Universitat de Barcelona
Química Inorgànica

Notícies Inorgàniques

Any 6, Núm. 36, Novembre de 2007

http://www.ub.es/inorgani/dqi.htm

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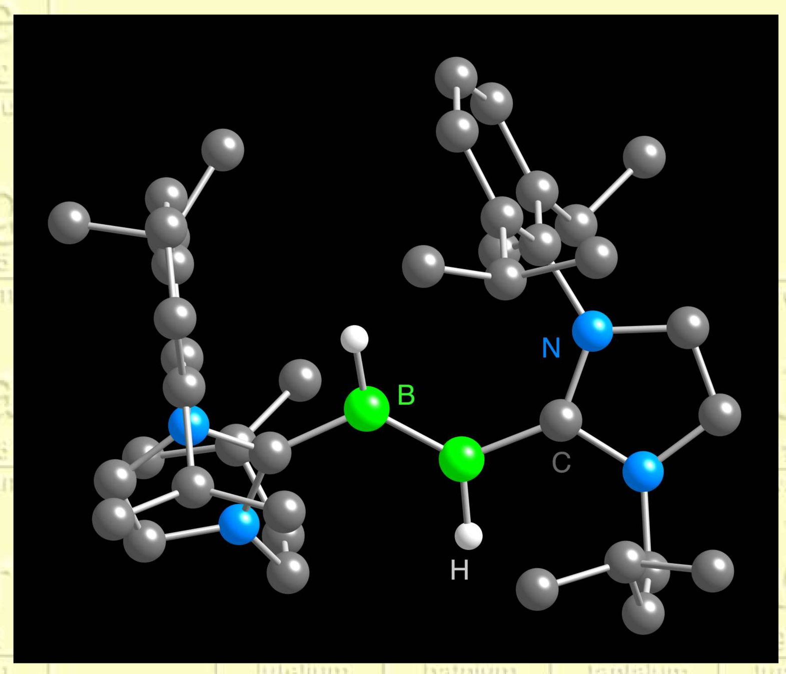
Dobles enllaços de bor

A team led by Gregory H. Robinson was trying to make a compound with a boron-boron triple bond using solution-phase chemistry. That didn't quite work out. But they got something else that will shed some light on multiple bonding: the first stable, neutral compound containing a boron-boron double bond (*J. Am. Chem. Soc.*, **2007**, *129*, 12412).

To make this "diborene," Robinson, a chemistry professor at the University of Georgia, Athens, and his coworkers synthesized a new starting material: $RBBr_3$, in which R is a bulky N-heterocyclic carbene ligand. The chemists treated this compound with a reducing agent (potassium graphite, KC_8), hoping to make RB= BR. But instead, the potassium liberated hydrogens from the solvent and the researchers isolated two crystalline hydrogen-containing products: the diborene RHB=BHR and the diborane $RH_2B–BH_2R$.

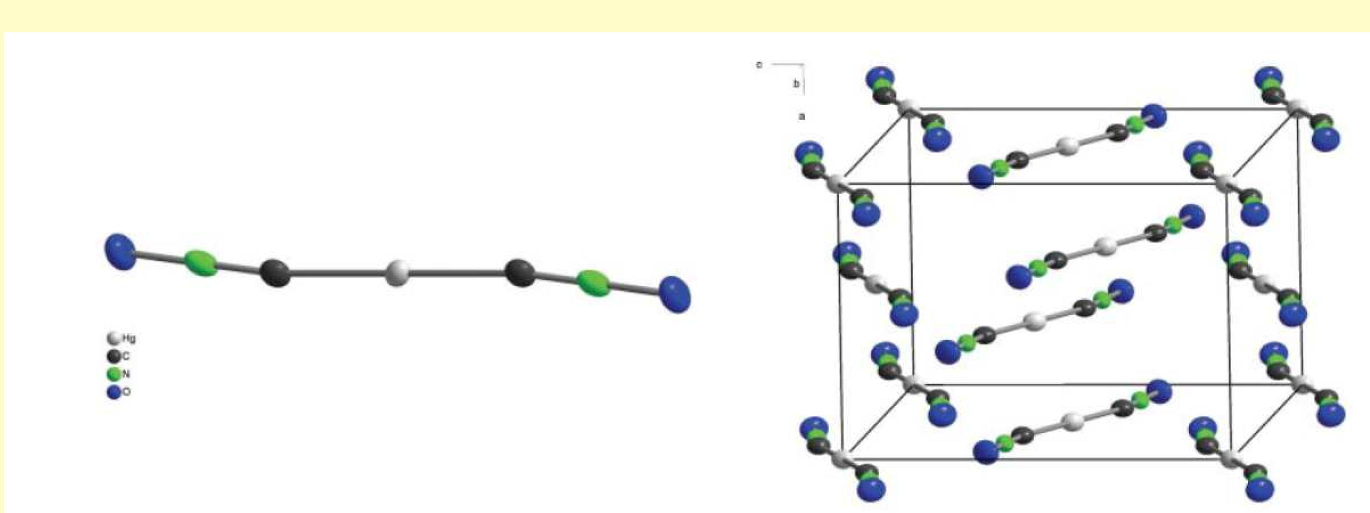


Estructura explosiva

Wolfgang Beck and Thomas M. Klapötke, professors at Ludwig Maximilians University in Munich, Germany, and their colleagues report that, as expected, the molecule $Hg(CNO)_2$ is nearly linear, with the nitrogens carrying a positive charge and the oxygens a negative charge. The mercury atom is bound to two carbon atoms, with the bonding arrangement O–NC– Hg–CN–O (*Z. Anorg. Allg. Chem.* **2007**, *633*, 1417). This connectivity and linear structure was predicted by a number of groups, including Beck's and Klapötke's. Other groups, however, had predicted that the O atoms were bound to Hg.

Mercury fulminate is sensitive to friction, heat, and shock, and it decomposes violently into mercury, carbon monoxide, and nitrogen. The word fulminate derives from a Latin term meaning to strike with lightning. The compound was used for years as an explosive, and by Alfred Nobel in blasting caps for detonating dynamite.

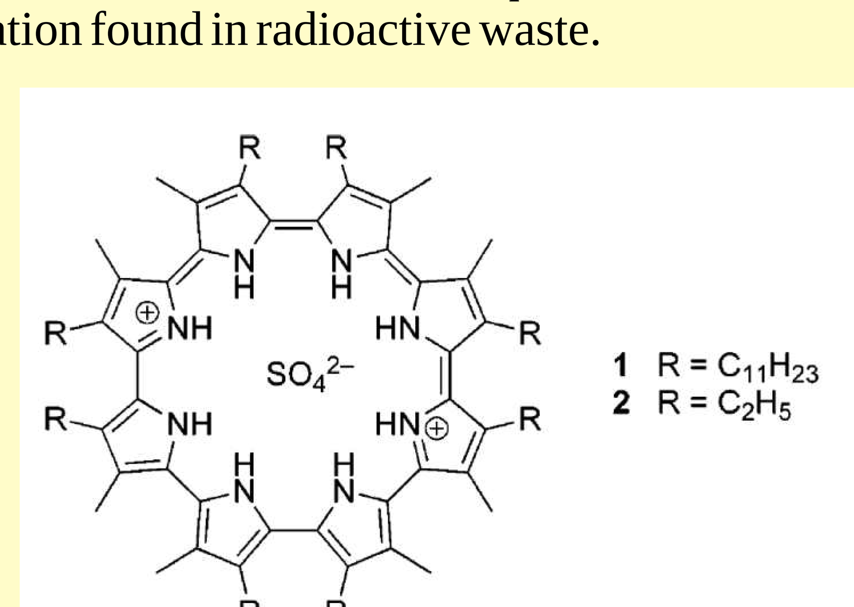
The German group, which specializes in the study of explosives, managed to keep the substance tame enough to perform X-ray diffraction studies. Working in the dark to avoid setting off an explosion, they synthesized large quantities of the unstable compound.



Extractor de sulfats

A small amount of corrosion-inducing sulfate anion in nuclear waste can make long-term storage difficult, so chemists have long been seeking a molecule that could selectively remove the sulfate. Now they have found the first promising candidate for a sulfate anion extractant: a doughnut-shaped molecule consisting of eight pyrrole units, each of which bears an 11-carbon alkyl chain to make the molecule more soluble in organic solvents (*J. Am. Chem. Soc.*, **2007**, *129*, 11020)

This so-called cyclo[8]pyrrole has a central cavity that is just the right size for binding to sulfate anion, according to Jonathan L. Sessler of the University of Texas, Austin. His team synthesized and studied the porphyrin-like compound in collaboration with Bruce A. Moyer of Oak Ridge National Laboratory. They have found that a toluene solution of the cyclo[8]pyrrole can extract sulfate anion out of aqueous solutions that are much richer in nitrate anion—the situation found in radioactive waste.

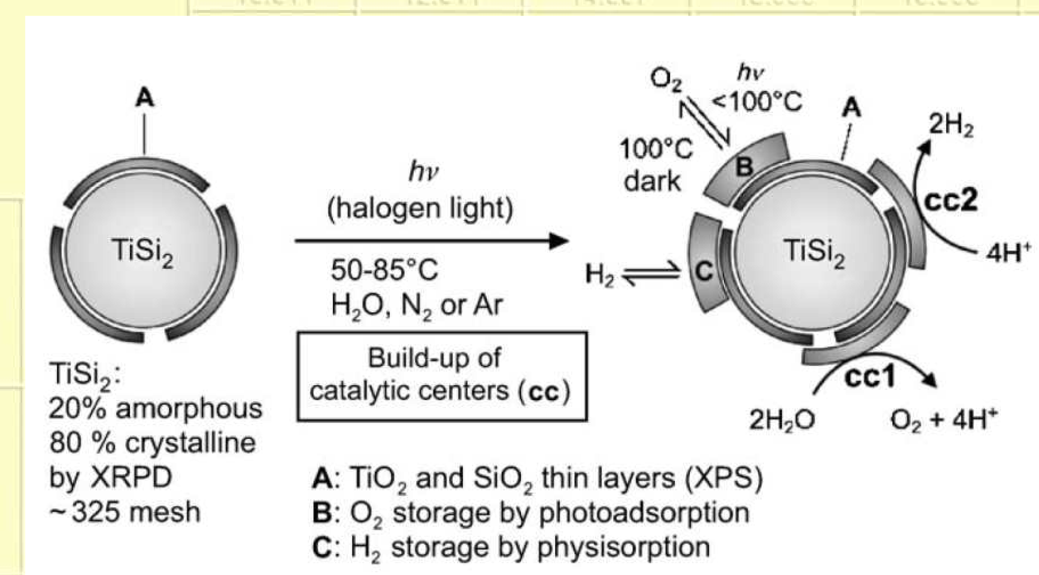


Hidrogen de dia, oxigen de nit

Scientists in Germany have developed a promising new catalyst that splits water using sunlight -and stores the hydrogen and oxygen produced. The research combines two important energy sources of the future: solar power and hydrogen fuel (P. Ritterskamp *et al. Angew. Chem. Int. Ed.*, **2007**, *46*, 7770).

The team at the Max Planck Institute for Bioinorganic Chemistry in Mülheim found that titanium disilicide ($TiSi_2$) could split water using a photocatalytic process akin to photosynthesis. The semiconductor was also able to separate and store the hydrogen and oxygen released.

As the reaction occurs, hydrogen and oxygen are absorbed onto the surface of the catalyst and held there. Although storage space is limited, the two gases can be released in different ways - hydrogen is released when the catalyst is cooled to ambient temperature, but oxygen is only released when the catalyst is heated to 100°C in the dark.

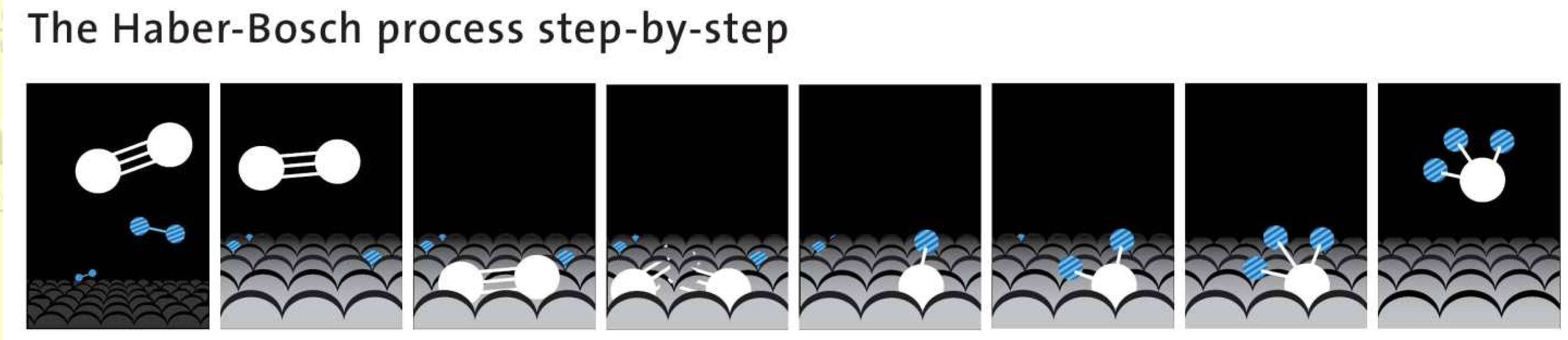


El Nobel 07, per a les superfícies

The Nobel Prize in Chemistry for 2007 is awarded for groundbreaking studies in surface chemistry. This science is important for the chemical industry and can help us to understand such varied processes as why iron rusts, how fuel cells function and how the catalysts in our cars work. Chemical reactions on catalytic surfaces play a vital role in many industrial operations, such as the production of artificial fertilizers. Surface chemistry can even explain the destruction of the ozone layer, as vital steps in the reaction actually take place on the surfaces of small crystals of ice in the stratosphere. The semiconductor industry is yet another area that depends on knowledge of surface chemistry.

It was thanks to processes developed in the semiconductor industry that the modern science of surface chemistry began to emerge in the 1960s. Gerhard Ertl was one of the first to see the potential of these new techniques. Step by step he has created a methodology for surface chemistry by demonstrating how different experimental procedures can be used to provide a complete picture of a surface reaction. This science requires advanced high-vacuum experimental equipment as the aim is to observe how individual layers of atoms and molecules behave on the extremely pure surface of a metal, for instance. Acquiring a complete picture of the reaction requires great precision and a combination of many different experimental techniques.

The Haber-Bosch process step-by-step



In the Haber-Bosch process nitrogen (white) reacts with hyrogen (striped) on an iron surface to then form molecules of ammonia which are released from the surface. This reaction, which extracts nitrogen from air, is an important step in the production of artificial fertilizer.

Més informació: http://nobelprize.org/

Breus

- La Societat Catalana de Química, que enguany fa 75 anys, ha esdevingut membre de la European Association for Chemical and Molecular Sciences.
- Ha estat publicada la versió castellana del Llibre Vermell de la IUPAC, *Nomenclatura de Química Inorgánica. Recomendaciones de la IUPAC de 2005.*
- Els microorganismes de fa 2500 milions d'anys obteníen la seva energia a partir de la desproporció del sofre (P. Philipott *et al.*, *Science*, **2007**, *317*, 1534)
- Els apunts i dibuixos de Francis Crick, codescubridor de l'estructura de l'ADN, es troben disponibles a Internet (http://profiles.nlm.nih.gov/SC/).

L'element número **36**, **criptó,** va ser descobert l'any 1898 per William Ramsay i Morris Travers. El seu nom prové del grec κρυπτος, que vol dir *amagat.*