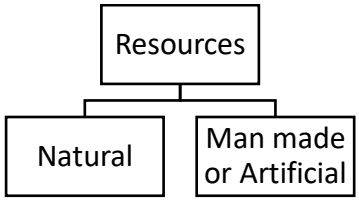
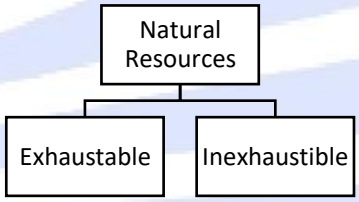
1.



Natural	Man made or Artificial
• Petroleum • Coal • Air • Water • Things obtained from nature – plants, animals, soil, minerals etc.	• Electricity • Things that are created by us (man made). eg. Plastics

2.



Exhaustible	Inexhaustible
• Limited • Can be exhausted by human activities • Also called non-renewable resources • Coal, petroleum, water, forest, minerals and fossil fuels	• Unlimited • Do not get depleted by human activities • Also called renewable resources • Sunlight, wind

3. Fossil fuels: Energy rich fuels made of Carbon compounds. Exhaustible, Formed by decomposition of dead plants and animals that were buried under extreme heat and pressure.

3.1 Coal: Slow process of conversion of dead Vegetation into coal is called Carbonisation. Coal was formed 300 million years ago. Coals burns in air lo produce heat energy and Carbon dioxide. Used in industries and in thermal power plants to produce electricity.

3.1.1 Destructive Distillation of Coal:

Heating of coal in limited supply of air gives ($1000^{\circ}C$). Coke, coal tar and coal gas.

3.1.2 Coke: Porous, black. Left behind as residue. Almost pure form of Carbon. (90% Carbon) Used in manufacture of steel and in extraction of metals from their ores. Preferred over coal as it bums without smoke.

3.1.3 Coal tar: Thick, black liquid with an unpleasant smell. Used in the manufacture of - synthetic dyes, drug, pesticides, perfumes, naphthalene balls, paints, plastics.

3.1.4 Coal gas: A mixture of hydrogen, methane, carbon monoxide and other gases. Used lo light street lights and in many industries.

3.2 Petroleum aka Crude oil / Black gold.

Dark colored, viscous liquid, Many products are obtained by refining of petroleum. It has great economic value (Black Gold).

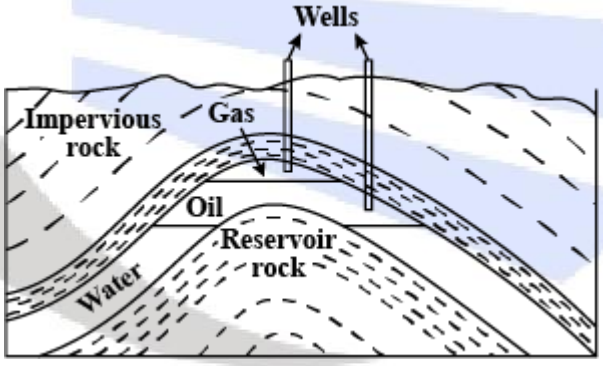
3.2.1 Refining of Petroleum is done in refineries. Process is called Fractional Distillation. The different products are separated on the basis of their boiling points. Since different components have different boiling points, they condense at different hight in the fractionation column. (Lower boiling point towards the top)

3.2.2 Fractions of petroleum and their uses

Constituent	Uses
• Petroleum gas in liquid form (LPG-Liquefied Petroleum gas)	• Fuel for home and industry
• Petrol	• Motor fuel, aviation fuel, solvent for dry cleaning.
• Kerosene	• Fuel for stoves, lamps and for jet aircrafts.
• Diesel	• Fuel for heavy motor vehicles, electric generators.
• Lubricating oil	• Lubrication
• Paraffin wax	• Ointments, candles, Vaseline etc.
• Bitumen	• Paints, road surfacing (Earlier coal tar was used for surfacing roads).

3.2.3 Petra (rock) and Oleum (oil) are the source for the word petroleum. It is mixed from between the rocks under Earth.

Petroleum was formed from the organisms lining in the sea. As these organisms died, their bodies settled at the bottom of the sea and got covered with sand and clay. Over millions of years, absence of air, high temperature and high pressure turned the dead organisms into petroleum and natural gas.



Layer of Petroleum oil and gas is above that of water. Oil and gas are lighter than water and do not mix with it.

3.3 Natural Gas: Easy to transport though pipes. Natural gas is stored under high pressure as Compressed National Gas (CNG). It is used for power generation.

3.3.1 CNG is a cleaner fuel. Less polluting. can be used directly for burning in homes and factories. (Vadodara, Deli).

Natural gas is used as raw material for many chemicals and fertilizers. National gas is found in India in Tripura, Rajasthan, Maharashtra and in the Krishna Godavari delta.

CNG is national gas scored under high pressure. It is used in vehicles and in power generation.

Petrochemicals are the chemicals derived from Petroleum and natural gas.

3.4 Judicious use of Fossil fuels.

Formation of coal and Petroleum is a very slow process and later millions of years. The conditions required for their production cannot be created in the laboratory. Since they are non-renewable and cannot be made in the laboratory, we must use them wisely. We should also look for alternative fuels.

3.4.1 Harmful results of burning fossil fuels.

1. Air pollution: Harmful gases like oxides of sulphur. Nitrogen and carbon are produced along with harmful particulate matter.
2. Global Warming: Excessive production of green house gases, due lo burning of fossil fuels, increases the amount of heat absorbed by the atmosphere. Rising temperatures can lead to global warning. Melting of glaciers will lead to flooding of coastal areas.
3. Acid Rain: Burning fossil fuels produces oxides of Carbon (CO_2, CO), Nitrogen (NO_2, NO) and Sulphur (SO_2). These oxides dissolve in rain water to form acids like sulphurous acid and Nitric acid. These acids can lead is corrosion of marble (Taj Mahal) and also cause harm to plants and animals.

3.5. PCRA

Petroleum Conservation Research Association (PCRA) of India advises people on judicious we of posse fuels.

- These fuels should be used only when necessary.
- Develop alternative sources of energy -Solar, wind, thy ho etc.
- PCRA advices people on how to save petrol/diesel white driving.

Tips by PCRA:

- Drive at a constant and moderate speed as far as possible. as possible.
- Switch off the engine at traffic lights or at a place where you have to wait.
- Ensure correct tyre pressure.
- Ensure regular maintenance of the vehicle.