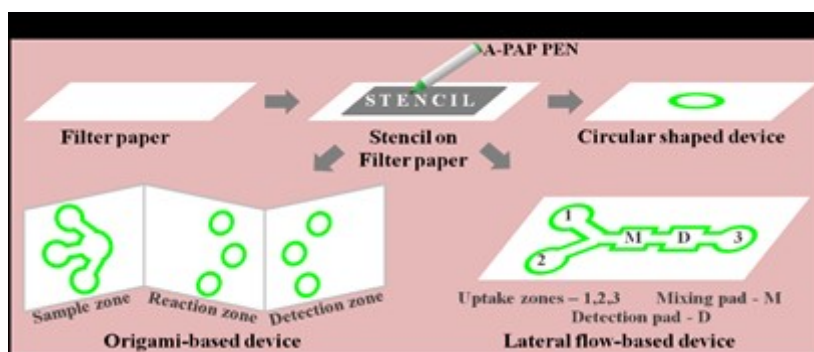


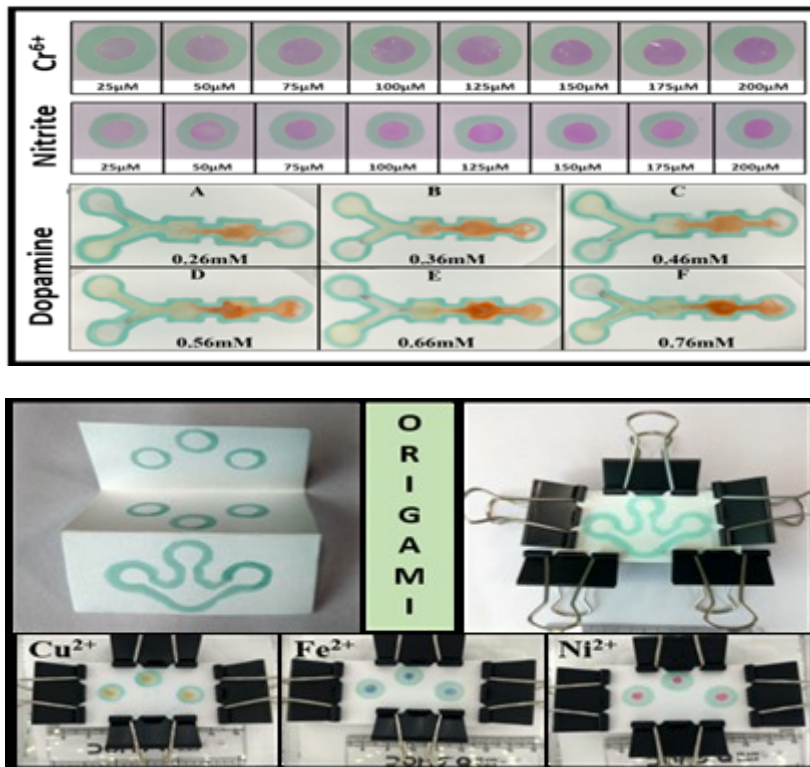
UPSC Daily Current Affairs | Prelim Bits 20-09-2024

Advanced PAP (A-PAP) pen, paper based device sensing contaminants

Scientists have recently developed fabricating paper-based devices using an Advanced PAP (A-PAP) pen.

- An Advanced PAP (A-PAP) pen is a **hydrophobic barrier pen** used in laboratory applications to draw barriers on glass slides to confine the flow of reagents.
- A-PAP pen offers a practical alternative to conventional sensing methods that necessitate specialized equipment and expertise making it suitable for resource-limited settings.
- PAP pen that **does not require any machinery or heating/drying** steps and adopts a DIY approach.
- **Recent analysis** - Using the A-PAP pen, the fabrication of two-dimensional (2D) paper-based devices for chemical detection of heavy metal and nitrite can be done.
- The versatility of fabrication technique for biological sensing using 2D lateral flow paper-based devices for the detection of dopamine can be done.
- Furthermore, the technique is also validated for fabricating complex three-dimensional (3D) paper-based devices using a paper origami technique for heavy metals sensing.
- The omission of the heating/drying step thereby enabling the rapid fabrication in around 10 seconds with superior contact angle suitable for testing and sensing applications.
- **Benefits** - This technique provides a valuable tool for creating affordable, efficient, and accessible chemical and biological testing solutions.
- Its versatility extends to fabricating simple and complex devices like lateral-flow-based and 3D origami devices.





Paper-based devices

- It is also known as paper-based analytical devices (PADs) or microfluidic paper-based analytical devices (μPADs).
- They are made by patterning paper to create channels and barriers, and can be used with a variety of detection methods.
- These are analytical tools that use paper to perform a variety of tasks
- **Detection** - PADs can detect biological analytes associated with disease, such as glucose, or foodborne pathogens.
- **Monitoring** - PADs can monitor environmental, health, and food issues.
- **Diagnosis** - PADs can be used for clinical diagnosis.
- **Drug development** - PADs can be used in drug development.
- PADs are inexpensive, portable, and disposable.

Reference

[PIB | Advanced PAP \(A-PAP\) pen](#)

Venus Orbiter Mission (VOM)

The Union Cabinet chaired by the Prime Minister has recently approved the development of Venus Orbiter Mission (VOM).

- The Venus Orbiter Mission (VOM) is a planned mission to study the surface and atmosphere of Venus.
- **Agency** - Indian Space Research Organisation (ISRO).
- **Aim** - It aims for scientific exploration and for better understanding of Venusian

atmosphere, geology and generate large amount of science data probing into its thick atmosphere.

- The mission is expected to be accomplished during March 2028.
- By studying Venus, Indian scientists hope to unlock answers to key questions about planetary evolution, particularly Venus, despite its similarities to Earth, developed so differently.
- By studying Venus, scientists hope to uncover how planetary environments can evolve differently despite similar beginnings.

Venus

- Venus is the 2nd planet from the Sun Earth's closest planetary neighbor.
- **Size** - Venus is the sixth largest planet and is similar in size to Earth.
- Due to its similar size and composition, Venus is often referred to as Earth's "twin".
- **Temperature** - Venus is believed to have once harbored conditions suitable for life.
- However, the planet underwent a dramatic transformation, evolving into an extremely hostile environment with surface ***temperatures exceeding 450°C*** and an atmosphere filled with toxic gases.
- Venus's dense atmosphere creates an intense greenhouse effect, trapping heat and making it the ***hottest planet in the solar system.***
- NASA explained that its surface temperatures are so extreme that they can melt lead.
- Beneath the thick, perpetual clouds, the planet features volcanic landscapes and distorted mountain ranges.
- Distance from the Sun - Venus is said to orbit the Sun at an average distance of 67 million miles (108 million kilometres), or ***0.72 astronomical units (AU).***

1 AU represents the distance between Earth and the Sun.

- At this range, sunlight takes about 6 minutes to reach Venus.
- **Moons-** Venus is one of only two planets in our solar system without a moon, but it does have a quasi-satellite called Zoozve.

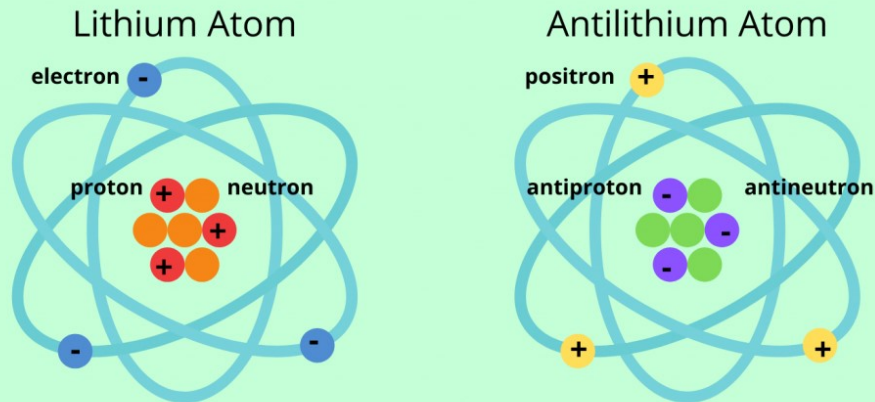
References

1. [PIB | Venus Orbiter Mission \(VOM\)](#)
2. [Economic Times | Venus Orbiter Mission](#)

Antimatter

- Antimatter is the twin of almost all the subatomic particles that make up the universe.
- The matter in universe comes in many forms like solids, liquids, gasses, and plasmas.
- These forms of matter all consist of subatomic particles that give matter its mass and volume.

Matter vs Antimatter



Atoms of matter and antimatter have the same mass, but opposite electrical charge and different quantum numbers.

sciencenotes.org

- These particles include protons and neutrons (also known as baryons), electrons and neutrinos (also known as leptons), and a variety of other particles in the Standard Model of Particle Physics.
- Protons and neutrons are themselves made up of particles known as quarks and gluons.
- But matter can have an opposite in the form of antimatter.
- All the subatomic particles in matter either **have their own anti-twins** (antiquarks, antiprotons, antineutrons, and antileptons such as antielectrons).
- These anti-particles can combine to form anti-atoms and, in principle, could even form anti-matter regions of the universe.
- Antimatter is made up of special particles that are like opposites to the ones in regular matter, having opposite electrical charges.
- In antimatter, there are antiparticles like **positrons** (positively charged electrons).
- When antimatter particles meet their matching matter particles, they cancel each other out, releasing a lot of energy.
- Antimatter is rare in the observable universe, but scientists find it in places with lots of energy, like cosmic rays and certain experiments in labs.
- British physicist **Paul Dirac** predicted antimatter in 1928 while trying to combine quantum mechanics, which describes subatomic particles, and Einstein's theory of relativity.
- Positrons were discovered by American California Institute of Technology physicist **Carl Anderson**.
- Dirac and Anderson received the **Nobel Prize in physics** for their work on this discovery in 1933 and in 1936 respectively.
- Humans have created antimatter particles using ultra-high-speed collisions at huge particle accelerators such as the Large Hadron Collider, located outside Geneva and operated by CERN, European Organization for Nuclear Research.
- Several experiments at CERN create antihydrogen, the antimatter twin of the element hydrogen.
- The most complex antimatter element produced to date is antihelium, the counterpart

to helium.

References

1. [Dept of Energy | Antimatter](#)
2. [Live Science | Anti matter](#)

Bio-RIDE Scheme

The Union Cabinet approved the Biotechnology Research Innovation and Entrepreneurship Development (Bio-RIDE) scheme to support cutting-edge research and development in biotechnology.

- The 2 umbrella schemes of Department of Biotechnology (DBT)
 - Biotechnology Research and Development (R&D) and
 - Industrial and Entrepreneurship Development (I&ED) merged as one scheme- 'Biotechnology Research Innovation and Entrepreneurship Development (Bio-RIDE)'.
- It is merged with a new component, '***Bio-manufacturing and Bio-foundry***'.
- **Aim** - To accelerate research, enhance product development, and bridge the gap between academic research and industrial applications.
- It is designed to foster innovation, promote bio-entrepreneurship, and strengthen India's position as a global leader in biomanufacturing and biotechnology.
- **Components of Bio-RIDE**
 - Biotechnology Research and Development (R&D).
 - Industrial & Entrepreneurship Development (I&ED).
 - Biomanufacturing and Bio foundry (a new component).
- **Nodal ministry**- The Department of Biotechnology (DBT) under the Ministry of Science and Technology.
- **Implementation** - During the 15th Finance Commission period (2021-2026).
- **Key Features**
 - **Promote Bio-Entrepreneurship**- Seed funding, incubation, and mentorship for startups.
 - **Advance Innovation**- Grants and incentives for cutting-edge research in areas like synthetic biology, biopharmaceuticals, bioenergy, and bioplastics.
 - **Facilitate Industry-Academia collaboration**- Strengthen partnerships between academic institutions, research organizations, and industry to commercialize biotech products.
 - **Encourage sustainable biomanufacturing**- Focus on environmentally sustainable practices aligned with India's green goals.
 - **Support researchers**- Extramural funding for researchers in biotechnology fields like agriculture, healthcare, and environmental sustainability.
 - **Nurture human resources**- Develop skilled manpower through holistic support and capacity building in biotechnology.

References

1. [PIB | Bio-RIDE scheme](#)
2. [Business Standard | Bio-RIDE scheme](#)

Spotted deer

Pench Tiger Reserve in Madhya Pradesh faces Habitat Strain recently due to Spotted Deer Overpopulation.

- The chital deer, also known as the spotted deer, chital deer, or axis deer, is a deer species native to the Indian subcontinent.
- **Scientific Name** - Axis axis.
- **Family** - [Cervidae](#).
- **Size** - 35 inches tall and weighs about 187 pounds.
- **Distribution** - The major area of their distribution is Sri Lanka and India, though they are introduced to USA and Australia as well.
- **Habitat** - is found in large numbers in dense deciduous or semievergreen forests and open grasslands.
- **Appearance** - The deer's golden-rufous coloring is speckled with white spots, and it has a white underbelly.
- Its curved, three-pronged antlers extend nearly 3 feet and shed each year.
- **Diet** - They are herbivores, they feed upon tall grass and shrubs.
- **Breeding** - The spotted deer has a prolonged mating season, as the perpetually warm climate allows females to remain fertile and to give birth to fawns any time of year.
- It is a social animal, usually occurs in herds of 10 to 50 individuals.



- **Conservation status**

- **IUCN** - Least concern.
- Not listed in CITES.
- **WPA, 1972** - Schedule III.

Reference

[Deccan chronicle | Spotted Deer](#)

