Super-Hydrophobic Cotton Composite for Oil Spills

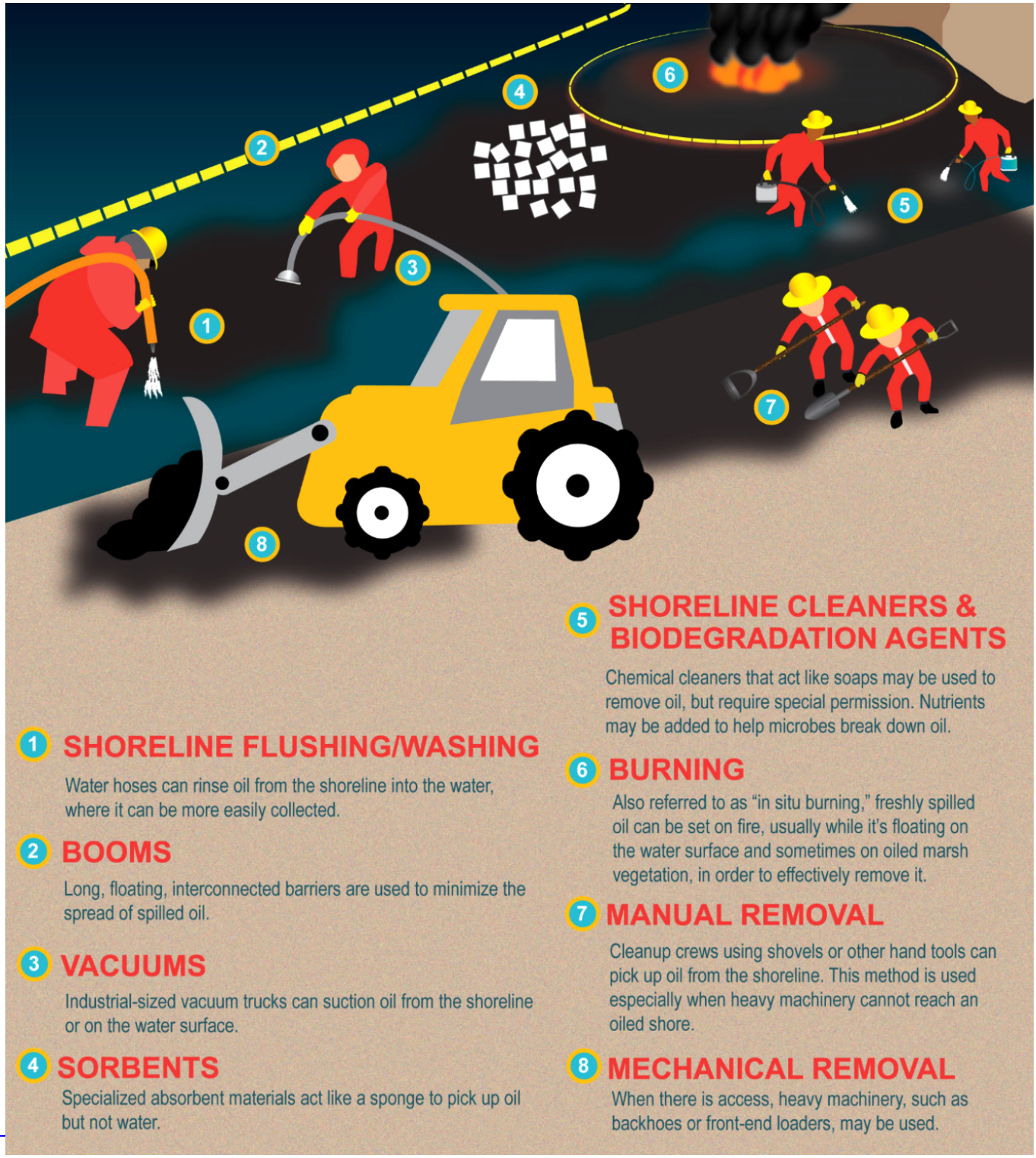
Why in News

Recently, the **Indian Institute of Technology (IIT), Guwahati,** has developed a **super-hydrophobic cotton composite** with **Metal-Organic Framework (MOF)** that can clean-up marine **oil-spill.**

- Earlier, a study confirmed that **Stimulating Bacteria (**Bioremediation**)** with nutrients in the cold seawaters of the Canadian Arctic can help decompose diesel and Other Petroleum Oil **after Oil Spills.**

Key Points

- **About:**
    - It is a **novel MOF composite, which is a highly porous and water-repellent material** and can absorb oil selectively from an oil-water mixture.
        - MOF are **crystalline porous solids** composed of a three-dimensional (3D) network of metal ions held in place by multidentate organic molecules **suitable for solid-phase extraction.**
    - This MOF composite has **great capability for selective separation of the oils from oil/water mixtures** and the separation efficiency lies between 95% and 98%, irrespective of the chemical composition and density of the oils.
    - It can also absorb **large volumes of oils and can be reused for a minimum of 10 times** so that the sorbents can provide more recovery of the spilled oil. Both heavy and light oils can be effectively absorbed by the material, which is easy to prepare, cost-effective and recyclable.
- **Significance:**
    - It will **clean-up the spilled oil from environmental water** (river, sea or ocean water) during oil transportation with high efficiency and large absorption capacity, thus reducing environmental water pollution.
    - It is **environmentally friendly and cost effective.** Such low-cost material will reduce the production cost of the material for large-scale synthesis for real applications, compared to currently available materials.
- **Other Remedies for Oil Spills:**



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Oil Spills

- **About:**
  - It refers to **any uncontrolled release of crude oil, gasoline, fuels, or other oil by-products** into the environment. It can pollute land, air, or water, though it is mostly used for oceanic oil spills.
  - The severe water contamination threatens the health of humans as well as other living species.
  - It has become a major environmental and economic problem, chiefly **as a result of intensified petroleum exploration and production on continental shelves** and the

transport of large amounts of oils in vessels.

        - **Major oil spills** are frequently followed by the **immediate suspension of commercial fishing** and also affect **tourism and commerce** through sea routes.
    - Oil spills that happen in rivers, bays and the ocean most often are caused by accidents **involving tankers, barges, pipelines, refineries, drilling rigs and storage facilities,** but also occur from recreational boats and natural disasters.
- **Related Laws in India:**
    - Presently, **there is no law covering oil spill** as such and its consequential environmental damage in India but India has **"the National Oil Spill Disaster Contingency Plan of 1996 (NOS-DCP)"** to handle such situations.
        - It gives the **Indian Coast Guard** the mandate to coordinate with state departments, ministries, port authorities and environmental agencies to assist in oil spill cleaning operations.
    - In 2015 India ratified the **International Convention on Civil Liability for Bunker Oil Pollution Damage, 2001** (Bunker Convention). Convention ensures adequate, prompt and effective compensation for damage caused by oil spills.
        - It was administered by the International Maritime Organization (IMO)**.**

Source: DTE