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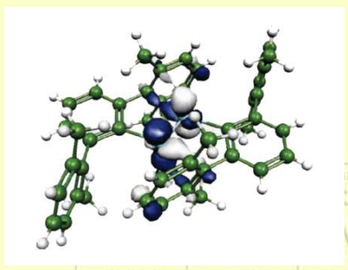
Caracteritzat el primer enllaç quíntuple

F. Albert Cotton and his coworkers at Texas A&M University surprised chemists in 1964 with evidence that the $[Re_2Cl_8]^{2-}$ ion contained the first known multiple bond between two metal atoms. Not only was it a multiple bond, it was an unprecedented quadruple bond. Cotton convinced the world that he was right, and inorganic chemistry hasn't been the same since.

Now, Philip P. Power at the University of California, Davis, and his coworkers report evidence for the first "quintuple" bond between two metal atoms in the dichromium complex, RCrCrR, where R is a bulky terphenyl ligand (*Science*, **2005**, *310*, 844). The chromium dimer exists as air- and moisture-sensitive dark red crystals that are stable up to 200 °C.

Power and his coworkers believe that the two chromium(I) atoms, which have a $3d^5$ electron configuration, share five electron pairs in five bonding molecular orbitals. Power is cautious about using the word "quintuple" to describe the bonding in the new molecule, preferring to call it "fivefold bonding" because the actual bond order is likely less than five.

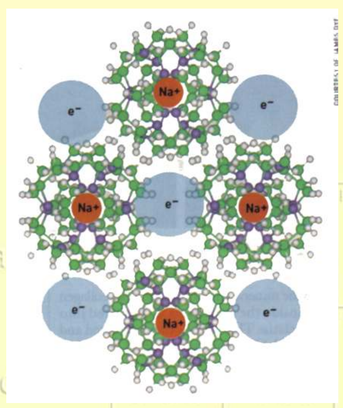


Nou electrur estable a temperatura ambient

James L. Dye, an emeritus professor at Michigan State University, has been exploring the chemistry of alkali metals. In his career, he can claim a lot of firsts stemming from the elements in the first column of the periodic table. Now comes the coup de grâce: synthesis of a room-temperature-stable electride, a compound in which the counterion in an alkali-metal cryptand complex is a trapped electron (*J. Am. Chem. Soc.* **2005**, *127*, 12416).

Alkali metals form some of the most simple and common compounds known. But, the highly reactive elements also form some complex and unusual compounds, such as alkalides and electrides. Alkalides are compounds in which alkali-metal atoms adopt both the 1+ and 1- oxidation states in the same molecule: Electrides are analogs of alkalides in which the alkali-metal cations are charge-balanced by electrons trapped in the crystal lattice.

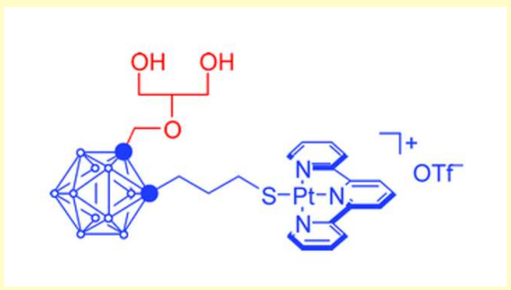
Dye's group has made a few dozen alkalides since the late 1960s, but just a handful of electrides. A hurdle to the electrides has been their thermal instability, which has required them to be prepared, isolated, and characterized at -20 °C or below. Key to coming up with a stable electride now was the design and synthesis of a cryptand that could stand up to the electrons, which are powerful reducing agents.



Carbaborans solubles contra el càncer

A new complex for more effective delivery of closo-carborane agents to tumour sites has been developed by chemists in Australia. Louis Rendina and colleagues from the University of Sydney and the University of Adelaide have increased the ability to obtain large cellular concentrations of boron by making the first example of a metal-containing carborane complex functionalised with a water-solubilising glycerol group *(Dalton Trans.*, **2005**, 2825).

Boron species are important in cancer treatments using boron neutron capture therapy (BNCT). Delivering them to the site of action is difficult because of their limited solubility in the body. Rendina's team had already discovered that platinum(II)-carborane complexes can deliver boron near to DNA. Now, by modifying the synthesis, Rendina has incorporated a glycerol group into the complex. Not only does this aid delivery to aqueous media, it also increases the linker length in the complex which prevents the carborane interacting with the platinum(II)-DNA binding process.

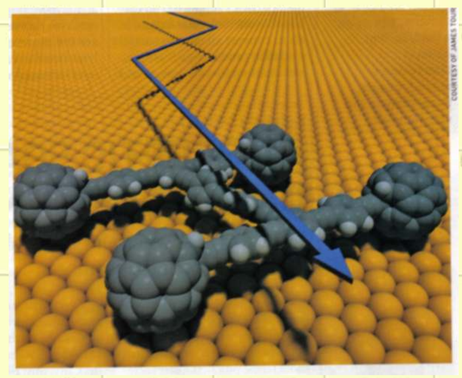


Arrenca el primer nanocotxe

Automakers aren't losing any sleep over a car recently unveiled by Rice University researchers. This new coupe doesn't have any seating or steering. On the upside, though, with a wheelbase less than 5 nm, parking it is unlikely to be a problem.

The new auto is the world's first single-molecule car. A group led by chemistry professor James M. Tour constructed the tiny four-wheeler from an oligo(phenylene ethynylene) chassis and axle covalently mounted to four fullerene wheels. With the help of electrical engineering professor Kevin F. Kelly and his lab, the team drove this nanocar around on a gold surface using the tip of a scanning tunneling microscope (*Nano Lett.*, **2005**, *5*, 2230).

The nanocar took eight years for Tour's lab to complete. When they began the project, they were able to assemble the chassis and axles in just six months. Adding the fullerene wheels proved far more difficult. The problem is that fullerenes shut down reactions mediated by transition-metal catalysts, and the axle and chassis are synthesized via palladium-catalyzed coupling reactions. Attaching the wheels had to be the last step of the synthesis, but getting four fullerenes onto the molecule in sufficiently high yield was not trivial.

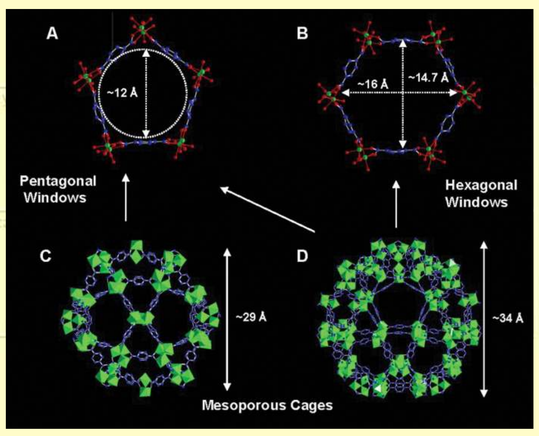


Material quasi buit

MIL-101 is a new, unusually porous material whose unit cell has an unprecedented volume of about 702,000 $Å^3$, meaning that the solid is about 90% empty space once the solvent molecules normally filling its pores are removed. It also boasts pores that are 29 or 34 Å across and an internal surface area of 5,900 m^2/g (G. Ferey *et al*. *Science* **2005**, *309*, 2040).

A tablespoon of MIL-101 has the surface area of a half-dozen football fields, or about seven times the area of the most catalytically effective zeolites. For comparison, cloverite has held the record since 1991 for the largest pores (close to 30 Å across), but its cell volume is only about 125,000 $Å^3$.

MIL-101--the letters stand for Matérial Institut Lavoisier--consists of inorganic chromium clusters linked by organic moieties. The key building block is a tetrahedral supercluster consisting of four smaller clusters (triads of oxochromium octahedra) that are held together by terephthalate (1,4-benzenedicarboxylate) groups. These superclusters form an extended framework containing cages of two different sizes.



Breus

• Ha mort Henry Taube (Saskatoon, Canada, 1915), Premi Nobel de Química l'any 1983 pel seu treball en els mecanismes de les reaccions de transferència d'electrons, especialment en complexos metàl·lics.

• La Chemical Genealogy Database Homepage permet saber quins són els nostres avantpassats científics: http://www.scs.uiuc.edu/~mainzv/Web_Genealogy

• S'ha avançat molt en una nova definició del quilogram basada en constants físiques fonamentals (*Chem. Eng. News*, 18 jul. 2005, p. 29; *El País*, 9 nov. 2005).

• S'ha descobert que l'oli d'oliva té un agent antiinflamatori d'acció similar a la de l'ibuprofè (G. K. Beauchamp *et al*., *Nature* **2005**, *437*, 45).

L'element número **24**,**crom**, va ser descobert el 1797 per Louis-Nicholas Vauquelin. El seu nom prové del mot grec χρωμα, que vol dir *color*.