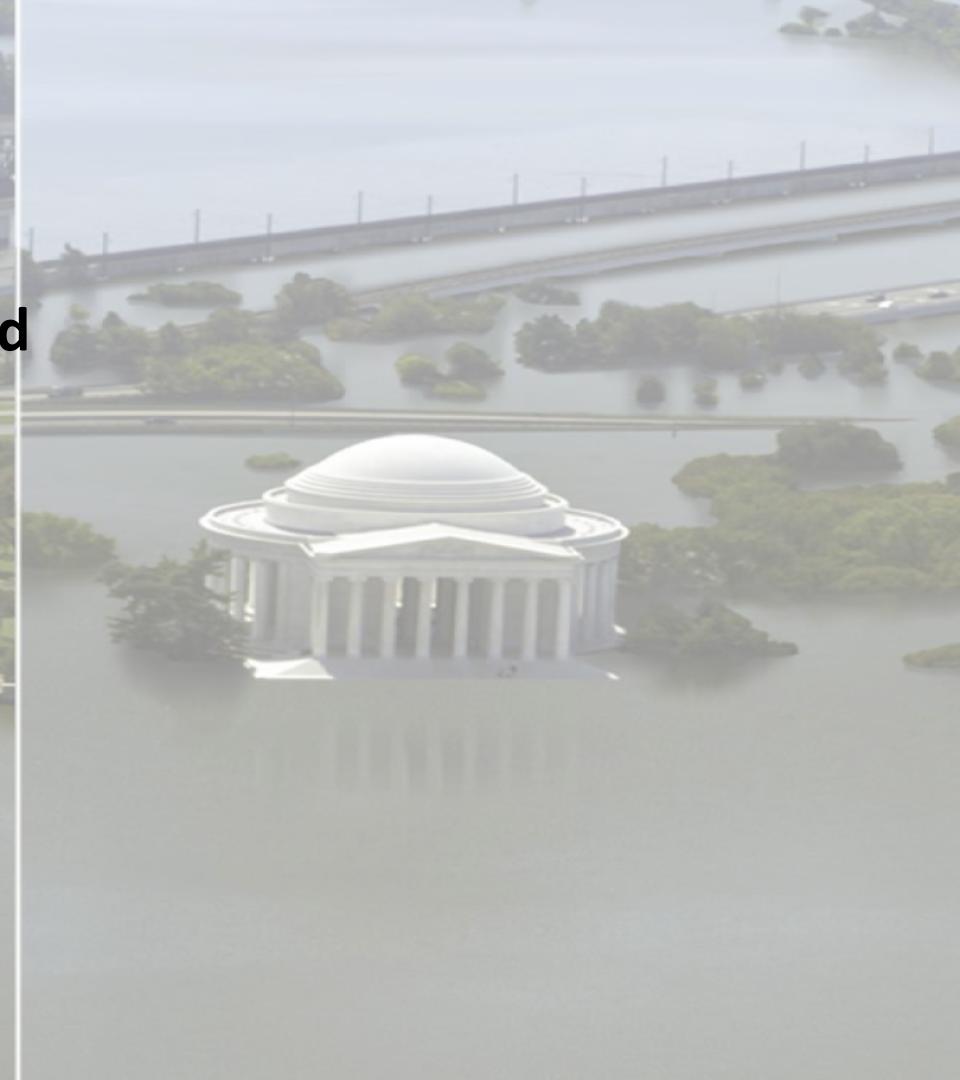
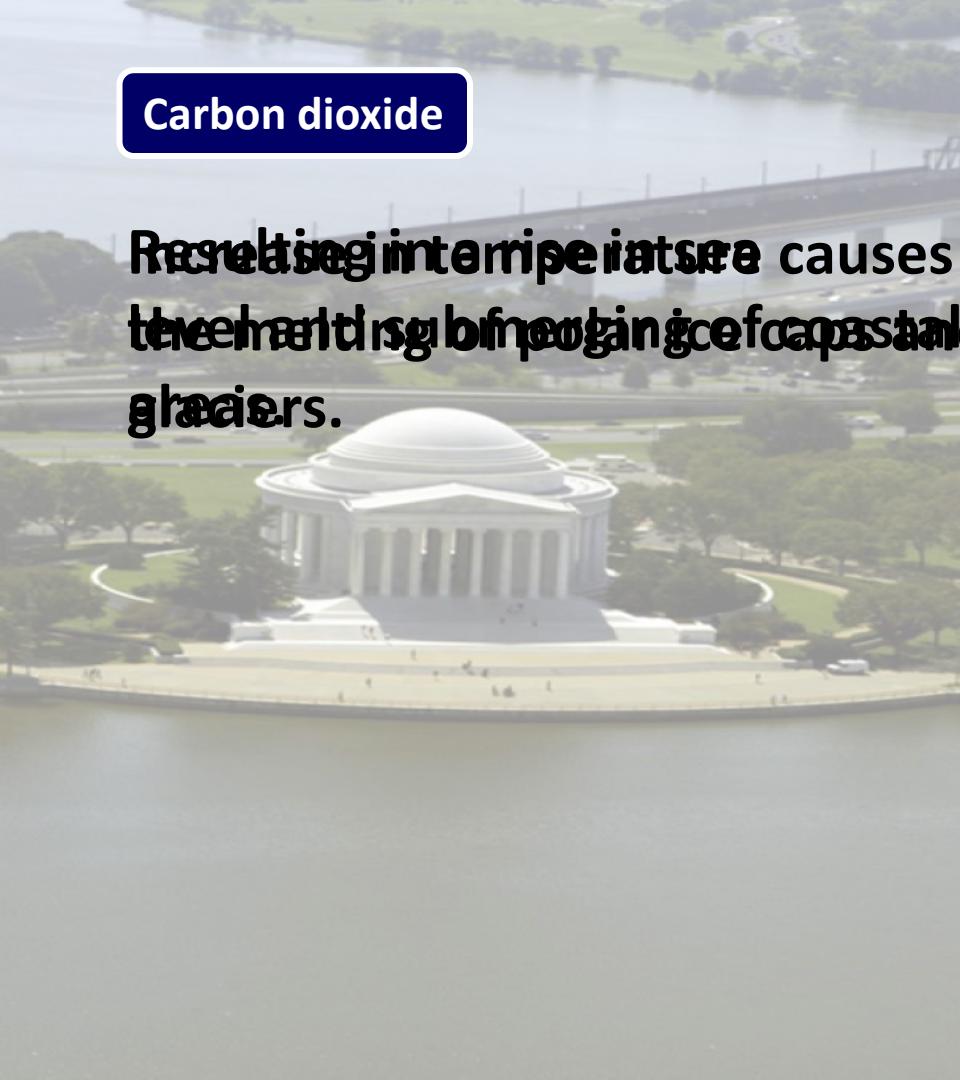
## Carbon dioxide

**CO<sub>2</sub> levels in the atmosphere have increased significantly due to the widespread combustion of fossil fuels.**



**Carbon dioxide**

Rising temperatures causes  
the melting of ice caps and  
glaciers.



# AIR POLLUTANTS

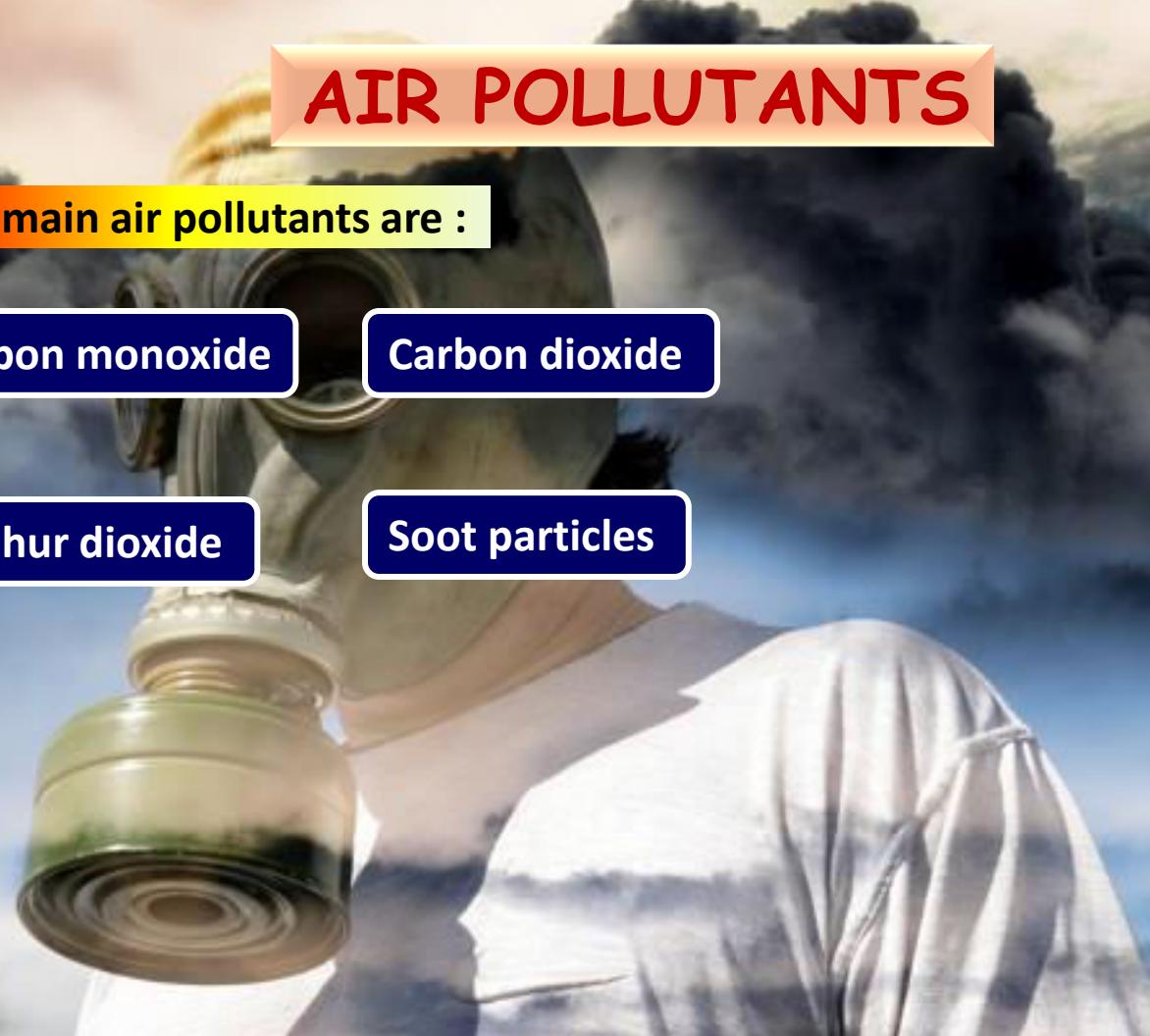
The main air pollutants are :

Carbon monoxide

Carbon dioxide

Sulphur dioxide

Soot particles



## Sulphur dioxide

Acid rain damages

~~the environment, buildings, trees, soil and water.~~

- ~~Plants~~ and animals

~~produce dilute solutions of~~

- ~~Aquatic life~~ sulphuric acid and nitric acid.

- ~~Soil and buildings~~



# AIR POLLUTANTS

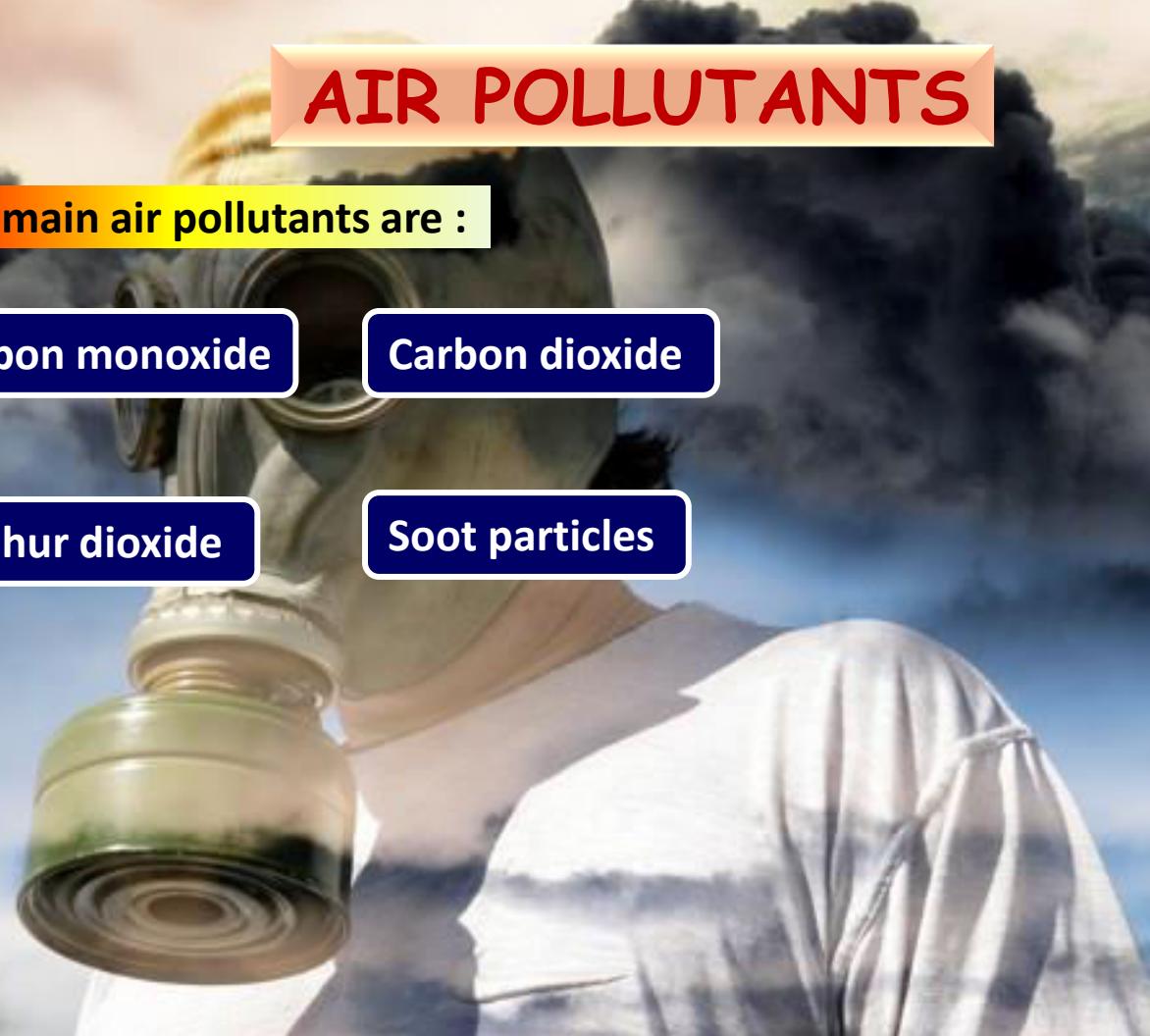
The main air pollutants are :

Carbon monoxide

Carbon dioxide

Sulphur dioxide

Soot particles



## Soot particles

These particles are introduced in the air due to the incomplete combustion of wood and fossil fuels like coal and petroleum.

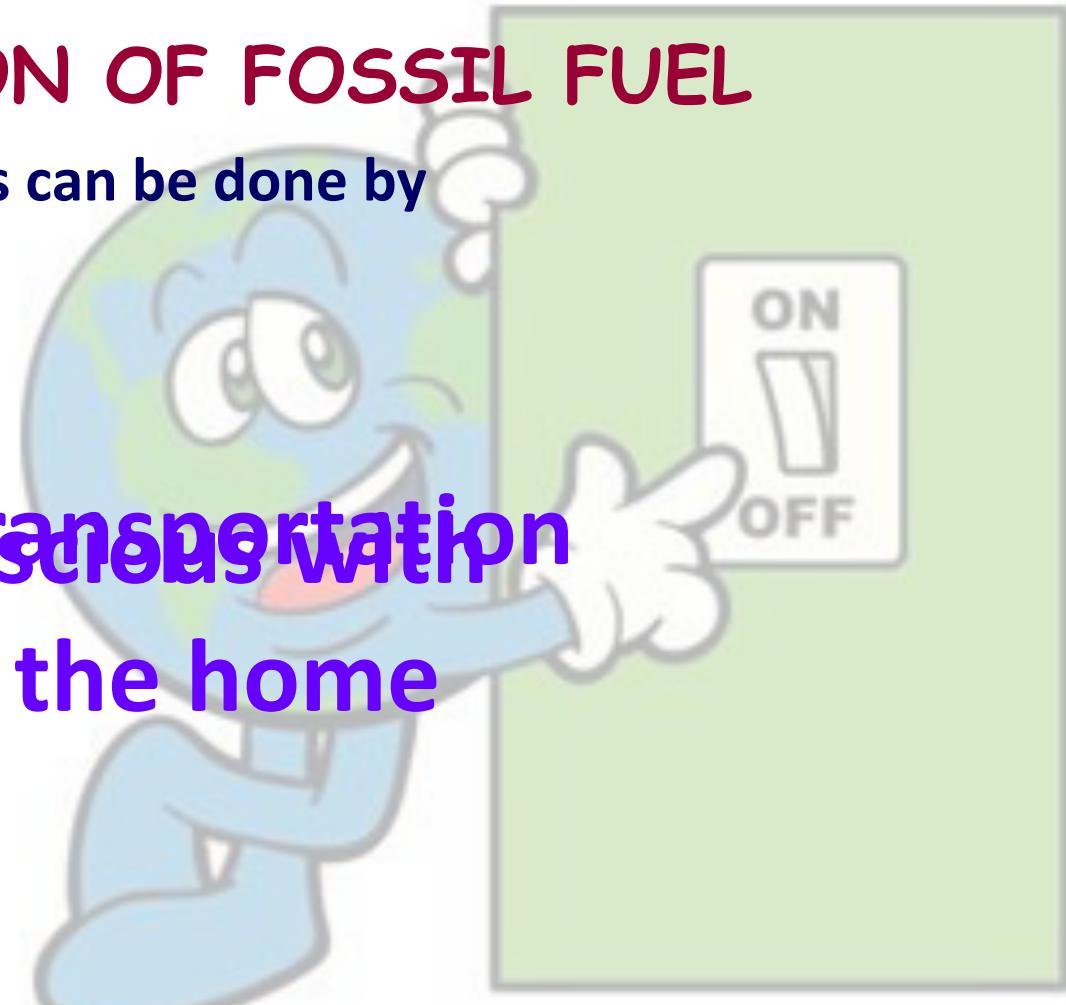
- trigger asthma attacks
- cause wheezing
- coughing and respiratory irritation



# CONSERVATION OF FOSSIL FUEL

Conservation of fossil fuels can be done by

~~driving a car, getting a job, taking public transportation, more often in the home~~



# **CONSERVATION OF FOSSIL FUEL**

**Conservation of fossil fuels can be done by**

**Use alternate sources of energy like**

**tidal power**

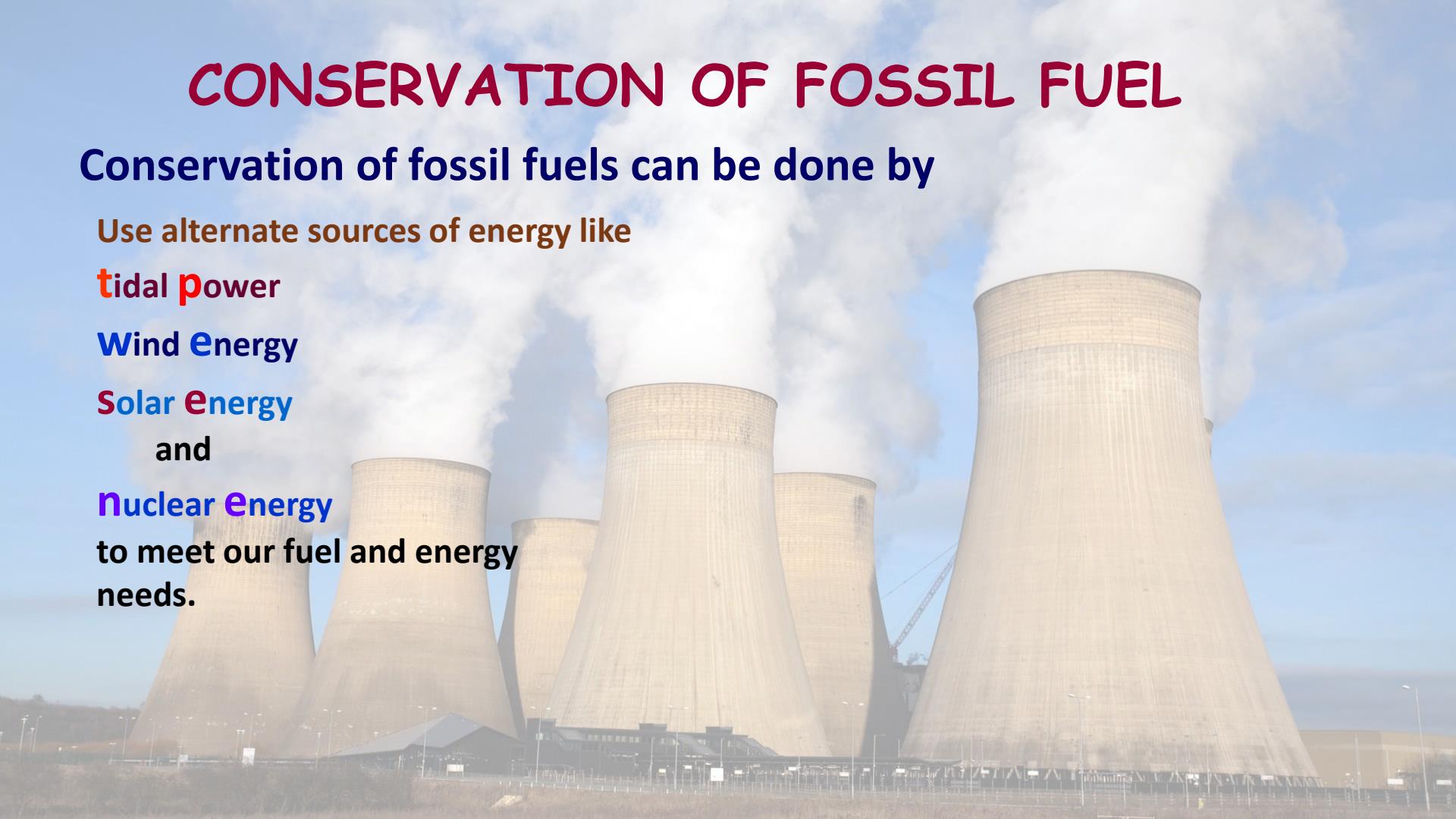
**Wind Energy**

**Solar Energy**

**and**

**Nuclear Energy**

**to meet our fuel and energy  
needs.**



- 
- # **Questions**
- 1. State the uses of natural gas.**
  - 2. What are the limitations of fossil fuels?**
  - 3. Name the main air pollutants.**
  - 4. What are the effects of carbon monoxide on human beings?**

# Thank You