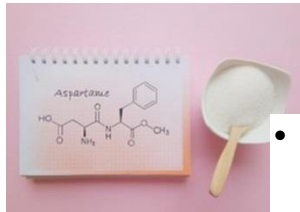


WHAT IS ASPARTAME?

The artificial sweetener called aspartame, found in many soft drinks, is set to be declared carcinogenic by the World Health Organisation's (WHO) cancer research unit.



About Aspartame:

- It is the world's most commonly used **low-calorie artificial sweetener**, which is approximately 200 times sweeter than sucrose (common sugar)
- It was discovered by **James M. Schlatter, a chemist**, in 1965 and was introduced to replace sucrose.
- The U.S. Food and Drug Administration (FDA) approved aspartame for use in some dry foods in 1981 and for carbonated beverages in 1983.
- It is made up of two amino acids: **aspartic acid and phenylalanine**, which are naturally occurring amino acids in many protein-rich foods.
- In the body, **aspartame is metabolised** into its constituent components, **aspartic acid, phenylalanine, and a small amount of methanol.**
- It is used worldwide as a sugar substitute in thousands of **foods and drinks**, including cereals, **sugar-free chewing gum**, low-calorie fruit juices and diet sodas.
- Around 100 countries around the world, including India, permit the use of aspartame.

WORLD ASTEROID DAY

World Asteroid Day is observed on June 30 every year.



About World Asteroid Day:

- It is observed on **June 30** every year.
- The day aims to **raise awareness about asteroid impact hazards** and crisis communication actions in case of a credible asteroid threat to planet Earth.
- The day also **aims to educate people about the latest and upcoming asteroid research and technology** through numerous events and activities held by organisations across the globe.

• History:

- The United Nations General Assembly (UNGA) passed a resolution in December 2016, designating June 30 as International Asteroid Day.
- The UNGA adopted the resolution based on the proposal made by the Association of Space Explorers, endorsed by the Committee on the Peaceful Uses of Outer Space (COPUOS).
- The date was chosen to commemorate the anniversary of the Tunguska asteroid's impact over Siberia on June 30, 1908.

Tunguska Event:

- It is considered the **biggest asteroid impact in recorded history** when an asteroid exploded a few kilometres above the Tunguska region of central Siberia.
- It flattened more than 80 million trees in seconds, over an area spanning nearly 800 square miles (2,000 square kilometres) — but left no crater.

What is an Asteroid?

- Asteroids are **small, rocky objects that orbit the sun.**
- Although asteroids orbit the sun like planets, **they are much smaller than planets.**
- They are **leftovers from the formation of our solar system.**
- From being as small as 10 meters across to as huge as 530 km in diameter, **asteroids have varied sizes.**

[INDIA'S LARGEST RADIO TELESCOPE PLAYS VITAL ROLE IN DETECTING UNIVERSE'S VIBRATIONS](#)

Why in news?

- Recently, an international team of astronomers announced scientific evidence confirming the presence of gravitational waves using pulsar observations.
- India's Giant Metrewave Radio Telescope (GMRT) was among the world's six large telescopes that played a vital role in providing this evidence.

Giant Metrewave Radio Telescope (GMRT)

- GMRT is a low-frequency radio telescope that helps investigate various radio astrophysical problems ranging from nearby solar systems to the edge of the observable universe.
- Located at Khodad, 80 km north of Pune, the telescope is operated by the **National Centre of Radio Astrophysics (NCRA)**.
 - NCRA is a part of the Tata Institute of Fundamental Research (TIFR), Mumbai.
 - GMRT is a project of the Department of Atomic Energy (DAE), operating under the Tata Institute of Fundamental Research (TIFR).
- It consists of 30 fully- steerable dish type antennas of 45-meter diameter each, spread over a 25-km region.
 - GMRT is presently the **world's largest radio telescope operating at meter wavelength**.

Gravitational Waves

- **About**
 - Gravitational waves are **ripples in space-time** caused by some of the most violent and energetic processes in the Universe.
 - Albert Einstein predicted the existence of gravitational waves in 1916 in his general theory of relativity.
 - Einstein's mathematics showed that **massive accelerating objects** would disrupt space-time in such a way that waves of undulating space-time would propagate in all directions away from the source.
 - These massive objects include things like neutron stars or black holes orbiting each other.
 - These cosmic ripples would travel at the speed of light, carrying with them information about their origins, as well as clues to the nature of gravity itself.

INDIA AND US-CHINA CHIP WARS

Context

- The **new US-India technology partnership** forged during recent visit of Indian PM to Washington DC identifies **technology as the new geopolitical frontier**.

- A key element of the partnership is the **resolve to diversify the global semiconductor supply chain**, which is at the centre of the rivalry between the world's two biggest economic powers, the US and China.

Semiconductor and its Importance

- **Semiconductor:** It is usually comprised of silicon, which conducts electricity more than an insulator, such as glass, but less than a pure conductor, such as copper or aluminium.
- **Importance**
 - Also known as semis/chips, semiconductors can be found in thousands of products such as computers, smartphones, appliances, gaming hardware, and medical equipment.
 - They are **essential to almost every modern device**, from a phone to advanced defence systems, and advanced artificial intelligence-powered machines.
 - But only a few countries are in the business of making chips, among the world's most advanced technologies, and some specialise only in some aspects of it.
 - 20th century was dominated by oil. **In the 21st century Chips are the new oil.**

US-China War on Semiconductors

- Since 2020, the US has taken several steps aimed at
 - Denying semiconductor technology to China to prevent it from gaining high tech dominance over the world.
 - Pumping up its own domestic capacity for making chips.
- **For example**, the Trump Administration listed the Chinese telecom giant **Huawei** and several ancillaries as a threat to US national security, and the Biden Administration retained restrictions on Huawei.
- In 2020, China was the biggest market for semiconductor machines. Beijing's "**Made in China 2025**" plan, launched in 2019 had prioritised achieving self-sufficiency in semiconductors.
- But the export controls set in motion by the US and more are in the pipeline have **made China's mission look difficult.**



CROSS & CLIMB ROHTAK



- **In a retaliatory move**, China has banned the US chipmaker company Micron from vital infrastructure projects.
- In 2022, the US Congress passed the **CHIPS and Science Act**, providing **\$280 billion** in new funding for domestic research and manufacturing of semiconductors in the US.

Opportunities for India from the Ongoing Chip War

- India is pushing itself as **an alternative to China**. India is aspiring for turning the ongoing war into its advantage.
- India does not have native semiconductors firm but it is trying to **attract foreign chipmakers companies** by providing them incentives and various other benefits.
- To realise this plan the government has announced a **10 billion dollars incentive plan** which aims to boost manufacturing of semiconductors in India.
- This is India's chance to be a global player in the semiconductor sector, **but success is not guaranteed**.
- India's government must provide its homegrown industry with the needed help, both financially and material-wise, and **strike the right balance between accepting U.S. partnership while not letting Washington dictate terms**.

US-India Cooperation in Semiconductor Field Amidst Global Chip War

- **Quad**: The leaders of Australia, Japan, India, and the US committed themselves to building resilient, diverse and secure supply chains of critical and emerging technologies including Semiconductors.
- **India-US iCET (Initiative on Critical and Emerging Technology)**
 - It was **launched** by the US President and Indian Prime Minister **on the sidelines of the Quad summit on May 2022**.
 - The primary goal is to **elevate and expand Indo-U.S. strategic technology partnership and defence industrial cooperation** between the governments, businesses, and academic institutions of the two countries.

- Resilient Semiconductor Supply Chains is one of the identified **six focus areas** of co-development and co-production under iCET.
- **Joint Task Force**
 - A task force set up jointly by the **US Semiconductor Industry Association and India Electronics Semiconductor Association** together with the government's Semiconductor Mission.
 - It will make a “readiness assessment” to identify “near term opportunities and facilitate long-term strategic development of complementary semiconductor ecosystems”.
 - The task force would also flag **opportunities and challenges for India's role in the global semiconductor value chain.**
- **MoU on Semiconductor Supply Chain and Innovation Partnership:** During the PM's US state visit, an MoU was signed on Semiconductor Supply Chain and Innovation Partnership to promote commercial opportunities, research, talent, and skill development.
- **Announcement by US Companies for India's Semiconductor Field**
 - **Micron Technology**, a leading US semiconductor firm, announced a **proposed investment of up to \$825 million** to build a facility in India, with the Indian government pitching in to take the combined investment value to \$2.75 billion.
 - This will **create up to 5,000 new direct and 15,000 indirect job opportunities in the next five years.**
 - **Lam Research** announced a **proposal to train 60,000 Indian engineers** through its Semiverse Solution virtual fabrication platform.
 - **Applied Materials** announced a **proposed investment of \$400 million** to establish a collaborative engineering centre in India.

Conclusion

- India is at least **two decades behind the chip curve**. It could take the country 10-20 years to establish itself as a serious player in the semiconductor industry.
- But for now, India has positioned itself in the global chip war, with a technology partnership that promises to take bilateral ties with the US to the next level.

EUCLID SPACE TELESCOPE

In an unprecedented effort, the European Space Agency plans to survey billions of galaxies using the Euclid Space Telescope, which is to be launched on July 1.



About Euclid Space Telescope:

- It is named after the **Greek mathematician Euclid** of Alexandria.
- This mission is **part of ESA's Cosmic Vision programme**, which plans to **explore the origin and components of the Universe** and the fundamental laws that govern it.
- The spacecraft will have a 1.2-metre-wide telescope and two instruments;
 - **A visible-wavelength camera** (the VISible instrument): It will look for tiny **distortions in the shapes of distant galaxies** from different points in time to highlight the tussle between the pull of gravity and the push of dark energy.
 - **A near-infrared camera/spectrometer**(the Near-Infrared Spectrometer and Photometer): It will look at how quickly the galaxies are moving away from each other, which will offer scientists insight into both dark energy and the working of gravity.
 - The detectors of the near-infrared instruments have been supplied by NASA, making the American agency an important part of the Euclid Consortium.
- It will be **floating 1.5 million kilometres above the Earth**, and the telescope hopes to deliver images that are at least four times sharper than ground-based ones.
- The spacecraft measures approximately 4.7 metres tall and 3.7 metres in diameter.
- It will be launched on a SpaceX Falcon 9 rocket and will **remain operational for a minimum of six years**.

HALOGENS

The recently published report of the Indian Institute of Tropical Meteorology said that halogens' contributions to cooling the environment could increase to 18-31 per cent by 2100.

Key findings of the report:

- Oceans, along with absorbing carbon dioxide and moderating the climate, also **cool the planet** by **releasing short-lived halogens** such as chlorine, bromine and iodine.



- The short-lived halogens from the ocean reduce warming by depleting ozone.
- They **increase methane's lifetime** in the atmosphere by destroying hydroxyl radicals (OH).
- They have increased the global methane burden by 14 per cent and 9 per cent for pre-industrial and present-day conditions.
- Halogens **increase the levels of water vapour, a greenhouse gas** in the atmosphere.
- The emission of halogen from the ocean is not the same across the world.
- Over continents, the emissions are small, while it is bigger in polar regions and some places with higher ozone levels.

Key facts about Halogens:

- The term Halogen in Greek means **salt-producing** because **it reacts** with many metals to **produce salts**.
- They are a group of elements **located in Group 17 of the periodic table, which** includes fluorine (F), chlorine (Cl), bromine (Br), iodine (I), and astatine (At).
- In 1826, Swedish **chemist Jons Berzelius** coined the term halogen for the entire group of elements.
- Unlike metals, they exist in **all three different states** of matter in their standard state.
- For example**, fluorine is found naturally as a gas, bromine as a liquid, and the larger iodine is found naturally as a solid.
- Reactivity:** Halogens are the most **reactive nonmetals on the periodic table** and are powerful oxidising agents.

WHAT ARE GHOST PARTICLES?

Scientists have recently revealed a new picture of our galaxy: made up of invisible “ghost particles” that have not been detected until now.



About Ghost Particles:

- Neutrinos are tiny subatomic particles, often called 'ghost particles' because they barely interact with anything else.
- **Source:** Neutrinos come from all kinds of different sources and are often the product of heavy particles turning into lighter ones, a process called “decay.”
- Neutrinos are denoted by the Greek symbol ν , or nu (pronounced “new”).
- They belong to the family of particles known as leptons. There are three main leptons, namely electrons, muons and tau particles, and each one has an associated neutrino and anti-neutrino.
- A neutrino is very similar to an electron but has no electrical charge and a very small mass.
- They are the most common particle in the universe. Approximately 100 trillion neutrinos pass completely harmlessly through the human body every second.
- They are extraordinarily difficult to detect, as they rarely collide with atoms.
- Of the four fundamental forces in the universe, neutrinos only interact with two — gravity and the weak force.
- But not all neutrinos are the same. They come in different types and can be thought of in terms of flavours, masses, and energies.

What is Antiparticle?

- In quantum theory, every type of particle is associated with an antiparticle with the same mass but with opposite physical charges. For example, the antiparticle of the electron is the positron.