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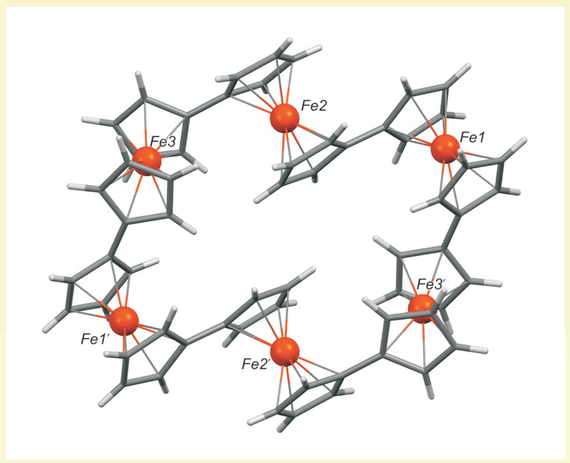
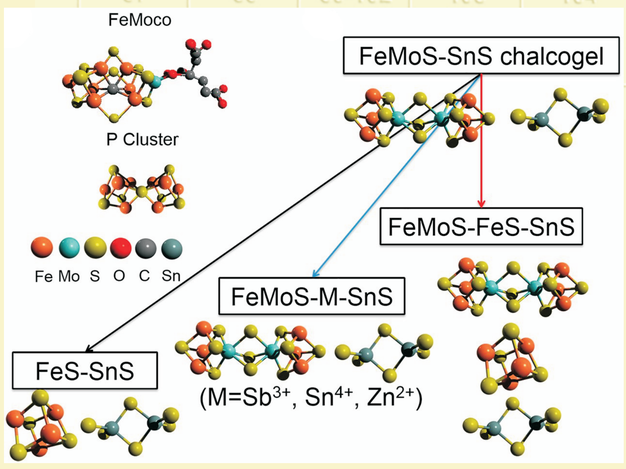
Un *benzè* de ferrocens

Ferrocene linear chains and macrocycles have been made before, but they contained spacer groups separating the metallocene units, which don't allow much interaction between the iron atoms. Now (M. S. Inkpen et al., *Nat. Chem*. **2016**, DOI: 10.1038/nchem.2553), examples in which five to nine ferrocene units are fused by direct cyclopentadienyl C–C linkages, that resemble a Ferris wheel, have been reported. These redox-active ferrous/ferric nanorings have substantial charge delocalization and are more stable than previous ferrocene-based macromolecules. The six-membered version represents an organometallic analog of benzene. The internal cavity of the molecules provides opportunities for host-guest chemistry, and the charge delocalization could lead to electronic and magnetic applications.



Cap a un amoníac més verd?

To produce the large quantities of fertilizer needed to sustain global food production, industry relies on the Haber-Bosch process to split dinitrogen from the air to synthesize ammonia. But to generate the high temperatures and pressures needed for the reaction, ammonia plants consume fossil fuels and, as a result, contribute significantly to greenhouse gas emissions, so development of green alternatives to the Haber-Bosch process is needed. Now (M. G. Kanatzidis et al., *Proc. Natl. Acad. Sci. USA*, **2016,** DOI: 10.1073/pnas.1605512113) researchers have prepared iron-sulfur (Fe_4S_4) clusters, found naturally in the nitrogenase enzymes bacteria use to split dinitrogen to make a light-driven catalyst that converts N_2 to NH_3 in water at ambient temperature and pressure. After synthesizing the Fe_4S_4 clusters, the researchers link them with $[Sn_2S_6]^{4-}$ anions and form the complex into a chalcogel, a foamy gel containing the chalcogen element sulfur. The black material absorbs visible light and uses that energy to break the N≡N triple bond, one of the strongest in chemistry. The nitrogen atoms then combine with water-derived hydrogen to make NH_3. The chalcogel is orders of magnitude less efficient than the Haber-Bosch process. But unlike the Haber-Bosch process or metal-N_2 complexes, the chalcogel catalyst can fix N_2 under quite mild conditions using light as the only driving force.

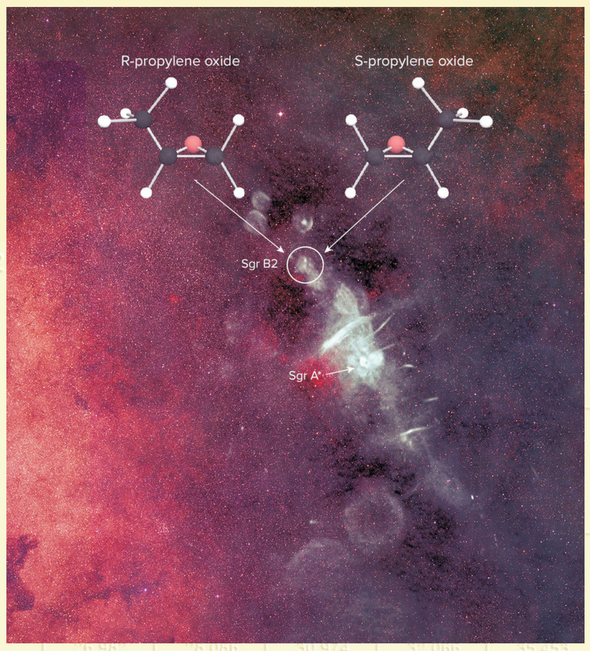


This chalcogel, a network of Fe_4S_4 clusters linked with $[Sn_2S_6]^{2-}$ anions, uses visible light to convet N_2 to NH_3

Quiralitat a l'espai

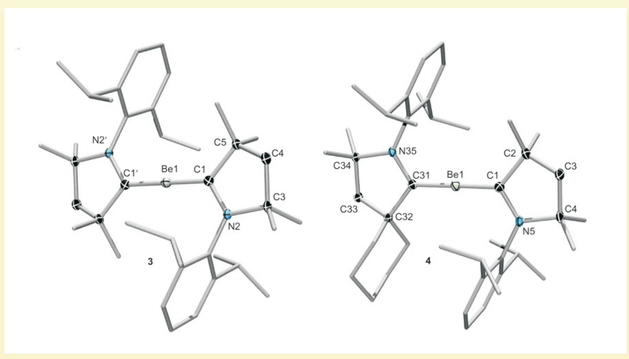
The discovery of propylene oxide in an interstellar cloud sets the stage for astronomers to explore chemical processes that led to the preference of one enantiomer over another in the formation of biomolecules on Earth. (G.A. Blake et al., *Science* **2016**, DOI: 10.1126/science.aae0328).Astronomers found chiral propylene oxide in the interstellar cloud Sagittarius B2 North, in which have found one-third of the 180 known interstellar molecules. Three characteristic radio frequency absorbance lines that definitively identify propylene oxide have been obsrved. However, at the moment, these observations don't distinguish between enantiomers.

Another article reports that an analysis of sugar-related compounds on meteorites has revealed an excess of D enantiomers, suggesting homochirality may have been down to the pre-life building blocks that were delivered to Earth from space billions of years ago (G. Cooper et al., *Proc. Natl. Acad. Sci. USA*, **2016**. DOI: 10.1073/pnas. 1603030113).



Un zero per al Be

The first stable and neutral compounds containing a zero-valent s-block metal have been obtained (M. Arrowsmith et al., *Nat. Chem.*, **2016**; DOI:10.1038/nchem.2542). Theoretical work has previously suggested that N-heterocyclic carbenes (NHCs) would be the way forward in making Be^+ and Be^0 complexes. The obtained compounds contain very short bonds between the beryllium and carbon atoms, and linear beryllium coordination geometries are observed reinforcing the idea of strong multiple Be-C bonds. The compound are highly coloured, a property that in the world of the metals is almost uniquely the reserve of the transition block and noy usually observed in compounds of s-block metals. Their structural, spectroscopic and theoretical data show that the complexes have a closed-shell singlet configuration that has a zero-valent Be^0 metal centre. Aditionally, an unusually strog three-centre two-electron pi bonds across the C-Be-C group endows the complexes with surprising stability.



Crystallographically determined structures of $[Be(^{Me}L)_2]$ and $[Be(^{Me}L)(^{Cy}L)]$

Breus

- La IUPAC ha proposat els noms i símbols **Nihoni** (Nh), **Moscovi** (Mc), **Tenessi** (Ts) i **Oganessó** (Og), per als nous elements de nombre atòmic 113, 115, 117 i 118, respectivament. (https://iupac.org/iupac-is-naming-the-four-new-elements-nihonium-moscovium-tennessine-and-oganesson/)
- Investigadors del Dpt. de Química Analítica de la Universitat de València han trobat que les cafeteres del tipus *Nespresso* són tan eficients com aparells industrials, de preu 500 vegades superior, en l'extracció de contaminants de diferents tipus de mostres (F. Esteve-Turillas et al., *Anal. Chem*., **2016**; DOI: 10.1021/acs.analchem.6b01400)
- Una nova tècnica ha permès descobrir dipòsits de Heli d'origen volcànic, a Tanzània, que augmentaran significativament les reserves d'aquest element.(*Chem, Eng. News*, **2016**, 94 (27))

Avui recomanem

El **Museu de la Ciència i de la Tècnica de Catalunya** de Terrassa (www.mnactec.cat) presenta com a exposició permanent «TOT ÉS QUÍMICA», organitzada en col·laboració amb la Societat Catalana de Química. La mostra dóna a conèixer la contribució de la química a la qualitat de vida d'avui. Està estructurada en cinc àmbits: Sóc Química... doncs existeixo. Quins elements! Posem-hi ordre. La transformació de la matèria. Gràcies a la Química.

L'element

L'element número 76, **osmi,** fou descobert pel químic anglès Smithson Tennant, l'any 1803, analitzant els residus de la reacció de l'aigua regia amb el platí; el nom prové del terme grec *"osme"* que vol dir olor.

És un dels elements menys abundants a l'escorça terrestre (0.0015 ppm). Es troba en la naturalesa lliure o bé formant aliatges, majoritàriament amb l'iridi, i, com la resta d'elements dels grup del platí (Ru, Rh, Pd, Os, Ir i Pt) ,en minerals de coure i níquel. Les reserves més importants es troben a Sudàfrica i a Rússia.

Es coneixen set isòtops naturals, sis estables i el ^{126}Os radioactiu, emet partícules alfa i té una vida mitjana de l'ordre de 10^{15} anys, que a efectes pràctics, pot considerar-se estable. No té aplicacions pràctiques significatives, en tot cas el OsO_4, amb un punt de fusió de 40 ºC, s'utilitza en química forense en la identificació d'empremtes dactilars i en la preparació de mostres estudiades per microscòpia electrònica, així com en síntesi orgànica.