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## Whitest Ever Paint Reflects 99% of Sunlight

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### Why in News

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The team of researchers from Purdue University have created an ultra-white paint.

The newer paint is whiter and **keeps the surface areas it is painted on cooler** and thus can act as a breakthrough in **combating the woes of global warming**.

### Key Points

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- **About:**

- The new ultrawhite white paint **reflects 99% of all light** that hits it, remaining significantly cooler than the ambient temperature, even when sitting in full sunlight.
- **Typical commercial white paint gets warmer instead of cooler** and paints currently available in the market reflect only 80-90% of the sunlight and therefore, they can't make surfaces cooler than their surroundings.
- **Older formulations of white paints were made of calcium carbonate**, while the **new one is made up of barium sulphate** making it more white.
  - Barium Sulphate is used to make photo paper and cosmetics white.
  - Different sized particles of this chemical compound, helps in scattering different amounts of light. This allows for light to scatter in a broad range, resulting in the highest reflectance.
- The paint could be the **closest equivalent to the blackest black paint Vantablack**, which is able to absorb 99.9% of visible light.
  - Vantablack has a diverse range of applications including high performance infrared cameras, sensors, satellite borne calibration sources etc.
  - Its ability to absorb light energy and convert it to heat is also of relevance in solar power development.

- **Reflection or Absorption of a Light by a Color:**
  - Every object is seen by the eye because of absorption or reflection of light.
  - The **light is made up of seven different colours** (Violet, Indigo, Blue, Green, Yellow, Orange and Red or VIBGYOR). Specifically, light is made up of wavelengths of different colours.
  - The **colour of any object or thing is determined by the wavelength the molecules are not able to absorb.**
    - This is **dependent on how electrons are arranged in an atom** (the building block of life, an atom is made up of electrons, protons and neutrons).
    - For example, if an individual is looking at a sofa that is green, this is because the fabric or material it is made up of is able to absorb all the colours except green (reflect the green coloured wavelengths).
  - If **an object is black**, it is because **it has absorbed all the wavelengths and therefore no light is reflected from them.**

This is the reason that darker objects, as a result absorbing all wavelengths **tend to heat up faster** (as during absorption the light energy is converted into heat energy).
- **Significance:**
  - The new paint technology will help buildings covered by this paint to be cooler for longer, eliminating the effects of **Urban Heat Island.**
  - The paint could help in the **fight against global warming** by reducing our reliance on electrically powered air conditioning.
    - As **Air conditioning** injects heat into Earth's atmosphere in multiple ways, including pushing hot air out of buildings, the heat of running the machines, and the usually fossil fuel-generated electricity that runs them that contributes to carbon dioxide emissions.
  - It can not only prevent heat-related deaths and illnesses but also limit water quality depletion that is caused by heated ground.
- **India's Related Initiative:**

India is one of the first countries in the world to develop a comprehensive **Cooling Action plan** which has a long term vision to address the cooling requirement across sectors and lists out actions which can help reduce the cooling demand.

## Way Forward

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- With climate change leading to a rise in temperatures and rapid concretisation exacerbating global warming, it has become important to develop adaptation strategies to reduce and combat heat stress.

- Key actions include cooling buildings naturally through better design, improving efficiency of cooling appliances, promoting renewable energy-based energy efficient cold chains and investing in research and development (R&D) of refrigerant gases that do not harm or warm the planet.
- Plant trees and other vegetation, space in urban areas might be limited, but one can easily integrate small green infrastructure practices into grassy or barren areas, vacant lots, and street rights-of-way.
- Greener rooftops, light-coloured concrete, making the road surface greyish or even pinkish can also be used as they absorb less heat and reflect more sunlight.

**Source: IE**