CRYSTAL GROWTH “ON THE ROCKS”. CHEMICAL MICROSCOPY. ACTIVITIES FOR THE INTERNATIONAL YEAR OF CRYSTALLOGRAPHY 2014

II Encontro Internacional da Casa das Ciências, Porto, 14 a 16 de Julho de 2014, Instituto Superior de Engenharia do Porto

Clementina Teixeira[1], Teresa Tasso de Figueiredo [2] & Gonçalo Santos[1]

[1]Centro de Química Estrutural, Instituto Superior Técnico, Universidade de Lisboa. [2]Externato Marista de Lisboa. Email: clementina@ist.utl.pt.

https://www.facebook.com/pages/Prof.ªClementina Teixeira da Cunha Pereira

“Projecto Estratégico – PEst-OE/QUI/UI0100/2013”

FCT Fundação para a Ciência e a Tecnologia
MINISTÉRIO DA EDUCAÇÃO E CIÊNCIA

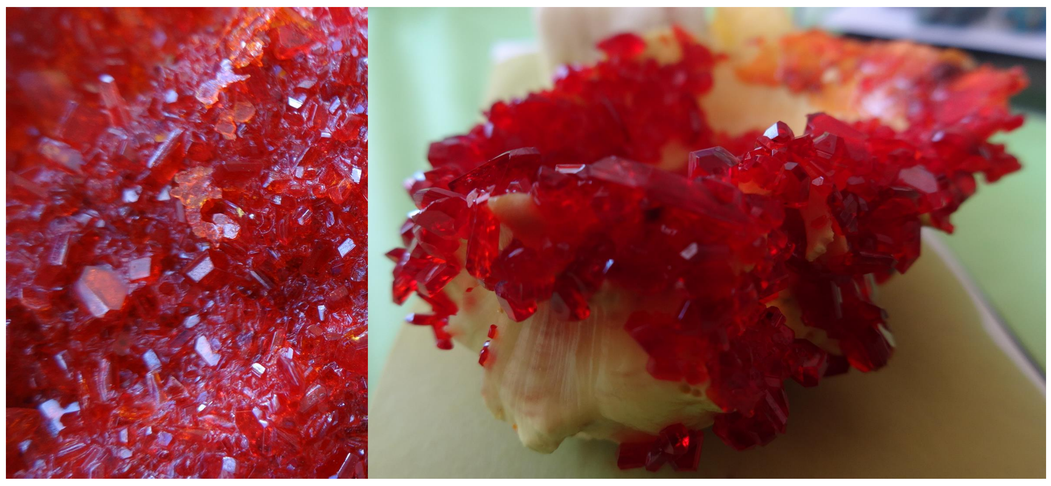
http://web.ist.utl.pt/clementina/cristais

Are crystals growing better “On the Rocks”? Always? Is Crystal Growth “On the rocks” enhanced by H-Bonding with the host?

Potassium Ferricyanide, $K_3[Fe(CN)_6]$
Potassium Hexacyanoferrate(III)

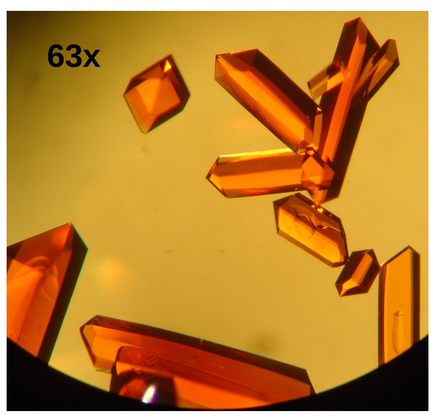
46-50 g/100 mL water. Any Host.
No enhanced growth “On the Rocks”!!!!!
No hydrogen bonding!!!!!!!!
Crystals are growing better by homogeneous nucleation, without the host

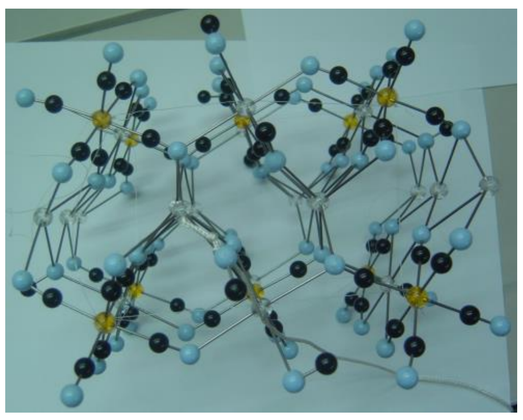
Another example: NaCl, etc.!!!!!!!!!

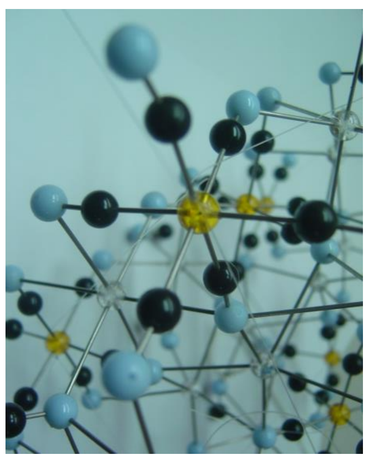


60 g/100 mL, shells

50 g/100 mL, no host!!!!!!!
Growth is better without host!!!!!







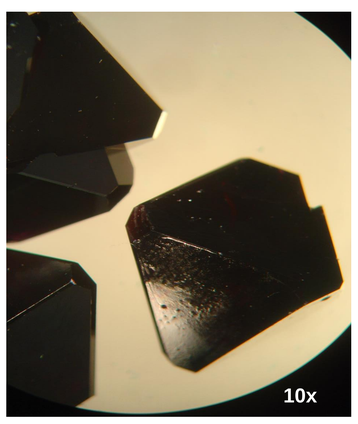
Beevers Miniature Model, x10^8 Crystal Lattice

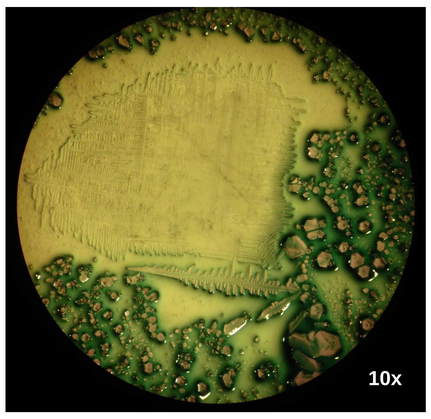
Chrome alum $Cr_2(SO_4)_3{\cdot}K_2(SO_4)\cdot 24H_2O$

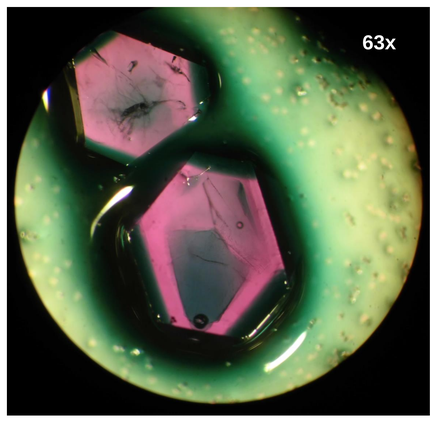
65g/100mL water. Volcanic rock. Any host, except low density volcanic rocks.

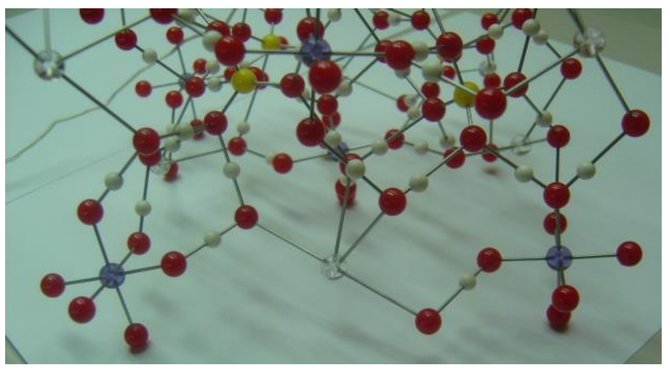
Growth by H-Bonding !!!!?

Beevers Miniature Model, x10^8 Crystal Lattice Potassium Alum (similar structure)









Cobalt-Ammonium Schönite
$CoSO_4{\cdot}(NH_4)_2SO_4{\cdot}6H_2O$

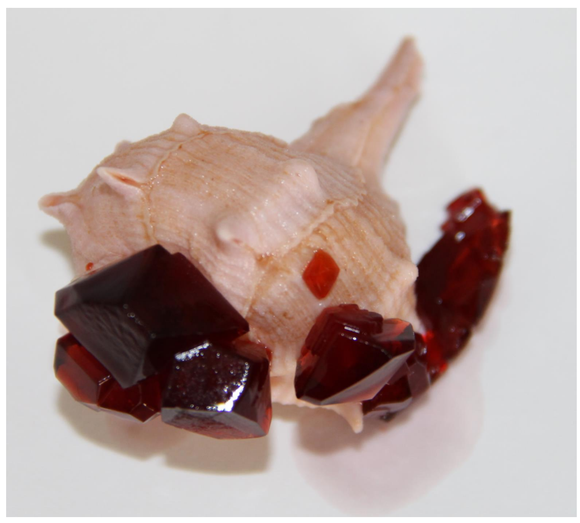
Any Host. Crystals prepared by the addition reaction:

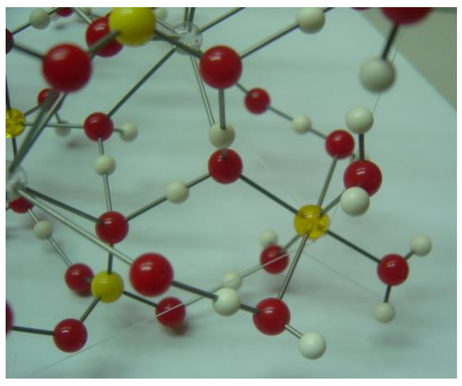
70.2 g $CoSO_4{\cdot}7H_2O$

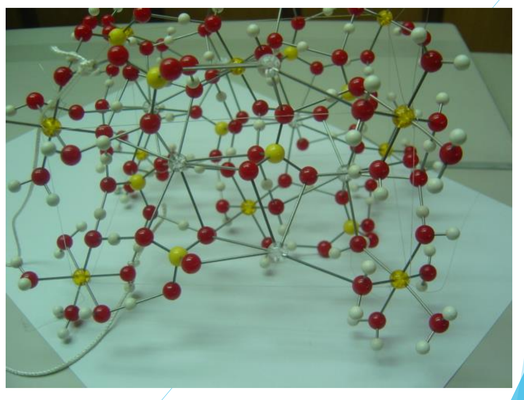
+

33 g $(NH_4)_2SO_4$ / 450 mL water.

Growth by H-Bonding !!!!!!!!?





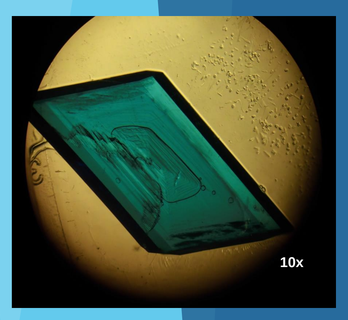


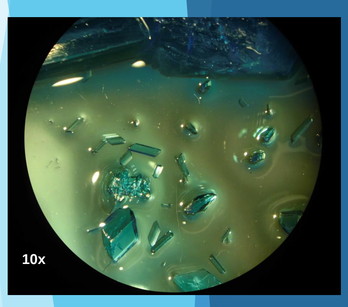
$CuSO_4{\cdot}K_2SO_4{\cdot}6H_2O$ Beevers models, x10^8, 1 Angström=1 cm
The structure of the Cobalt-Ammonium double salt is similar, but the rate of growth is enhanced by increased H-Bonding

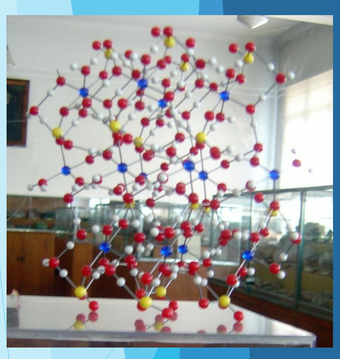
Copper (II) Sulphate Pentahydrate $CuSO_4{\cdot}5H_2O$

50-56 g/100mL water. Any host. Best host: granite.

Growth by H-Bonding !!!!!! ?







Beevers Miniature Models, x10^8 Crystals Lattices

Copper-Ammonium Schönite
$CuSO_4{\cdot}(NH_4)_2SO_4{\cdot}6H_2O$

Any Host. Prepared by addition of $\cdot(NH_4)_2SO_4$ (c) to Cu^{2+} (aq), recycling solutions of $CuSO_4{\cdot}5H_2O$

Growth enhanced by H-bonding!!!!!!!?