Oceans of Liquid Diamond May Exist On Neptune and Uranus

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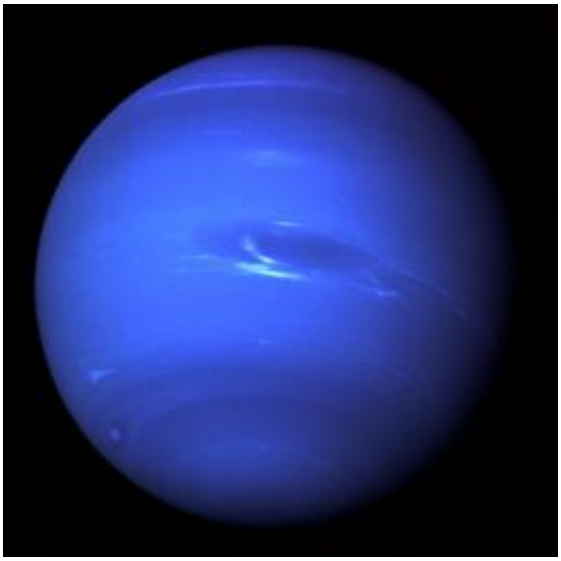
When scientists melted diamond under ultra high temperatures and pressure and reduced both temperature and pressure the solid diamond chunks floated on top of liquid diamond. Credit: Getty Images

(PhysOrg.com) -- Scientist explains how it may be possible for the planets Neptune and Uranus to contain liquid diamond oceans.

The research was conducted by taking detailed measurements of the melting point of diamond. When diamond is melted it behaves like water during freezing and melting, with solid forms floating atop liquid forms. Diamond is a very hard material which makes it difficult to melt. Measuring the melting point of a diamond is very difficult because when it's heated to very high temperatures the diamond changes to graphite.

Since it's the graphite and not the diamond that turns to liquid, scientist are faced with the problem of melting the diamond without it turning to graphite.

Scientists can get around this problem by exposing the diamond to extremely high pressures by blasting it with lasers. The diamond is liquefied at pressures 40 million times greater than that found at Earth's sea level.



[b]Neptune:[/b] By Neptune's diamond oceans! NASA

When the pressure is lowered to 11 million times greater than Earth's sea level and the temperature drops to about 50,000 degrees, chunks of diamond start to appear.

Scientists discovered something they didn't expect, after the pressure kept dropping the temperature of the diamond remained the same, with more chunks of diamond forming. The chunks of diamond did not sink

but floated on top of the liquid diamond, creating diamond icebergs.

These ultrahigh temperatures and ultrahigh pressures are found in huge gas giant planets like Neptune and Uranus.

Neptune and Uranus are estimated to be made up of 10% carbon. A large ocean of liquid diamond could deflect or tilt the magnetic field out of alignment with the rotation of the planet.

The only way scientists can know for sure if liquid diamond exists on these gas giant planets is either by sending a scientific spacecraft to one of them or by simulating the conditions on earth. Both methods would be very expensive and take years to prepare.

The paper is published in *Nature Physics.*

More information: *Nature Physics* 6, 9-10 (1 January 2010); doi:10.1038/nphys1491