Science & Technology CLASS-2

Topic - Different Nature of fuel, Renewable Energy

Anti-knocking Agent

Petrol
- Methanol, Ethanol
- Tetra Ethylead (TEL)
- Benzene Toluene Xylene (BTX)

Octane No → Petrol grading (83, 86)

Cetane No → Diesal grading

Coal burning → CO_2, NOx, SO_2
- Plant
- Animal.

Gasohal — Gasoline (Petrol) + Ethanol

90% + 10%

Ethanol ← source: Sugarcane, Maize Plant

Anti Knocking Agent

Gaseous Nature of fuel → maxm calarific value.

LPG — Propane & Butane — (Ethyl Mercapton mixed for smell)
CNG — Methane
Hydrogen — H_2

Problem with Gaseous nature of fuel

1. Odourless
2. Burning temp — normal room temp.
3. Difficult to carry

Note Point

LNG Terminal in India

Dabhal, Hazira, Petronet

Gaseous Nature of fuel

↓

Green fuel — Heat ↑ — Pollution ↓

↓

Environmental Friendly

⇒ Natural Gas

CNG (Compressed Natural Gas)
PNG (Piped Natural Gas)
LNG (Liquified Natural Gas)

PNG → Cooking Gas Connection

↳ PMUG Scheme

CNG — (CH_4)

cg

1. Biogas & Biotoilet
2. Coal bed Methane
3. Shale Gas (2004, 2014, 2016)
4. Clathrates / Gashydrates / Methane Hydrates. (2019)

Biogas & Biotoilet

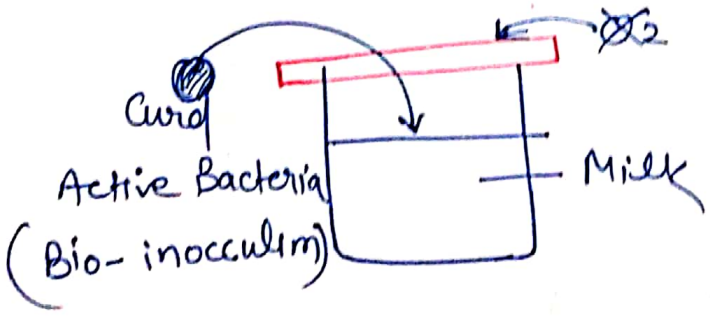
Terminology

(i) Microbial Acitvity — Role of Micro organism

(ii) Anaerobic Respiration → ~~O_2~~ — Energy

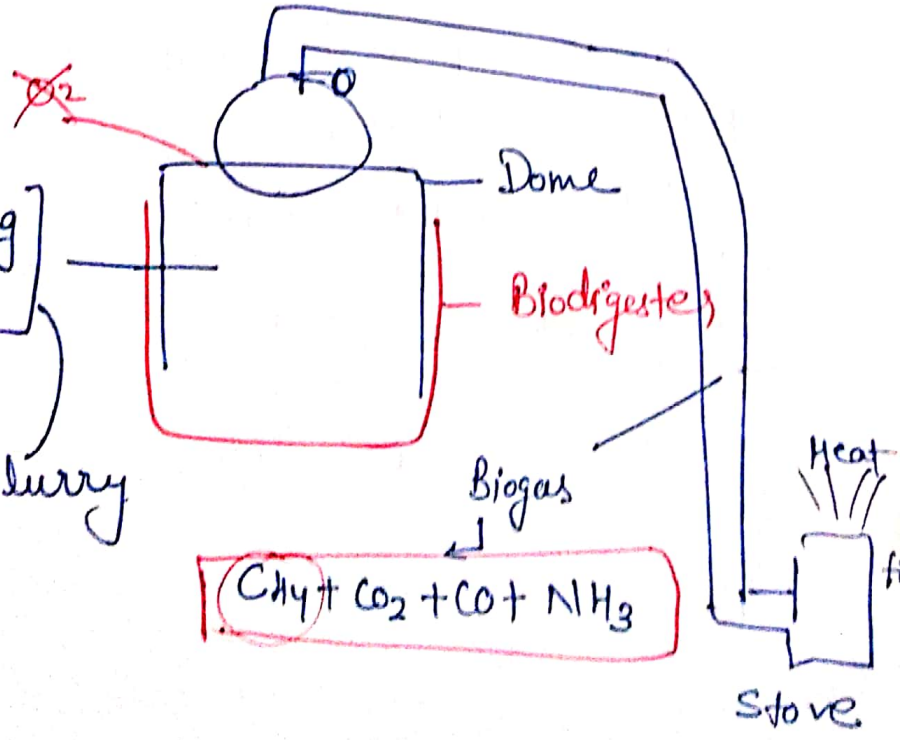
(iii) Bio-inoculum

(iv) Decomposers / Decomposer



Biogas System

organic waste + Bacteria → cow dung + water (1:1)



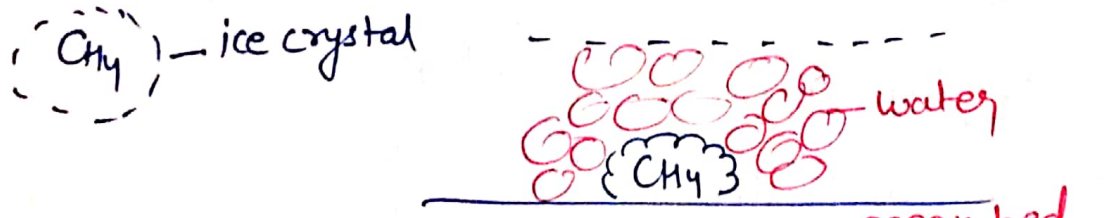
Note 40-60% CH_4 is enough for burner uses. but as a CNG, CH_4 % should be 80-90% or beyond it. This is called Methane Enrichment.

Biotoilet — Provision came in 2015 Budget, with Allocation ₹ 1000 Cr → Train Coaches (DRDO + IRCTC) — Faecal Discharge

Clathrates / Gas Hydrates / Methane Hydrates

These are also methane reserve

firstly identified at Polar regions — 2%
Ocean bed — 98%

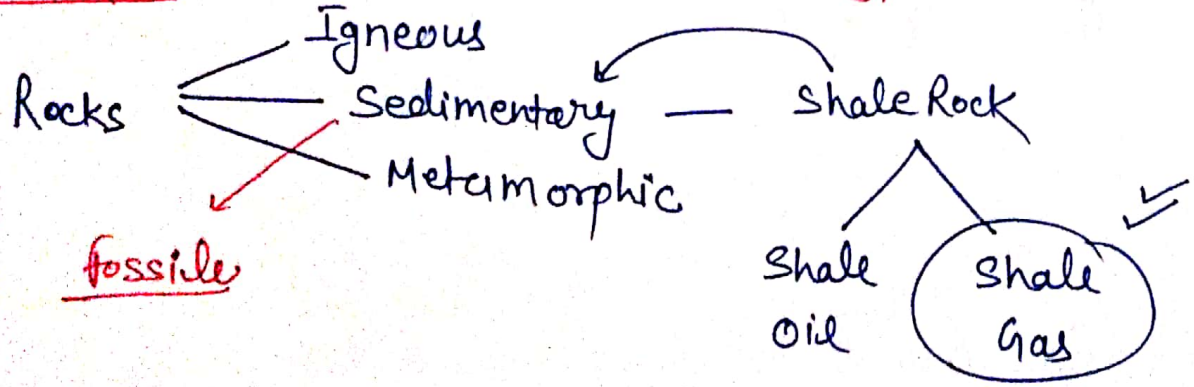


[more X3 time then present known fossile fuel]

[Gulf of Mannar in India]

Shale Gas

Type ——— subtype



Shale Gas <- CH_4, Propane, Butane

Shale Gas Reserves World wide

1. China
2. Argentina
3. Algeria
4. USA
:
11. India

Exploration Technology of Shale Gas

1. Hydraulic fracturing
2. Horizontal Drilling

Shale Gas Reserves in India

1. Cambay basin
2. Assam - Arakan basin
3. Gondwana Region
4. Indo Gangetic Plain
5. Krishna Godavari basin
6. Cauvery basin

According to MoPNG

↓

Ministry of Petroleum and Natural Gas

→ Guar (Cluster bean) → Fodder Crop.

→ legume (Pulses Group) } Good Bio fertilizer

Crop Rotation

→ Arid & Semi Arid Region
(Rajasthan to Pakistan)

Guar Gum → was in high demand
↓ before 2014
Hydraulic fracturing
Synthetic Guar Gum
2016

→ Guar Gum also used in food item for thickness.
eg - ice cream, tomato ketchup.

Renewable Energy Vast Potential?

① Near to Equator — Good Solar Intensity
Sunny Day - 340+ day } Solar Energy

② Dominating Coastal Regions — Tidal Energy (Ocean Energy)
Good Wind speed - (Wind Energy)

③ Minimum speed of wind — 8 km/H

Average wind speed of India — 10 km/H

(4) More then 200 location — as Geothermal Energy Source

(5) Biodiversity Rich — Biomass Energy.

Renewable Energy

Advantages

> Inexhaustable
> Use Again & Again
> No/min Pollution
> Long Life Span

Disadvantages

> High initial cost
> need of more space
> Dependent on weather
> They are not primary source of energy.
> it takes time in energy generation.

Solar Energy

= on 1% Solar Radiation Receive by Earth Surface.

Utilise in 3 ways

① Photosynthesis

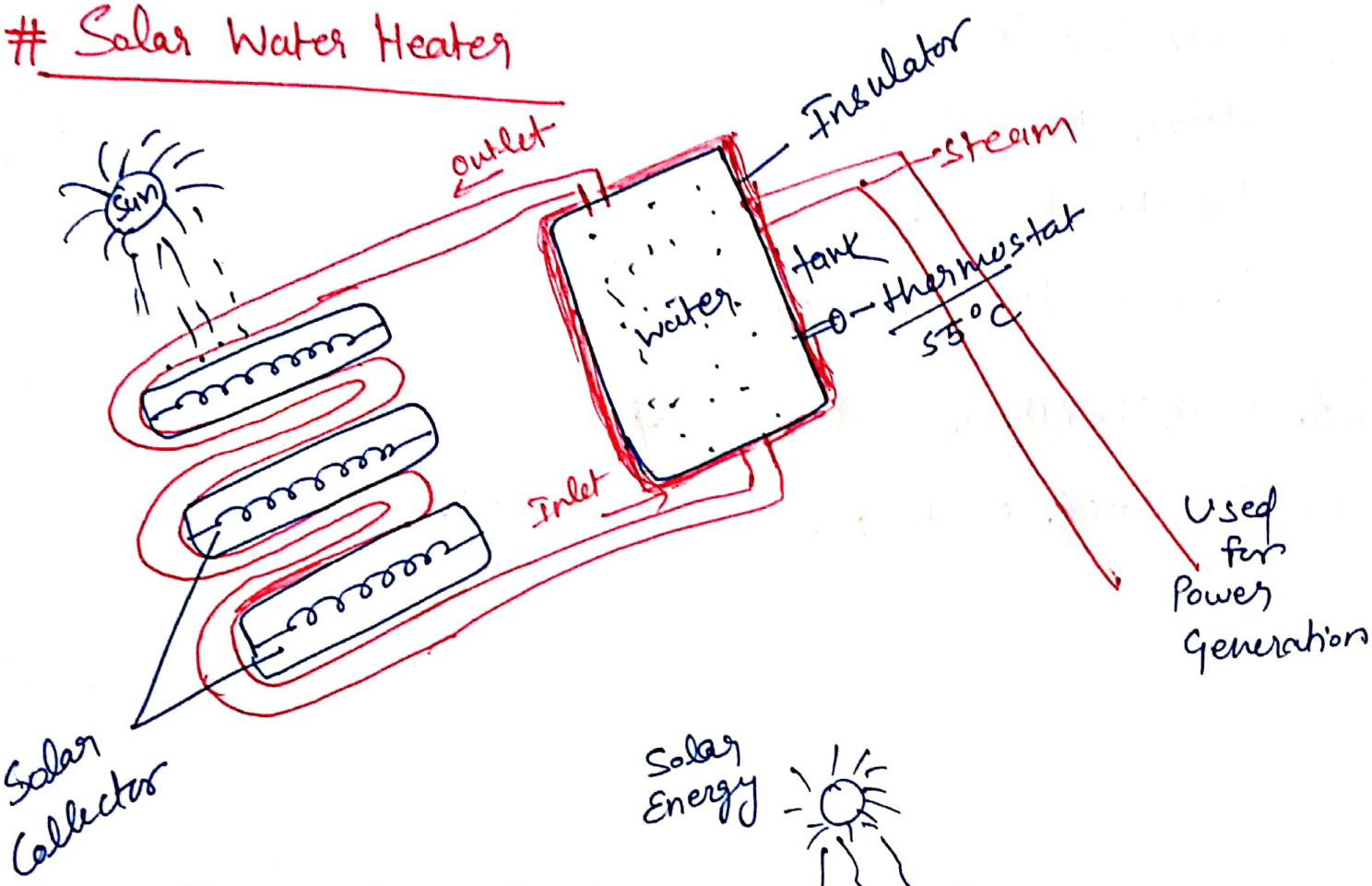
② Solar Energy into thermal Energy (heat)
- Solar water heater
- Air heater
- Solar Pond heater
- Solar Cooker heater

③ Photovoltaics (PV) / Solar Panel

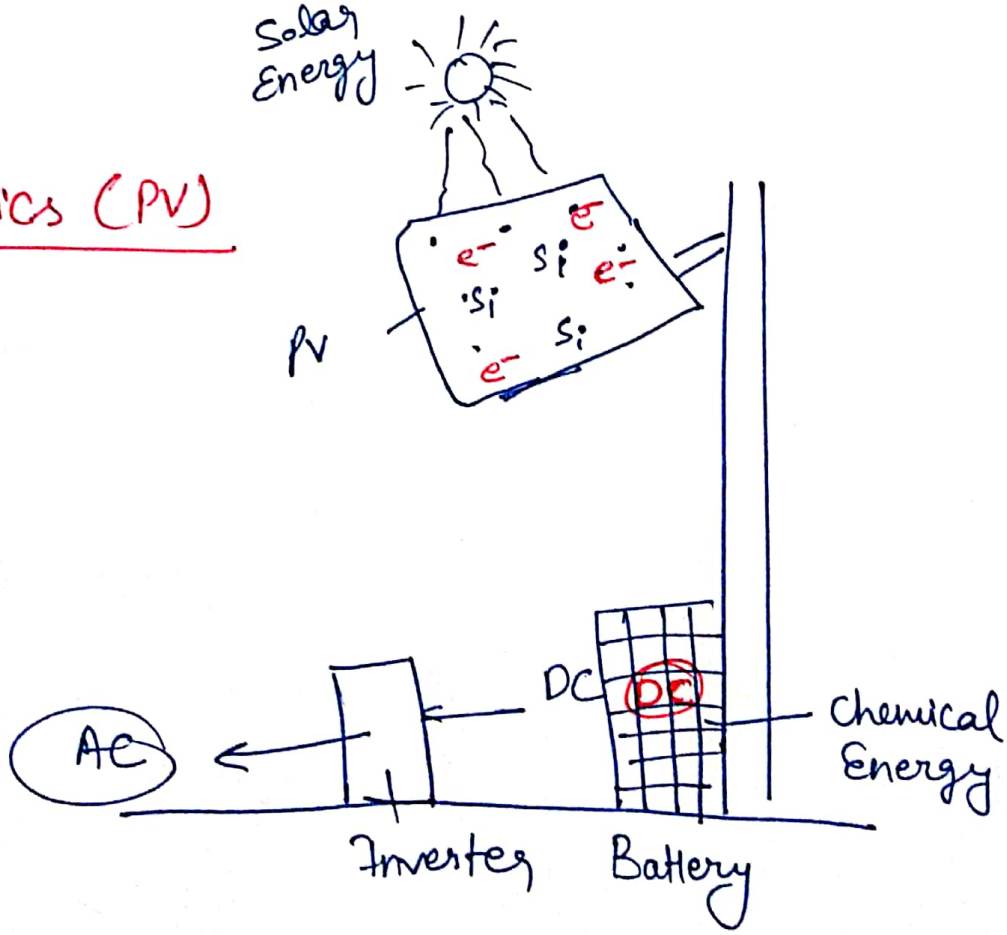
Solar Energy → Electrical Energy

* Asia's first & Largest Solar Pond heater in Bhuj (Gujarat)

Solar Water Heater



Photovaltaics (PV)



Solar Energy & its Utilization

1

Solar Tariff (2018 PJ)

Saffron Revalution

Target of S.E

Government Programme / Scheme

Q. Coal Tariff vs Solar Tariff ?

Q. Solar Tariff is cheaper than Coal Tariff ?