

Extraction of Hydrocarbons

The utilization of hydrocarbons for powering large engines polluting the air and water contributed to the phenomenon of global warming.

- About: The term 'hydrocarbon' means compounds of carbon and hydrogen only. Hydrocarbons are the critical energy storage molecules within all major types of fossil fuels (including coal, oil, and natural gas) and biofuels.
- Burning hydrocarbons in the presence of oxygen (O₂) produces carbon dioxide (CO₂) and water (H₂O).
- Formation: The geological forces within the Earth's crust subjected dead organisms to heat and pressure, resulting in the accumulation of hydrocarbons within rock formations.
- Forms of Hydrocarbons: The most common forms in which these hydrocarbons exist in subterranean rock formations are natural gas, coal, crude oil, and petroleum.
- They are usually situated in subterranean reservoirs formed when a denser, more durable rock layer rests atop a less resistant one. This creates a lid that causes hydrocarbons to accumulate below it.
- These formations play a crucial role because without them, the hydrocarbons would rise to the surface and disperse.
- Uses of Hydrocarbons:
 - Feedstock in petrochemical plants to make chemicals, plastics, and synthetic rubber
 - Fuels for heating, cooking, and drying
 - Fuels for transportation
 - Additives for motor gasoline production
 - Diluent (a diluting or thinning agent) for transporting heavy crude oil
- Assessment of Porosity and Permeability: Experts use the tools, methods, and techniques of the field of petroleum geology to assess these rocks, including to check for their porosity and permeability.
- If a rock formation is highly porous, it could hold a larger quantity of hydrocarbons. Similarly, the more permeable a rock is, more easily the hydrocarbons will flow through it.
- Source of Hydrocarbon: The primary source of hydrocarbons in this rocky underground is called kerogen: lumps of organic matter.
- Kerogen can be deposited from three possible sources: as the remains of a lake (lacustrine), of a larger marine ecosystem, or of a terrestrial ecosystem.
- Kerogen Degradation and Hydrocarbon Yield: Over time, the rocks enclosing the kerogen can undergo heating and compression, exerting pressure on the kerogen, leading to its degradation.
- Depending on its origin, lacustrine kerogen produces waxy oils, marine kerogen yields oil and gas, while terrestrial kerogen results in light oils, gas, and coal.
- Source Rock Assessment: The rock containing the kerogen is called the source rock, and petroleum geologists are tasked with locating it, understanding its geophysical and thermal characteristics, and characterising its ability to yield hydrocarbons.
- They also undertake modelling activities informed by observational data and dig smaller exploration wells to estimate the amount of hydrocarbons there, and report it to the relevant regulatory body.

Hydrocarbon Potential Of Sedimentary Basins of India:

Category-I: These are commercially produced covering 30% of total basinal area (1.0 million sq km) and a total hydrocarbon of 21,487 MMTOE, which is 86% of the country's total that includes discovered as well as risked undiscovered potential. These 7 basins are namely:

- Krishna-Godavari (KG)
- Mumbai Offshore
- Assam Shelf
- Rajasthan

- Cauvery
- Assam- Arakan Fold Belt
- Cambay.

Category-II basins: These which are discovered but awaiting development, cover 0.78 million sq km (23% of total basinal area), holding 8% (1,951 MMTOE) of the total hydrocarbon in place. These include:

- Saurashtra
- Kutch
- Vindhyan
- Mahanadi
- Andaman

Hydrocarbon Exploration and Licensing Policy (HELP):

About: HELP is an exploration and production policy of the Government of India that replaced the New Exploration Licensing Policy (NELP).

Objective: To enhance domestic oil and gas production by intensifying exploration activity and investment.

Open acreage licensing policy: Through this, an explorer can study and bid for any block in accordance with its competitive advantage.

Revenue sharing model: This encourages cost efficiency in mining operations by replacing the profit-sharing contract established by NELP.

The contractor pays the government a share of its revenue (net of royalty) as per the contract.

Marketing and pricing freedom: The contractor can sell crude oil in the domestic market through a transparent bidding process.

ENVIRONMENT

The Coral Fort Initiative : An Innovative Solution to Protecting Coral

Researchers in South Florida are pioneering an innovative approach to safeguarding laboratory-grown coral from predatory fish, utilizing biodegradable materials to aid in coral reef restoration efforts.

Marine researcher Kyle Pisano and his partner, Kirk Dotson, have developed the Coral Fort—a biodegradable cage crafted partly from drinking straws—to enhance the survival rate of transplanted coral. Predators like parrot fish pose a significant threat to newly transplanted coral, often causing survival rates to plummet below 40%.

Coral Fort (A biodegradable Cage)

- The cage comprises a limestone disc encircled by eight vertical drinking straws made from a biodegradable material called polyhydroxyalkanoate (a biopolymer derived from canola oil).
- These straws, initially designed for boba drinks, provide adequate protection for the coral before harmlessly dissolving in the ocean.
- The Coral Fort, designed to dissolve over time, eliminates the need for maintenance or removal.

Significance :

- It helps in reducing the labor-intensive process of protecting and maintaining coral.
- This innovative solution not only enhances the survival of transplanted coral but also streamlines restoration efforts crucial for preserving oceanic biodiversity and coastal resilience against natural disasters like hurricanes.

Corals :

- Corals are colonial marine invertebrates of the phylum Cnidaria.
- Polyp: An individual coral is known as a polyp.
- A polyp is a sac-like animal, excretes an exoskeleton near the base.
- Polyps form a symbiotic relationship with plant-like cells called zooxanthellae (unicellular dinoflagellates).
- Symbiotic Relationship: Coral Polyp can ingest tiny organisms called plankton & other small creatures but still majority of their energy and nutrients they get from the zooxanthellae living within their tissues which also is responsible for giving the corals its color. In return corals provide the zooxanthellae with shelter and protection.

Coral Reefs :

- Coral reefs are formed when thousands of polyps living together in a coral colony secrete calcium carbonate exoskeleton beneath it. Over time, the skeletons of many coral colonies add up to build the structure of a coral reef.
- Coral reefs, often referred to as the “rainforest of the sea,” are crucial ecosystems supporting over 25% of marine species. However, the decline of coral populations due to various factors, including rising ocean temperatures, has prompted urgent conservation measures.

Significance of coral reef ecosystems

- Coral reefs protect coastlines from harsh ocean storms and floods.
- They serve as nurseries, and breeding and feeding grounds for marine wildlife.
- They provide livelihood opportunities through tourism and fishery for coastal communities. According to the National Oceanic and Atmospheric Administration (NOAA), about 500 million people worldwide are dependent on coral reefs for livelihood.

Parrot Fish relationship with Corals :

- Named for their bright colors and beak-like mouths, Parrotfish are large herbivores that graze on the algae growing atop hard corals.
- They digest the algae and excrete the coral as fine sand.
- Coral sand found on our reefs and even helps to form reef islands.
- It's estimated a single parrotfish could produce up to 90 kilograms of sand each year.
- In the process of feeding on coral polyps, parrotfish may actually help spread the beneficial zooxanthellae algae that corals cultivate.
- This sort of cross-pollination results in more genetically diverse and resilient reefs.
- An even more important benefit of all this chewing on the reef is the removal of light-leaching algae from the surfaces of corals.

PRELIM FACT
1. Health drinks

The Indian government, has instructed e-commerce platforms to stop categorizing certain beverages, including Bournvita, as “health drinks” on their sites.

This directive follows clarification from the Food Safety and Standards Authority of India (FSSAI) that there are no defined standards for the term “health drink.”

The government aims to prevent misleading information and ensure transparency for consumers, prompting e-commerce platforms to remove such beverages from the health drinks category.

The Food Safety and Standards Authority of India (FSSAI) is a statutory body that regulates the manufacture, storage, distribution, sale, and import of food, and establishes standards to ensure food safety.

It is administered by the Ministry of Health and Family Welfare.

2. Shrinkflation

- Shrinkflation, the reduction in product sizes while maintaining prices, is resurfacing in the fast-moving consumer goods (FMCG) industry due to rising input costs.
- Brands like Clear, Frooti, and Smooth are introducing smaller packaging at the same or slightly reduced prices to cope with inflation.
- The trend is attributed to various factors, including rising prices of commodities like crude oil, palm oil, coffee, cocoa, and sugar, alongside global supply chain disruptions and geopolitical tensions.
- Shrinkflation refers to the practice employed by manufacturers wherein the size or quantity of a product is reduced while keeping its price the same or slightly adjusted.
- This strategy allows companies to maintain profit margins amid rising production costs.
- Shrinkflation often goes unnoticed by consumers initially but can lead to dissatisfaction as they **realize they are receiving less for the same amount of money.**

3. Special Rupee Vostro Account (SRVA)

The Indian government has simplified the payment mechanism for traders importing pulses from Myanmar by implementing the Rupee/Kyat direct payment system through the Special Rupee Vostro Account (SRVA) via Punjab National Bank.

What is SRVA?

SRVA is an account that domestic banks hold for foreign banks in the former's domestic currency, the rupee, which allows domestic banks to provide international banking services to their clients who have global banking needs without having to be physically present abroad.

The SRVA is an additional arrangement to the existing system that uses freely convertible currencies and works as a complimentary system.

It has three important components:

1. All exports and imports must be denominated and invoiced in domestic currency (e.g. Rupee)
2. The exchange rate between the currencies of the trading partner countries would be market-determined
3. The final settlement also takes place in domestic currency (e.g. Rupee)

This mechanism aims to streamline trade transactions and reduce costs associated with currency conversions.

4. Gopi Thotakura (1st Indian Space Tourist)

- Gopi Thotakura, an entrepreneur and pilot, is set to be the first Indian space tourist on the NS-25 mission by Blue Origin (an American Space startup, founded in 2000 by Jeff Bezos, the founder of Amazon).
- Space tourism is a burgeoning sector allowing individuals to experience space travel for recreational or business purposes. It encompasses:
 - Suborbital space flights (altitude of 100 km referred to as Karman Line)
 - Orbital Space Flights (altitudes over 400 kilometres)
 - Lunar space tourism (trips to the moon).
- Challenges facing space tourism include its high cost, environmental concerns regarding rocket emissions, and safety issues. Despite these challenges, the space tourism market is growing rapidly, with increasing interest from both tourists and industry players.

About Kármán Line

- It is the boundary between Earth's atmosphere and outer space, located approximately 100 kilometres (62 miles) above sea level. It is named after Hungarian-American engineer and physicist Theodore von Kármán, who first calculated the altitude where the atmosphere becomes too thin to support conventional aircraft flight.

5. Satellite Calls

- Chinese scientists have developed the world's first satellite that enables smartphones to make direct calls through it, bypassing mobile towers.
- This innovation aims to address communication challenges during emergencies, such as natural disasters.
- The satellite, part of the Tiantong Project, symbolizes China's commitment to enhancing communication resilience.
- The Tiantong-1 series, involving three satellites, orbits synchronously at 36,000 kilometres altitude, potentially revolutionizing communication across the Asia-Pacific region.
- Huawei introduced the first satellite-compatible smartphone, followed by other Chinese manufacturers.

6. Ashwagandha

- Ashwagandha, a 3000-year-old Indian herb, is gaining global attention and popularity for its numerous health benefits.
 - Scientific research highlights its potential in stress management, cognitive function, physical performance, and more.
- About Ashwagandha:
- It is an evergreen shrub found in parts of India, Africa, and the Middle East.
 - Used as a medicinal plant, especially in traditional Ayurvedic medicine.

Its supplements are often promoted for stress and anxiety, sleep, male infertility, athletic performance, etc.

ANSWER WRITING

Q. The reservation of seats for women in the institutions of local self-government has had a limited impact on the patriarchal character of the Indian Political Process.”

The reservation of seats for women in local self-government institutions in India, as mandated by the 73rd and 74th Constitutional Amendments, represents a landmark move towards gender inclusion in politics. This policy, aimed at empowering women and ensuring their participation in governance, is pivotal in a country where politics has been predominantly male-dominated.

Positive Impacts:

- **Empowerment and Participation:** The policy has undoubtedly opened doors for women in political spaces, traditionally inaccessible to them. For instance, Meena Behen, the first woman sarpanch of her village, transformed the societal norms that confined women to domestic spaces by forming a self-help group, promoting women’s active participation in community affairs.
- **Policy Influence:** Women in leadership roles have shifted focus towards issues like education and healthcare, as seen in the case of Radha Devi, a village sarpanch who significantly reduced girl drop-out rates in schools.

Challenges and Limitations:

- **‘Sarpanch Pati’ Phenomenon:** The real power is often exercised by the male relatives of the elected women, undermining their autonomy and perpetuating patriarchal norms.
- **Political Barriers:** The lack of political will to support women candidates and the dominance of family politics in India restricts the entry of women without political backgrounds, as observed in the prevalence of the ‘3B brigade’ – beti, bahu, biwi (daughter, daughter-in-law, wife).
- **Gender Bias in Broader Political Sphere:** The legislative history of the Women’s Reservation Bill highlights the persistent gender disparity in politics, with women occupying only 15 percent of Lok Sabha seats, indicating a systemic issue that goes beyond local self-government.

Way Forward:

- **Enhanced Political Training and Support:** Building capacities of women representatives, as done by the project initiated by the Ministry of Panchayati Raj and UNDP, is crucial for effective functioning
- **Gender-Sensitive Policies:** The need for policies that not only reserve seats for women but also actively promote their participation and address gender stereotypes.
- **Wider Political Reforms:** Implementing broader electoral and political reforms, such as the Women’s Reservation Bill in Parliament and state legislatures, to ensure a more balanced gender representation at all levels of governance.

While the reservation of seats for women in local self-governments has marked a significant stride towards gender inclusion in Indian politics, its impact on the deeply entrenched patriarchal character of the political process is limited. The challenges faced by women representatives, stemming from societal norms and political structures, highlight the need for a more comprehensive approach. This approach should not only focus on increasing the number of women in politics but also on empowering them, changing societal attitudes, and reforming the political ecosystem to foster genuine gender equality in governance.

MCQs

1. Consider the following statements the Food Safety and Standards Authority of India (FSSAI):
 1. It is a statutory body under the administration of the Ministry of Consumer Affairs, Food and Public Distribution.
 2. It regulates the manufacture, storage, distribution, sale, and import of food articles, while also establishing standards to ensure food safety.

Which of the statements given above is/are correct?
 (a) 1 only
(b) 2 only
 (c) Both 1 and 2
 (d) Neither 1 nor 2
2. Which of the following best describes ‘Shrinkflation’?

- (a) **The process of reducing the size or quantity of a product while maintaining its price.**
 (b) The act of inflating the size of a product without changing its price.
 (c) The reduction of production costs by increasing the efficiency of manufacturing processes.
 (d) The expansion of a company's product line to include more options for consumers.
3. Which of the following statements accurately describes a Nostro account?
 (a) **It is a bank account held by a bank in a foreign currency in another bank.**
 (b) It is a personal savings account held by an individual in a local bank.
 (c) It is a credit card account provided by a local bank to its customers.
 (d) It is a term deposit account held by a business in a local bank.
4. Which of the following statements best describes the Kármán Line?
 (a) It is the boundary between the Earth's crust and mantle.
 (b) **It marks the point where the Earth's atmosphere ends and outer space begins.**
 (c) It indicates the separation between the Earth's core and mantle.
 (d) It defines the boundary between the Earth's lithosphere and asthenosphere.
5. Which of the following statements about radiation therapy is correct?
 (a) Radiation therapy uses radioactive substances to treat diseases.
 (b) Radiation therapy is only used for treating cancer.
 (c) **Radiation therapy can be used alone or in combination with other treatments like surgery and chemotherapy.**
 (d) Radiation therapy is a surgical procedure to remove tumors.
6. Consider the following statements regarding the 'Satellite calls':
 1. Satellite calls have a shorter latency compared to terrestrial calls.
 2. Satellite phones require a direct line of sight to the satellite for communication.
 3. Satellite calls are generally more affordable than landline calls.
 How many of the above statements is/correct?
 (a) **Only one**
 (b) Only two
 (c) All three
 (d) None
7. Consider the following statements about Ashwagandha:
 1. Asia and Africa are home to the evergreen shrub ashwagandha.
 2. It is an adaptogen known for its stress-relieving properties.
 Which of the statements given above is/are correct?
 (a) 1 only
 (b) 2 only
 (c) **Both 1 and 2**
 (d) Neither 1 nor 2
8. With reference to Hydrocarbons, consider the following statements:
 1. The primary source of hydrocarbons in the rocky underground reservoirs is the kerogen.
 2. Hydrocarbons exist in subterranean rock formations in the form of coal and crude oil.
 3. Only a rock with low porosity can help in the easier draining of hydrocarbons.
 How many of the above statements are incorrect?
 (a) **Only one**
 (b) Only two
 (c) All three
 (d) None
9. Consider the following statements about Meningitis:
 1. Meningitis is the inflammation of the tissues surrounding only the brain caused by bacteria.
 2. Acute Bacterial meningitis is caused by Streptococcus agalactiae.
 3. Uganda's Men5CV vaccine provides protection against multiple strains of the meningococcus bacteria.
 How many of the above statements are correct?
 (a) **Only one**
 (b) Only two
 (c) All three
 (d) None
10. Which of the following statements about 'Larsemann Hills' is correct?
 (a) Larsemann Hills is located in the Andes Mountains of South America.
 (b) The hills are known for their dense tropical rainforests.
 (c) Larsemann Hills are the tallest mountain range in the world.
 (d) **It is a range of hills in Antarctica.**