Polinitrogen: un al·lòtrop amb enllaços senzills

El primer compost amb enllaç Zn-Zn és un organometà-líc

More than 40 years ago, chemist Neil Bartlett and others burst the myth that the “inert gases” were chemically inert by synthesizing xenon compounds. In later work, Bartlett and others showed that XeF\(_2\) can act as a ligand for metal ions, but the metal centers were simultaneously coordinated by AF\(_2\) (A = As, Sb, P). Boris Žemva of Jožef Stefan Institute, in Ljubljana, Slovenia, and coworkers have now prepared the first compound in which a metal center is coordinated only to XeF\(_2\) molecules [Angew. Chem. Int. Ed., 43, 3456 (2004)].

The researchers synthesized Ca(XeF\(_2\))(AsF\(_6\)), a white crystalline solid, by reacting a 20-fold excess of XeF\(_2\) with Ca(AsF\(_6\)) in anhydrous HF solvent. The two calcium atoms are crystallographically different: One calcium atom is coordinated to fluorine atoms from all nine XeF\(_2\) molecules, while the other calcium atom is coordinated to fluorine atoms from all nine XeF\(_2\) molecules. The team hopes next to synthesize a compound where all metal centers are coordinated only to XeF\(_2\).

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Els compostos de xenò, bons ligands

The moon is probably the most extensively studied planetary body in the solar system, not least because it is the only one that mankind has actually set foot on. However, it is still capable of throwing up the odd surprise, such as the new lunar mineral recently discovered by a team of US planetary scientist and Russian chemists [M. Anand et al., Proc. Natl. Acad. Sci., 101, 6847 (2004)].

The mineral, a species of iron silicide (FeSi), was discovered in a lunar meteorite found in the Dhofar region of Oman in January 2000. This is the first time that iron silicides have been found in lunar rocks and the first time that FeSi has been found naturally. The researchers also discovered two other species of iron silicide in the meteorite, FeS\(_2\) and Fe\(_2\)Si, which had previously been discovered in terrestrial rocks.

The authors propose that micrometeorites hitting the lunar surface melt and vaporise iron silicates present in the soil, which then combine and condense to produce iron silicides. They have named the new iron silicide mineral hapkeite, after Bruce Hapke, the US scientist who first predicted the presence of impact-induced iron in the lunar soil.

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Nitrogenase is the much-studied enzyme that catalyzes the reduction of N\(_2\) to NH\(_2\) and the reduction of other triple bonded substrates such as alkynes. The X-ray structure of the enzyme’s active site has been known for a decade, yet chemists still don’t know whether reduction occurs at one or more iron atoms in the enzyme’s FeMo-cofactor or at a molydenum atom. Brian M. Hoffman of Northwestern University and colleagues now report the first detailed description of a trapped nitrogenase reduction intermediate (shown), providing new evidence supporting iron as the reduction site [J. Am. Chem. Soc., 126, 9563 (2004)].

The intermediate (labelled 3 in the figure) was generated by freezing a reaction of isotopically labeled propargyl alcohol with a modified nitrogenase and was characterized in a series of electron-nuclear double resonance spectroscopy experiments. Propinquity of the origin of the hydrogen atoms—either the alcohol or the solvent—allowed the researchers to propose that a cyclic intermediate forms when the triple bond of the alcohol coordinates to an iron atom. This is circumstantial evidence that N\(_2\) binds to the same site, they say, but direct evidence is still needed.

Els compostos de xenò, bons ligands

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Breus

- Ha mort el Dr. Joan Oró (Lleida, 1923), químic reconegut pels seus estudis sobre l’origen de la vida.
- Els Estats Units i la Unió Europea dels 15 representen el 72 % de la producció científica mundial.
- La IUPAC ha establert el sistema de nomenclatura dels ful·lerens.
- Una tinta intel·ligent que conté diòxid de titani, trietanolamina i blau de metilè controla el bon estat dels aliments envasats [S.K. Lee et al., Chem. Commun., 1912 (2004)].