SCIENCE

By Ankita Ma'am For Class 8th

Coal and Petroleum

ONE SHOT

Topics To Be Covered

1. Natural Resources
2. Coal → formation, Uses, Products
3. Petroleum → formation, Uses, Constituents
4. Natural Gas → formation, Uses

Resources

→ Natural

→ Man-made

Needs. support. easy

Natural Resources

- The resources that we get from nature are called natural resources.
- Example- we get heat and light from the Sun, water from rivers, and food from plants and animals.

Exhaustible and Inexhaustible Resources

#2m

Inexhaustible resources

- Resources present in unlimited quantity that cannot get exhausted by human activities
- Also known as renewable resources

Sunlight

Water

Exhaustible resources

- Resources present in limited quantity that can get exhausted by human activities
- Also known as non-renewable resources

Fossil fuels

Forest

Fossil Fuels

- Fossil fuels come from the remains of plants and animals that died millions of years ago.
- Example- Coal, Oil, Petroleum Gas.

Dead organisms

Buried under layers

Fossil Fuels

Coal

- Coal is formed from the remains of plants that died and fell into swamps millions of years ago.

Hard as stone and is black in colour

Mainly composed of carbon

Formed from dead plant matter

Coal Formation

Define, MCQ, fill ups

- The slow process of conversion of dead vegetation into coal is called coalification.

Ancient swamp forest

Burial under sediment

Compression and Heat

Coal Formation complete

Please Let Bittu Attend

Peat

- Soft, spongy material made of decayed plants
- Low carbon content, burns with smoke

Lignite

- Brown coal, slightly harder than peat
- Higher carbon, more energy

Bituminous Coal

- Black, soft coal
- Used in homes and industries, high carbon

Anthracite

- Hardest and purest form of coal
- Shiny black, burns clean with high heat

Uses of Coal

Heating purpose in homes and industries

Fuel for steam engine

Electricity production in thermal power plants

Phasssss Gaye!

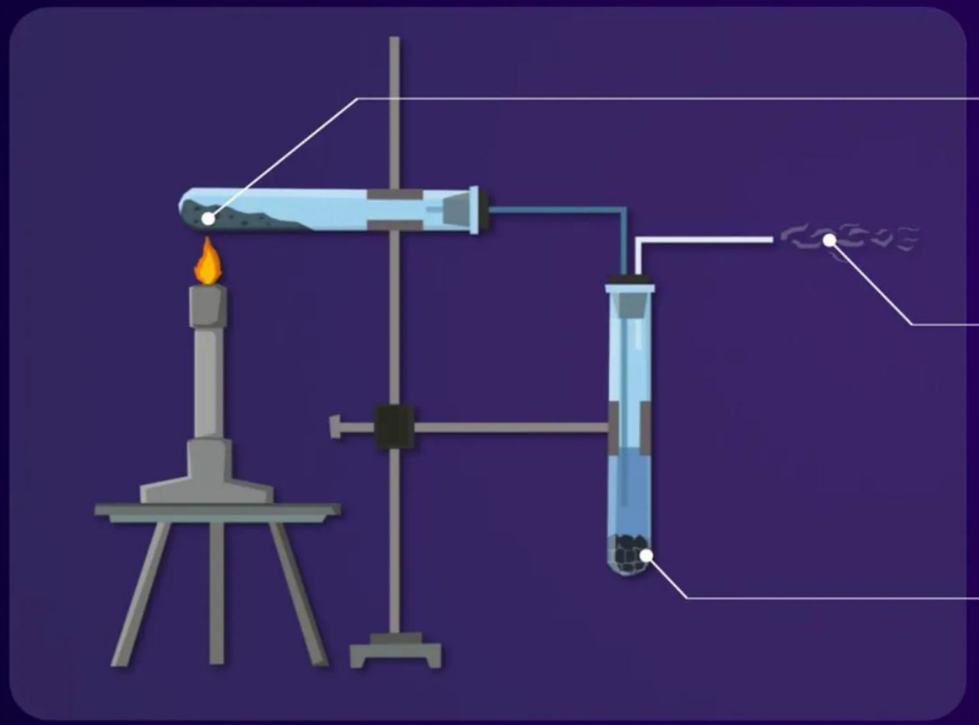
Coal and charcoal refer to the same thing.

Coal is a naturally occurring fossil fuel, whereas charcoal is obtained by heating wood to high temperatures in the absence of oxygen.

Destructive Distillation

Destructive distillation: Heating coal strongly in the absence of air

Carbonisation: Conversion of coal into other carbon-rich substances by destructive distillation



Coke
Solid grey-black residue, composed mainly of carbon

Coal gas
Mixture of gases - hydrogen, carbon monoxide, and methane

Coal tar
Thick black liquid with an unpleasant smell, contains a mixture of carbonaceous substances

Useful Products from Coal

Coal gas

Power plants

Coke

Steel production

Metal industry

Coal Tar

Paints

Explosives

Roads

Cosmetics

Medicines

Petroleum

MCQ

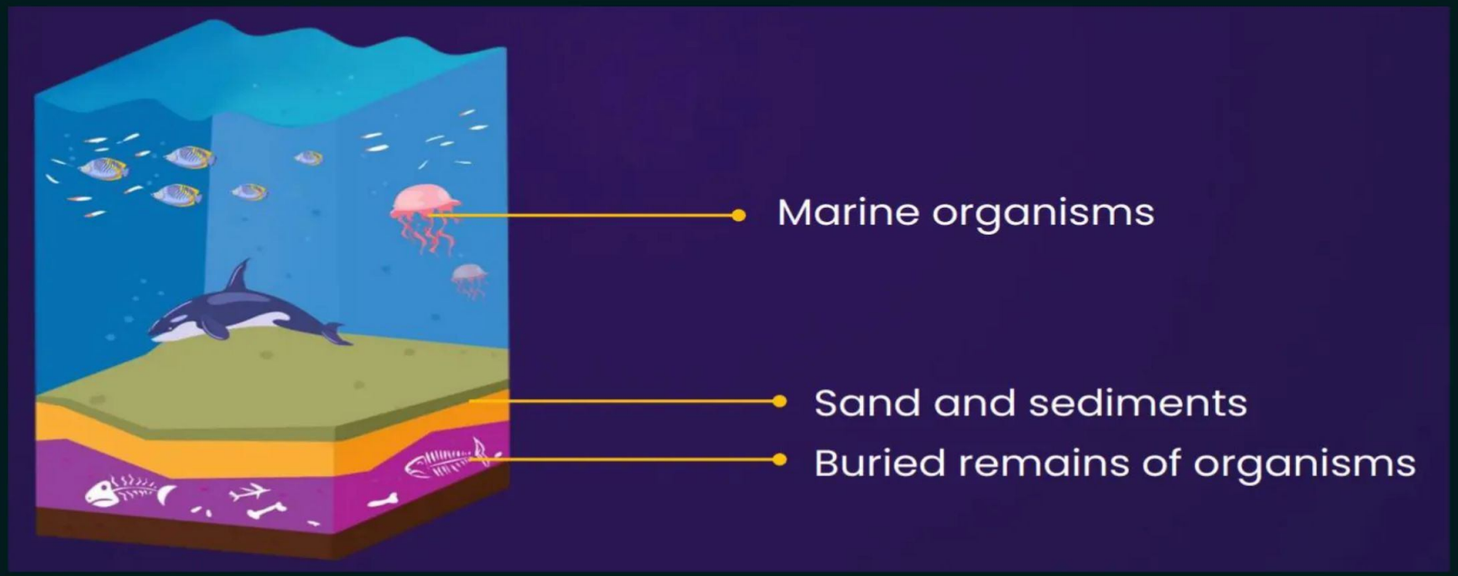
- Petroleum is a natural fuel that is found deep underground. It is a thick, blackish-brown oily liquid with a strong smell.
- We can't use petroleum as it is, so we process it to make many useful products like petrol, diesel, and gas for cooking. This makes petroleum very valuable, that's why it is often called "black gold."

Petroleum

- Dark oily liquid with unpleasant odour
- Mixture of various useful components
- Formed from organisms living in sea

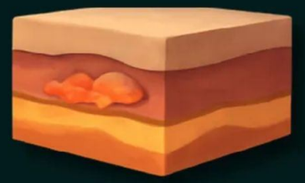
Formation of Petroleum

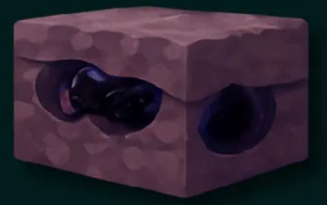
- Formed from the buried remains of dead marine organisms over millions of years
- Formed under enormous pressure and temperature in the absence of oxygen.



Formation of Petroleum

A journey from sea creatures to energy fuel





Dead sea organisms sink: Tiny sea plants and animals die and settle at the sea floor.

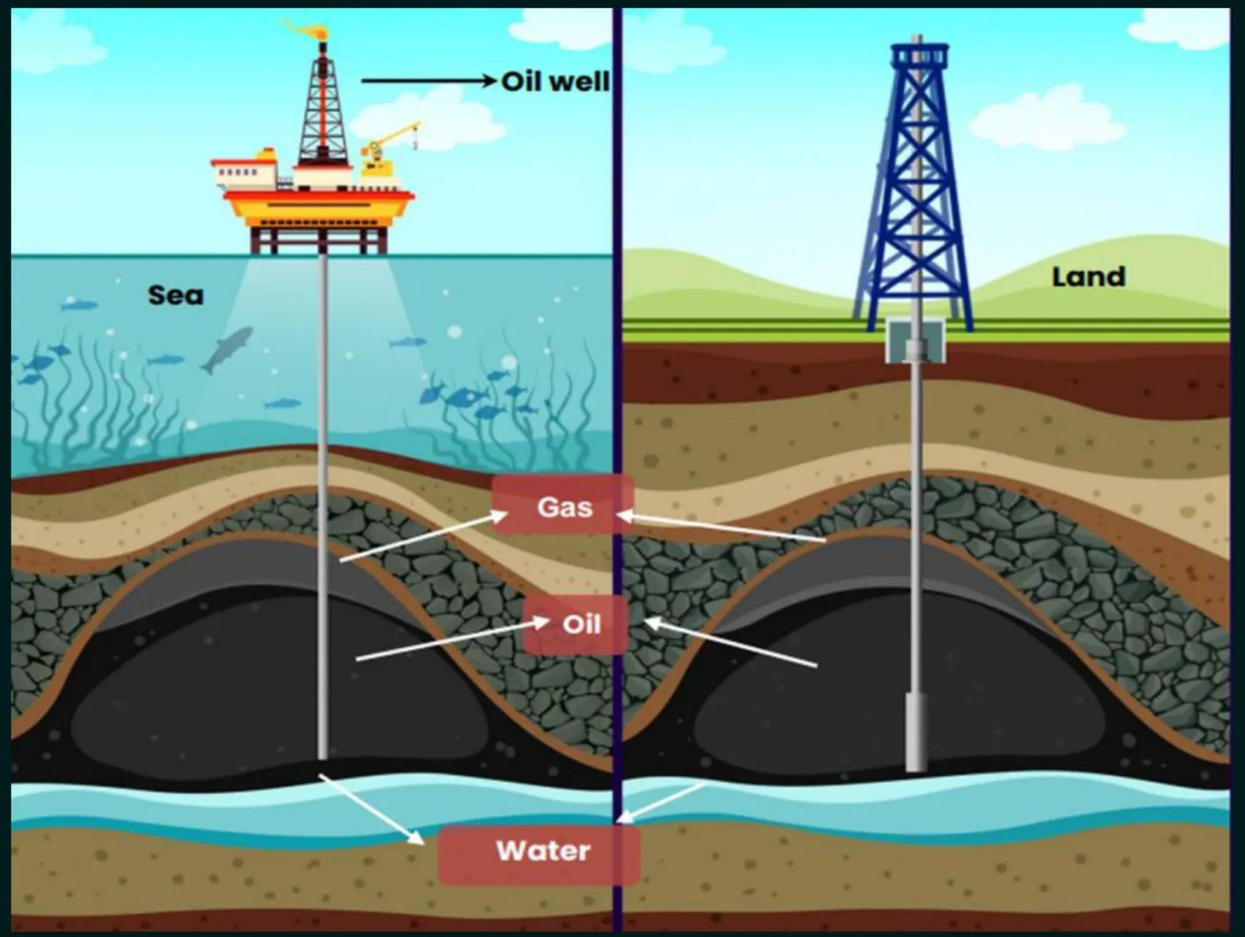
Covered by layers of sand and clay: Over time, more and more sand and clay bury these remains.

Pressure and heat build up: As layers pile up, pressure increases and temperature rises deep underground.

Transformation over millions of years: Without air, under high heat and pressure, the remains slowly turn into petroleum and natural gas.

Structure of Petroleum Reservoirs

#MCQ #2-3m



- Petroleum reservoirs have a distinct layered structure because different substances inside have different weights and properties:
- **Impermeable Rock Layers:** These are solid, dense rock layers that do not let liquids or gases pass through. They act as a cap, trapping petroleum beneath them.

Structure of Petroleum Reservoirs

- **Reservoir Rock:** Porous and permeable rocks underneath where petroleum accumulates. These rocks have tiny spaces that hold oil and gas.
- **Arrangement of Layers in the Reservoir:**

  Top Layer: Natural gas (lighter than oil and water)
  Middle Layer: Petroleum (oil)
  Bottom Layer: Water (heaviest, found below oil)
  These layers form because oil and gas are lighter and don’t mix with water.

Extraction of Petroleum

Drilling wells

Pumping oil and gas to the surface

Petroleum in refinery for further processing

Refining of Petroleum Products

How does refining work?

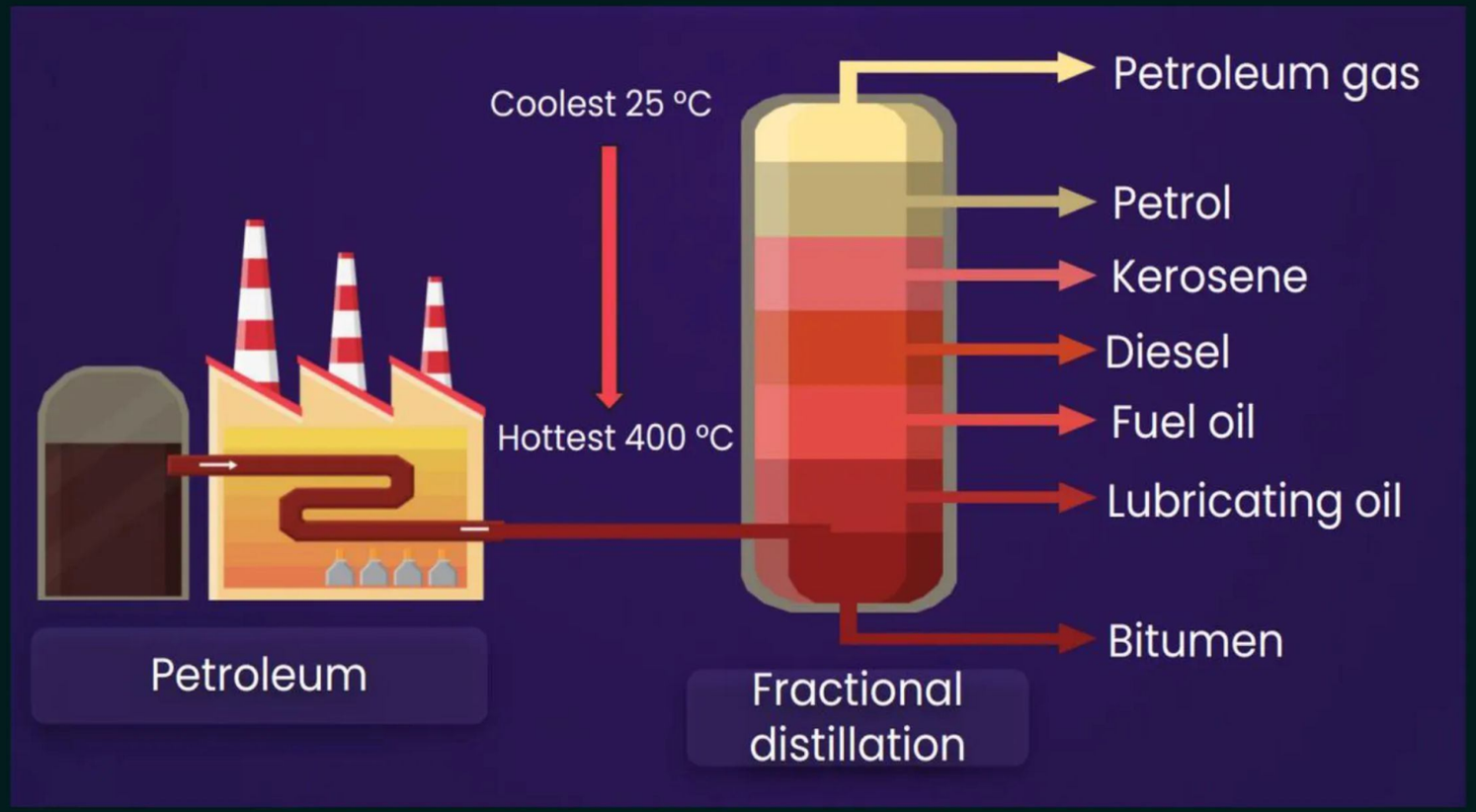
- Refining happens in big factories called petroleum refineries.
- Crude petroleum is heated in a tall tower called a fractionating column.
- Different parts boil at different temperatures and turn into gases at different heights inside the tower.
- These gases are collected separately and cooled into liquids called fractions.

Why refining is important?

- It helps us get different useful products like petrol, diesel, kerosene etc., from one raw material.
- These products power our vehicles, homes, and industries.
- It provides materials to make plastics, medicines, and fertilizers.
- Refining makes petroleum safe and useful for everyday life.

Refining of Petroleum Products

- Process of separation of different constituents from petroleum.
- Separated by the principle of fractional distillation, which makes use of the difference in boiling points of different constituents.



Uses of Constituents

Petroleum gas	Petrol	Kerosene	Diesel
			
Fuel for home and industry	Fuel in automobiles	Fuel in jet aircrafts	Fuel in buses and trucks

Fuel oil	Lubricating oil	Bitumen	Paraffin wax
			
Ships	Lubrication	Roads and paints	Candles

Petrochemicals

- Petrochemicals are useful chemical substances derived from petroleum and natural gas.
- They are used in the manufacture of various products such as detergents, synthetic fibres (like polyester, nylon, and acrylic), polythene, and other man-made plastics.
- Hydrogen gas obtained from natural gas, which is used in the production of fertilizers like urea, is also considered a petrochemical.

Uses of Petrochemicals

- **Detergents**: Used for cleaning clothes, dishes, and in industries.
- **Synthetic Fibres:** Such as polyester, nylon, and acrylic. These fibres are used to make clothes, carpets, and other fabrics.
- **Polythene and other plastics:** Used widely in packaging materials, containers, toys, and household goods.

Petrochemical products

Uses of Petrochemicals

- **Fertilisers:** Hydrogen from natural gas is used to manufacture urea, a common fertiliser essential for agriculture.
- **Medicines:** Many medicines and pharmaceutical products are made using petrochemicals.
- **Cosmetics:** Ingredients in perfumes, shampoos, and lotions come from petrochemicals.
- **Other Products**: Petrochemicals are also used in making paints, medicines, explosives, and cosmetics.

Formation of Natural Gas

Dead Sea Organisms: Millions of years ago, tiny sea plants and animals lived in the oceans. When they died, their bodies sank to the sea floor and piled up over time.

Burial: These remains were gradually covered by thick layers of sand and clay. Because of this, the remains were protected from air and did not decay completely.

Transformation: Over millions of years, the weight of the layers above caused high pressure and temperature. This heat and pressure slowly transformed the buried remains into natural gas and petroleum.

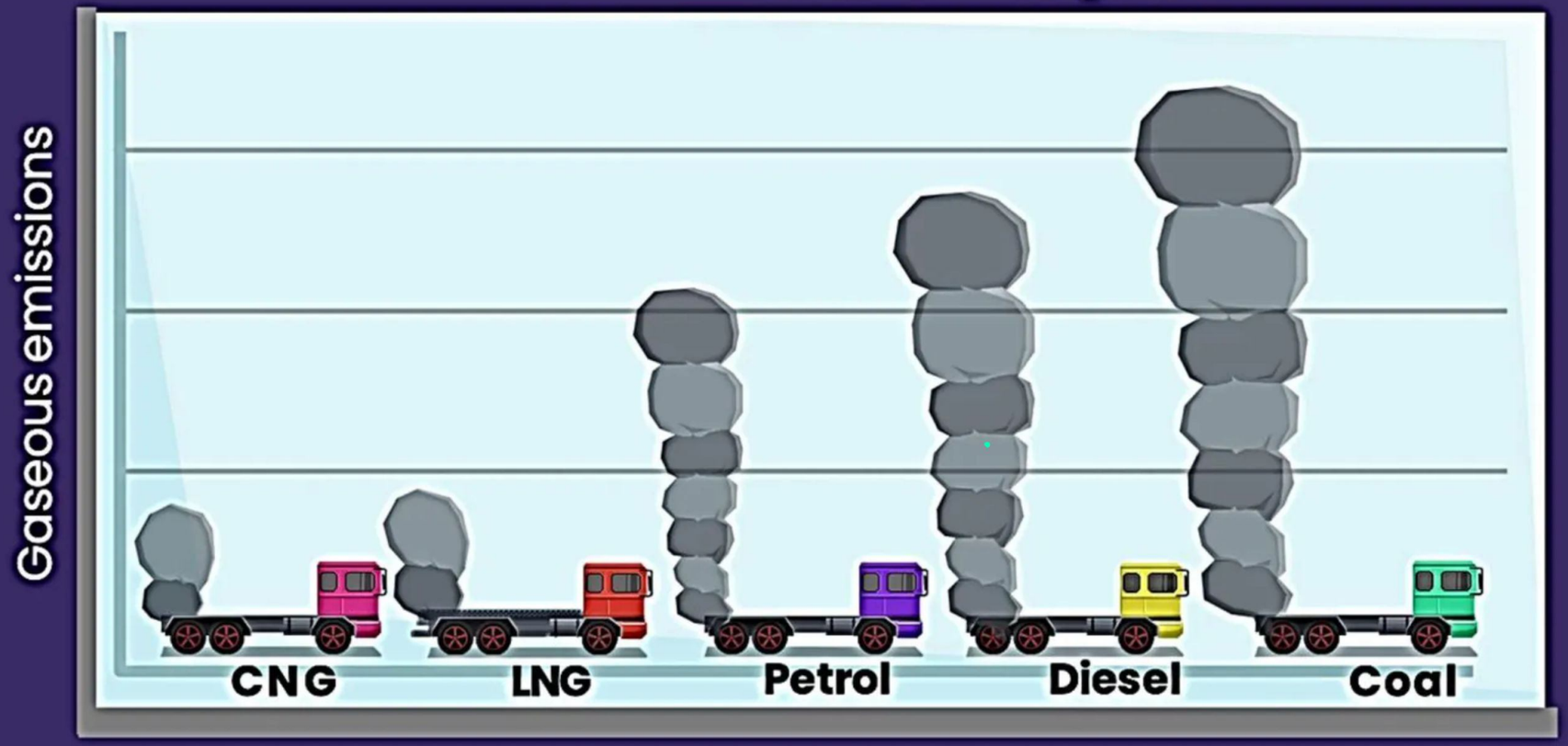
Trapping: The natural gas and oil moved into porous rocks but were trapped beneath hard, impermeable rock layers, forming underground reservoirs that we extract today.

Uses of Natural Gas

* Industries
* Thermal Power Plants
* Transportation
* Home

Environment and CNG

Unlike coal, petrol, and diesel, CNG and LNG do not emit soot, smoke, and harmful gases.



Gaseous emissions are lesser for CNG and LNG.

Natural Gas Reserves in India

#MCQ

Tripura

It is one of the earliest and important sites where natural gas is found and extracted

Rajasthan

It also has rich natural gas fields that contribute to the local and national supply

Maharashtra

It hosts several natural gas reserves, including offshore fields in the Arabian Sea

Krishna Godavari Delta

it is one of the largest and most productive natural gas reserves

Pollution

Air Pollution

Harmful gases

Less visibility

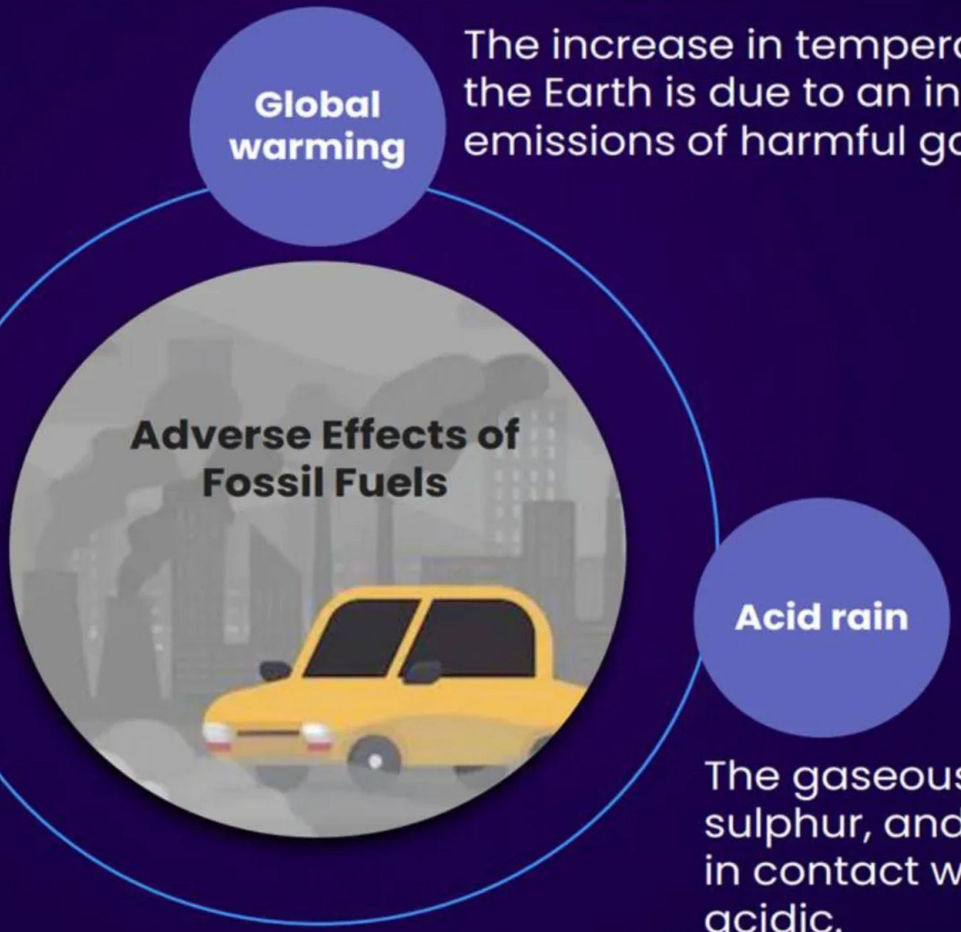
Acid rain

Respiratory diseases

Pollution

#3m

Important



Pollution

Coal mining

Deforestation

Water contamination

Soil degradation

Explosive accidents in mines

Petroleum and natural gas extraction

Water contamination due to oil spills

Sustainable Energy Practices

Shifting to cleaner alternatives

Use fossil fuels wisely

Renewable Energy Sources

Clean fuel technologies

Energy Conservation

Community efforts

Promote public transport

Homework

How are fossil fuels different from other energy sources like Sun, Water, Wind, etc.?

Resources → Natural → Exhaustible → Fossil fuels
→ Human-made → Inexhaustible

Coal
- Uses
- formation
- Coke, Coal Tar & Coal Gas

Petroleum
- Uses
- formation
- fractional distillation

Natural Gas
- Uses
- formation
- Reserves in India

- *Environmental Impacts
- *Sustainable Practices

Thank You