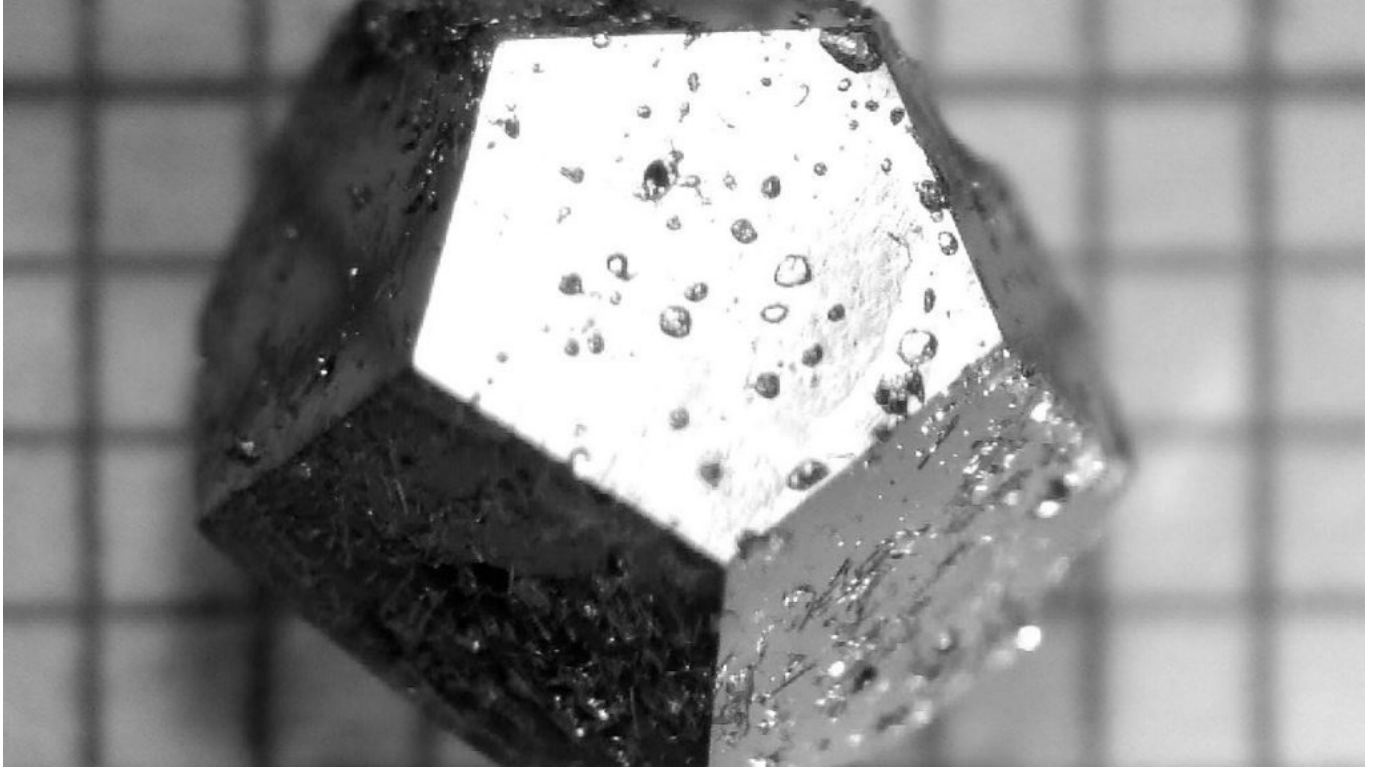


Quasicrystals

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Context- A third natural source of quasicrystals has been discovered by scientists in the Sand Hills of north central Nebraska, USA.

Key Highlights

- Quasicrystals are fascinating materials with a one-of-a-kind set of characteristics. They are evidence of the beauty and power of natural irregularity.

How it differs from conventional crystal:

- In contrast to conventional crystals, quasicrystals' atoms are arranged in a pattern that repeats itself irregularly as opposed to a fixed, repetitive pattern.
- Quasicrystals are a symbol of the power of irregularity because of their deviation from the normal arrangement of atoms in solids.
- Due to their chemical and physical properties, common salt crystals, like those of sodium chloride (NaCl), adopt a cubic pattern.
- The sodium and chloride ions are able to optimize for factors like density and thermal stability thanks to the cubic pattern.
- Quasicrystals, on the other hand, form in a pattern that is less optimal and breaks away from the cubic structure.
- The traces of a stressful event are still present in the structure of their atomic lattice.

Application:

- They are used to make nonstick frying pans, surgical and acupuncture needles, dental

instruments, razor blades, and dental instruments.

How Quasicrystals were Discovered?

- In the laboratory, American-Israeli researcher Dan Shechtman made the 1982 discovery of quasicrystals.
- For finding quasicrystals, Dan Shechtman won the Nobel Prize in Chemistry in 2011.
- In 2009, the Russian meteorite Khatyrka yielded the first natural quasicrystal.
- Over millions of years, the meteorite from Khatyrka is thought to have been in a number of space collisions, which would have put it under a lot of pressure and heat.
- Physicists used “shock synthesis” in the lab to create new quasicrystals inspired by these conditions.
- In the Trinity test of the Manhattan Project, which took place in 1945, the remains of the first ever detonated atomic weapon were found to contain a quasicrystal.
- The Trinity test and the Khatyrka meteorite, two examples of intense, fiery conditions, are thought to be the origins of natural quasicrystals, according to these findings.