Microbial Conditions on K2-18 b

Prelims – *General Science.*

Mains (GS III) – *Awareness in the fields of Space.*

Why in News?

Researchers utilizing the James Webb Space Telescope have detected possible bio-signature gases in the atmosphere of exoplanet K2-18 b hinting at the presence of microbial life.

- **Recent Findings -** The atmosphere of the planet holds chemical signatures of gases that, on Earth, are exclusively generated through biological activities, primarily microbial life such as marine phytoplankton algae.
- The two gases
  - Dimethyl sulfide, or DMS, and
  - Dimethyl disulfide, or DMDS
- The gases were detected at atmospheric concentrations of more than 10 parts per million by volume.
- To ascertain the chemical composition of an exoplanet's atmosphere, astronomers analyze the light from its host star as the planet passes in front of it from the perspective of Earth, called the ***transit method.***
- Earlier observations by Webb had identified methane and carbon dioxide in K2-18 b's atmosphere, the first time that carbon-based molecules were discovered in the atmosphere of an exoplanet in a star's habitable zone.

K2-18 b

- It is an ***exoplanet*** (orbits a star outside of our own solar system) found in a habitable zone, a distance where liquid water, a key ingredient for life, can exist on a planetary surface.
- **Discovered by -** Kepler Space Telescope in 2009.
- Constellation – Leo.
- **Location -** It orbits the red dwarf star K2-18, located approximately 124 light-years away from Earth.

  A light-year is the distance light travels in a year, 9.5 trillion km.

- **Size & weight –** It is with a radius 2. 6 times that of Earth and a mass 8. 6 times greater.
- **Type of Planet –** It is part of the "sub-Neptune" class of planets, with a diameter greater than Earth's but less than that of Neptune, our solar system's smallest gas

planet.

James Webb Space Telescope (JWST)
• It is the largest and most powerful infrared space telescope ever built. • **Joint project by -** NASA, the European Space Agency (ESA), and the Canadian Space Agency (CSA). • **Launched in -** December 2021. • **Location -** JWST is positioned at the Sun-Earth L2 Lagrange point, a stable location for observation and minimal orbital adjustments. • **Objective -** To study the formation of stars and galaxies, examine exoplanet atmospheres, observe the early universe, and explore the origins of life. • **Infrared Focus -** Unlike Hubble, which primarily observes visible and ultraviolet light, JWST is optimized for infrared, enabling it to see through dust clouds and observe objects far beyond Hubble's reach.

Reference

The Hindu | exoplanet K2-18 b

