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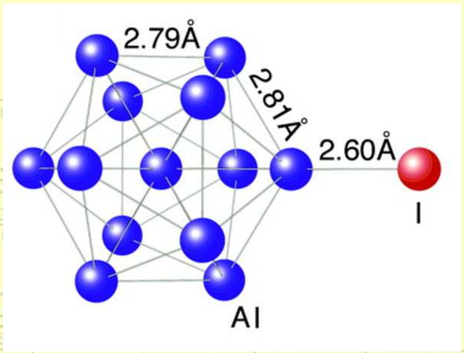
L'alumini... un halogen?

Al_{13}, a cluster of 13 aluminum atoms, acts in chemical reactions like a single halogen atom, suggesting that it can be used as a building block for a new class of nanoscale materials composed of similar element-like clusters [*Science*, **304**, 84 (2004)]. D.E. Bergeron and coworkers (University of Pennsilvania) revealed that the Al_{13} group maintains its integrity as an intact metal cluster when it reacts with HI in the gas phase to form the anionic cluster $Al_{13}I^-$ (shown, Al = blue and I = red). In the cluster, the Al_{13} group has higher electron affinity than iodine and behaves like bromine. This, along with its single-entity behavior in reactions, demonstrates that Al_{13} has "pseudohalogen" or "superhalogen" character, and it is the first metal cluster found to act in this manner.



El quars, una nova eina de datació

By measuring the thickness of the so-called hydration layer of quartz-containing artifacts and other materials, researchers can determine their age with a high degree of accuracy, according to a new study [*J. Archaeol. Sci.*, **31**, 883 (2004)].

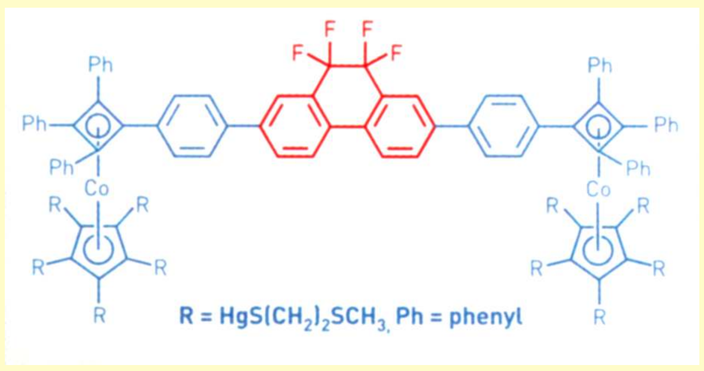
The new method—quartz hydration dating—can date artifacts from 100 to 100,000 years old, filling a chronological gap for artifacts and other materials that are between 50,000 and 100,000 years old, and for which current dating techniques are mostly ineffective.

Materials containing quartz are common and have been used for millennia to make tools, housewares, and decorative objects. When quartz crystals are fractured or carved, water diffuses into the fresh surface to form a hydration layer that increases in thickness with age. Recognizing this phenomenon, archaeological scientist Jonathon E. Ericson of the University of California, Irvine, and coworkers at Johann Wolfgang Goethe University, Frankfurt, bombarded quartz samples with ^{15}N ions, which react with hydrogen in water or other molecular species to produce ^{12}C, an alpha particle, and gamma rays.

The gamma-ray yield is measured at various energy levels to create a concentration curve that represents the depth of the hydration layer. The team then developed a general equation for the rate of diffusion of water into the quartz surface. Comparing the diffusion rate with the layer depth allows researchers to determine a sample's age.

L'animació arriba a les revistes de química

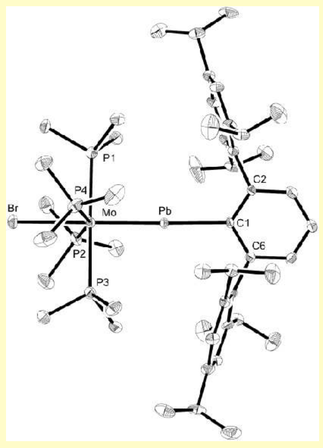
Molecular machinery is still a far-off dream, but many labs are nonetheless pursuing it. At the University of Colorado, Josef Michl and coworkers have synthesized molecules (such as the one shown) that contain a rotating moiety (red) and two cyclopentadienyl "feet" with thiomercurial "tentacles" that adsorb to a gold surface so that the rotator axle is held parallel to the surface. The rotator is free to turn, but in practice the team finds that the tentacles sometimes impede its rotation. In the absence of such interference, the dipole of the rotator can be flipped by the electric field of a scanning tunneling microscope tip. Molecular dynamics calculations suggest that an alternating electric field perpendicular to the surface could be used to spin such a molecular rotor in one direction. A movie of this rotary action is viewable by clicking on a link in Michl's paper [*J. Am. Chem. Soc.*, published online March 11, http://dx.doi.org/10.1021/ja039482f]. This marks the first time that any chemical journal has had animation directly linked to the body of an article.



El plom ja forma triples enllaços

Double- and triple-bonded group 14 elements other than carbon have been a hot topic since the first double-bonded silicon compound was observed in the early 1980s. Nearly all members of this class of compounds have been reported so far, but not one featuring a lead triple bond. Now, even that has been accomplished by chemistry professor Alexander C. Filippou and coworkers of Humboldt University, in Berlin, who report the synthesis of a molybdenum complex containing a Mo≡Pb triple bond [*Angew. Chem. Int. Ed.*, **2004**, 2243].

The triple bond is formed by reacting a molybdenum complex containing phosphine and dinitrogen ligands with a bulky aryl lead bromide in toluene at room temperature. The reaction proceeds with a color change from orange to brown and elimination of N_2 gas, resulting in the stable but air-sensitive plumbylidyne complex (shown, R = 2,6-[2,4,6-triisopropylphenyl]phenyl). The crystal structure reveals linear coordination of Pb and a short Mo≡Pb triple bond length of 2.55 Å, which is 0.43 Å shorter than Mo-Pb single

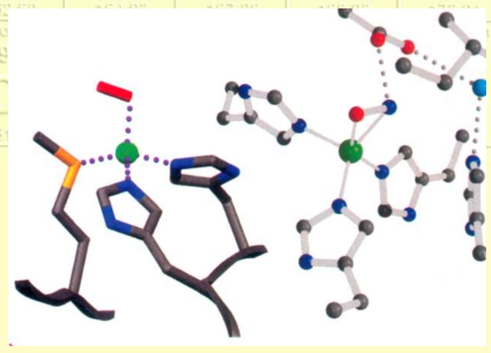


Nous modes de coordinació del O_2 i NO

X-ray structures of two different copper-containing metalloenzymes have revealed novel metal adducts of nitric oxide (NO) and oxygen that may be key intermediates in these enzimes'catalytic mechanisms. The ways in which NO and O_2 bind to copper in the active sites of these two enzymes have not previously seen in nature.

A team led by structural biologists M.E.P. Murphy and E.I. Tocheva of the University of British Columbia, trapped the novel Cu-NO complex in NO-saturated crystals of nitrite reductase, a bacterial enzyme that produces NO from nitrite [*Science*, **304**, 867 (2004)]. The NO molecule is bound "side on" to the enzyme's copper atom. This unusual Cu-NO binding mode is unprecedented in both synthetic and biological systems.

The unusual Cu-O_2 complex was observed in a X-ray crystal structure op peptidylglicine-alpha-hydroxylating monooxygenase, a copper enzyme involved in peptide hormone processing [*Science*, **304**, 864 (2004)]. In this structure, which was solved by structural biologist L.M. Amzel and coworkers (Johns Hopkins University of Medicine), an O_2 molecule is bound to one of the enzyme's copper atoms via just one of its oxygen atoms. Although theoretical and experimental studies of synthetic copper complexes have suggested that such "end on" coordination of O_2 to Cu is possible, this is the first time anyone's been able to capture a structural picture of Cu binding O_2 in this way.



Breus

- Per a l'element 111 s'ha proposat el nom de *röntgeni*, en honor de W. H. Röntgen, descobridor dels raigs X.
- El rutherfordi es comporta com un element del grup 4 [*J. Am. Chem. Soc.*, **126**, 5219 (2004)].
- S'ha preparat el $C_{50}Cl_{10}$, l'estructura del qual trenca la regla del *pentàgon aïllat* dels ful·lerens [*Science*, **304**, 699 (2004].
- A l'adreça http://www.chemistry.org/portal/a/c/s/1/history.html es poden trobar efemèrides setmanals de la història de la Química.

L'element número **16**, **sofre**, es coneix des de l'antiguitat (segle XVI abans de Crist). Ja se'n fa referència a la Bíblia (Genesi 19,24), així com a l'Odissea d'Homer.