

White Dwarf

A White Dwarf is the final evolutionary stage of a star. White Dwarf Stars are called so because they were first discovered in that particular colour.

Their characteristics include having a mass as that of the Sun, a radius comparable to the Earth and low luminosity.

Scientists believe that White dwarfs are the end-stage of those states whose mass is insufficient to become a neutron star or a blackhole. It is believed that 97% of stars of the Milky Way galaxy are white dwarfs.

This article will further give information about White Dwarfs within the context of the IAS Exam. The information will be useful in the Science and Technology segment of the exam.

How are White Dwarfs formed?

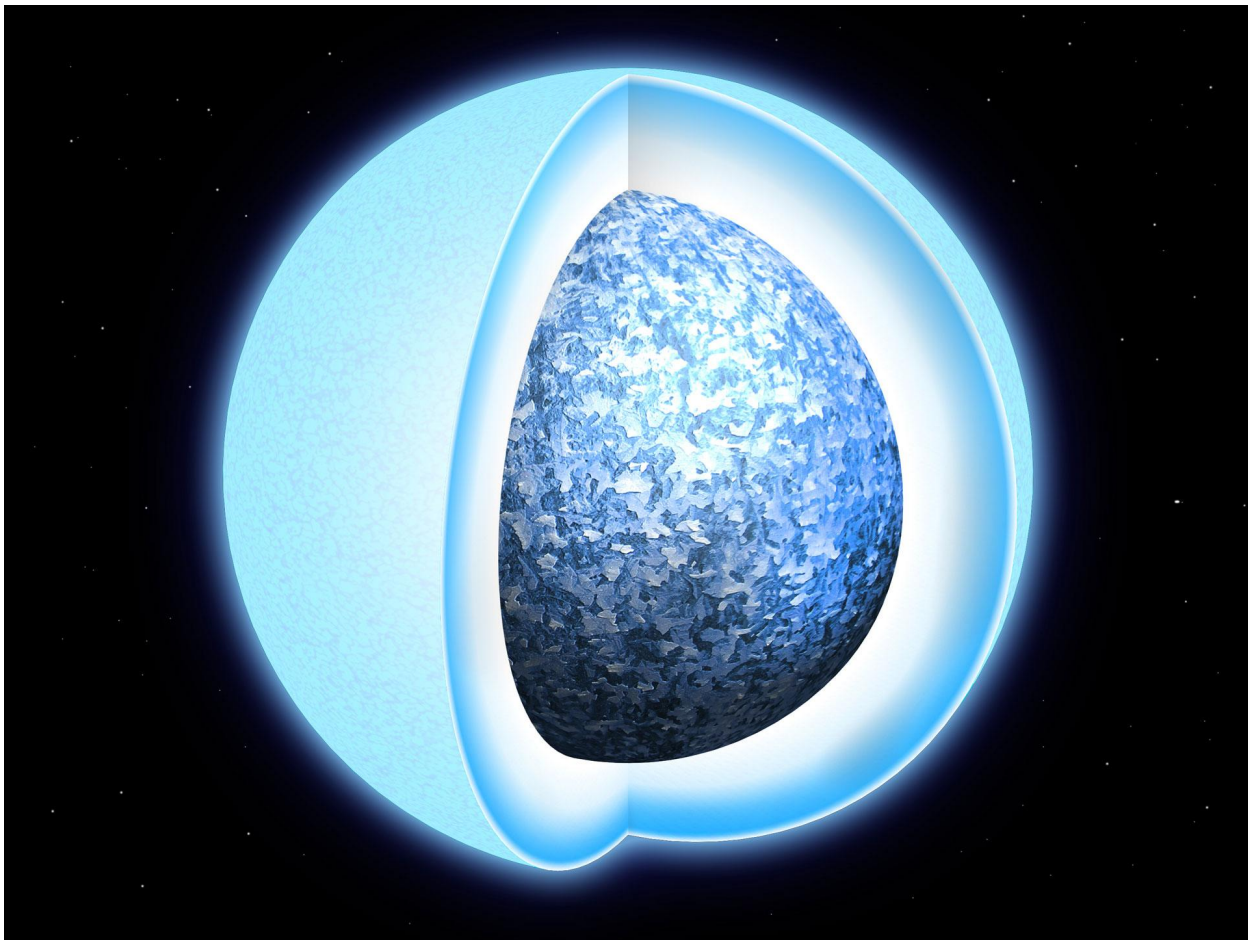
The core of a star produces heat through fusion and outward pressure. It is kept in check by an inward push when the star's mass generates gravity. Once the hydrogen that is used as fuel is depleted and fusion slows, the star collapses on itself due to its own gravitational pull.

Once condensing and compacting takes place, the collapsing star is heated up further, its last hydrogen reserves being burnt up. This causes the star's outer layers to greatly expand and at this stage it becomes a Red Giant.

The surface of a red giant is usually cool due to heating being spread out on its surface. But its core is red-hot. Red giants exist for about a billion years, compared to 10 billion years to that of a normal star.

Red giants are hot enough to turn the helium at their core, which was made by fusing hydrogen, into heavy elements like carbon.

If (or when) a red Giant lacks the mass to generate core temperatures required to fuse carbon, an inert mass of carbon and oxygen will build up at the center. Once this star sheds its layers and forms a planetary nebula, it will leave a core behind. This core is the white dwarf.



Facts about White Dwarfs

- The **nearest white dwarf** is **Sirius B** located at 8.6 light years.
- There are believed to be **eight white dwarfs** among the hundred star systems **nearest to the Sun**.
- A white dwarf is **very hot when it forms**, but because it has no source of energy, it will gradually cool as it radiates its energy.
- The **first white dwarf** discovered was in the triple star system of 40 Eridani. The discovery was made by William Herschel on 31 January 1783.
- A white dwarf will consume matter from the other star until a critical mass is reached. It will trigger a chain reaction that results in the white dwarf violently **exploding in a type of supernova**.

- The most massive stars will eventually go supernova, but **stars with anything from 0.8 to about ten solar masses** will ultimately become white dwarfs.

Frequently Asked Questions about White Dwarf

What does a white dwarf turn into?

Over a very long time, a white dwarf will cool and its material will begin to crystallize, starting with the core. The star's low temperature means it will no longer emit significant heat or light, and it will become a cold black dwarf.

How do white stars get their names?

White dwarf stars, so called because of the white colour of the first few that were discovered, are characterized by a low luminosity, a mass on the order of that of the Sun, and a radius comparable to that of Earth.

