

# **UPSC Daily Current Affairs | Prelim Bits 17-07-2024**

# **Bimetallic NiFe systems**

A new study claims that a bimetallic Nickel-Iron layered double hydroxide system is the most efficient for oxygen production through water splitting.

- **Research by** The Institute of Advanced Study in Science and Technology (IASST).
- Nodal Agency- Department of Science and Technology (DST)
- **Finding-** A bimetallic Nickel-Iron layered double hydroxide system **efficiently produces O2 through water splitting**.
- It eliminates the need for trimetallic solutions to enhance productivity.

Water splitting is a sustainable and eco-friendly method to generate green and pure H2 and O2 on a large scale without harming flora and fauna.

- To improve water splitting efficiency, scientists have focused on 2 key reactions i.e.
  - $_{\circ}$  The hydrogen evolution reaction (HER) and
  - The oxygen evolution reaction (OER).
- Composition and Structure- NiFe systems combine nickel (Ni) and iron (Fe) at the molecular level.
- NiFe LDHs are structured with *positively charged* metal hydroxide layers separated by anions and water molecules.
- This structure provides a high surface area and favorable catalytic sites.
- Catalytic Properties- NiFe LDHs are highly efficient catalysts for the OER, a crucial step in water splitting.
- The combination of  $\underline{\it Ni~and~Fe}$  improves  $\underline{\it catalytic~activity}$  and stability.
- **Applications** NiFe systems are extensively used in electrochemical cells for splitting water into hydrogen and oxygen.
- They also explored applications in batteries, supercapacitors, and other energy storage and conversion devices due to their excellent electrochemical properties.
- Advantages- NiFe systems are made from abundant and inexpensive

metals, making them a cost-effective alternative to precious metal catalysts like *platinum and iridium*.

#### Reference

PIB | Bimetallic NiFe systems

# Chandipura virus

Recently 6 children have died due to suspected Chandipura virus Infection (CHPV) in Gujarat.

• Chandipura virus, aka Chandipura vesiculovirus (CHPV), is an **RNA virus**.

RNA virus is a virus that has single-stranded as well as doublestranded RNA as its genetic material.

- It is a *noncontagious* disease.
- Virus Family- Rhabdoviridae family.

The Rhabdoviridae family are bullet-shaped, negative-sense singlestranded RNA (ssRNA) viruses which also includes the rabies virus.

- First identified- In 1965 in Chandipura, Maharashtra.
- **Transmission** Chandipura virus is primarily transmitted through the **bite of infected sandflies** (genus Phlebotomus).
- The virus primarily affects children and has been associated with outbreaks of acute encephalitis in India.
- It is a serious pathogen with a rapid onset of severe symptoms, primarily affecting children in certain regions.
- The virus resides in the salivary gland of these insects, and can be transmitted to humans or other vertebrates like domestic animals through bites.
  - Vector-borne transmission- The primary mode of transmission is through sandfly bites.
  - **Animal reservoirs-** Certain animal species may act as reservoirs for the virus, though this is still under investigation.
  - Environmental factors- Outbreaks have been linked to specific

environmental conditions that favor the breeding of sandflies.

- Symptoms Fever, Headache, Vomiting, Convulsions, Coma.
- **Treatment** There is *no specific antiviral treatment* or vaccine for Chandipura virus infection.
- Prevalance of Disease in India- Significant outbreaks of the disease in India were seen in 2003-04 in states such as <u>Maharashtra</u>, <u>northern</u> <u>Gujarat and Andhra Pradesh</u>.
- The infection has largely remained endemic to the central part of India, where the population of CHPV infection-spreading sandflies and mosquitoes is higher.

#### Reference

Indian Express | Chandipura virus

# Governing rules on civil servants

The Centre has formed a single-member committee to review all documents submitted by probationary IAS officer Puja Khedkar for her civil services candidature.

- All IAS, Indian Police Service (IPS) and Indian Forest Service officers are governed by the <u>All India Services (conduct) Rules</u>, <u>1968</u> from the time they are allotted their service, and begin training.
- AIS (Conduct) Rule 3(1)- Every member of the Service shall always maintain absolute integrity and devotion to duty and shall do nothing unbecoming of a member of the Service.
- **Rule 4(1)** Officers must not use their "position or influence" to "secure employment for any member of his family with any private undertaking or NGO".
- **Rule 11(1)** Officers may accept gifts from close relatives or friends without official dealings on special occasions but must report gifts over Rs 25,000.
- Rule 12- It outlines circumstances for discharging probationers, including being found ineligible or unsuitable by the central government, willfully neglecting probationary studies or duties, and lacking necessary qualities of mind and character.
- Few sub-rules
- Officers should maintain high ethical standards,
  - Integrity and honesty;

- Political neutrality;
- Accountability and transparency;
- Responsiveness to the public, particularly to the weaker sections;
  courtesy and good behavior with the public.
- They must take a decision solely in the public interest.
- Declare any private interests relating to his public duties.
- Not place himself under any financial or other obligations to any individual or organization which may influence him.
- Not misuse his position as civil servant and not take decisions to derive financial or material benefits for himself, his family or his friends.

#### Reference

The Indian Express | Rules governing civil servants

### **Squalus Hima**

Scientists from the Zoological Survey of India (ZSI) have discovered a new species Squalus hima from Sakthikulangara fishing harbour in Kerala along the Arabian Sea.

- It is a newly discovered dogfish shark characterized by smooth dorsal fin spines.
- It is commonly known as  $\underline{\mathit{spurdogs}}$ .
- Genus Squalus and Centrophorus.
- Family- Squalidae.
- This species has been largely misidentified with S. mitsukurii and S. Lalannei.
- **Distinction** Squalus hima sp.nov differs from other species by the number of precaudal vertebrae, total vertebrae, teeth count, trunk & head heights, fin structure, and fin color.
- **Apperance** It is characterised by an angular short snout, a small mouth almost as wide as the snout, first dorsal fin origin behind the pectoral fins, and body without any spots.
- **Threats** Genus Squalus and Centrophorus contains liver oil that with high levels of squalene (or squalane is when it is processed for products).
- It is in high demand for pharmaceutical industries, particularly for making high end cosmetic products and anti-cancerous products.



### Reference

The Hindu | Squalus hima

