07.1-5 A NEW CRYSTAL GROWTH FORM OF VATERITE CaCO₃.
By A.M. Shaikh and D.J. Shearman, Geology Department, University of Kuwait.

An unusual growth form of vaterite, CaCO₃ (rhombohedral), was obtained in the laboratory by decomposition of the crystals of skaitte CaCO₃·0.6H₂O (monoclinic). The purpose of the experiment was to grow crystals of skaitte at temperatures close to 0°C, allowing them to decompose to calcium carbonate and water at normal laboratory temperature to see whether the skaitte crystals would become pseudomorphed in calcite. The reason for doing this was to try to gather evidence to support the current suggestion that skaitte was the precursor mineral of the calcite pseudomorphs known as jarroiwites, thinolites, gdenilonites and gemiishites. The skaitte crystals did become pseudomorphed in calcium carbonate, but XRD analysis proved the carbonate to be dominantly vaterite with a small proportion of calcite. Scanning electron micrographs showed that the microcrystalline vaterite occurred as arborosencence aggregates 30 to 40 μm in size. This growth form of vaterite does not appear to have been described before.

Vaterite is an extremely rare mineral in sedimentary rocks, a fact which is not surprising in view of its poor stability. What is of interest is that the overall shape of new growth forms is reminiscent of that of some dendritic calcite tubers, although on a smaller scale. The morphology and microcrystallinity of these new forms of vaterite and calcite are of interest and further studies are needed to understand their formation.

07.1-6 CRYSTAL GROWTH AND DESTRUCTION IN THE Cu-S SYSTEM.
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The compounds Cu₂S and Cu₃₅S₁₀0.8 were synthesized at 100°C in a quartz ampule under a vacuum of about 10⁻³ Torr. The chosen synthesis temperature being lower than the melting point of Cu (1083°C), the reaction takes place between solid Cu and S vapor. After termination of the synthesis the surface structure of the samples was investigated with a JEOL−35CF Scanning Electron Microscope, the composition by the EDX (energy dispersive X-ray spectrum) method and the phase composition by powder X-ray diffraction. Crystals 200–800 μm in size were observed on the surface of the samples Cu₂S crystals had the form of hexagonal prisms while the crystals of Cu₃₅S₁₀₀.₈ displayed truncated octahedra with well developed (111) and (100) faces. Sometimes growth steps could be seen on the crystal faces. A process of crystal destruction by decomposition of the Cu₃₅S₁₀₀.₈ with discernible destruction figures—quadrangular pyramids, truncated quadrangular pyramids and right-angled prisms on the (100) face and triangular pyramids and prisms on the (111) face. Transformation from right-angled prisms to mushroom-shaped figures was observed on the (100) faces. The crystal growth on the sample surface during synthesis can be due to vapor-phase reaction of S with solid Cu and material transport by sublimation from warmer to cooler parts of the sample. The simultaneousity of both processes-crystal growth and destruction may be connected with a steady temperature gradient along the sample diameter. The local temperature fluctuations on the different faces of the crystals lead to the simultaneous appearance of all the stages of the destruction process. One might attempt to explain the stability of some faces of the crystals during destruction in terms of the periodic bond-chain theory.

07.1-7 CRYSTAL GROWTH AND SUPERCONDUCTIVITY OF Nb₅Sn, Nb₃Al, Nb₃Al,₂₅Ge,₂₅ AND Nb₂Al. By Kim Christensen and Svend B. Rasmussen, Department of Inorganic Chemistry, Aarhus University, DK-8000 Aarhus C, Denmark.

Small single crystals of Nb₅Sn have been grown from the melt. Niobium tubes were used to confine the melt and to prevent evaporation of Sn. Crystals of size up to 1x1x0.1 mm were found. Bulk samples showed onset of superconductivity at 16.6 K. Low temperature powder photographs showed the well-known cubic-to-tetragonal phase transition which is being investigated further by single crystal methods. Crystals of the niobium-aluminium and niobium-aluminium-germanium compounds were grown by floating zone methods. In these cases Al₃Sn tubes were used to confine the melts and to prevent evaporation of aluminium. Single crystals big enough for X-ray diffraction were not obtained for Nb₃Al whereas crystals of size up to 1x1x1 mm were obtained for the ternary compounds Nb₃Al,₂₅Ge,₂₅. The sigma phase Nb₂Al yielded crystals that were twinned of size 0.5x0.5x0.1 mm. Sintered Nb₂Al became superconducting at 10.6–11.5 K and Nb₃Al,₂₅Ge,₂₅ at 16.2–19.0 K. Nb₂Al did not exhibit a transition to superconductivity down to 7 K. Low temperature powder photographs taken near the transition temperature of Nb₅Sn and Nb₂Al,₂₅Ge,₂₅ showed no signs of a phase transition. Neither did single crystal diffractometer measurements on Nb₃Al,₂₅Ge,₂₅. The stoichiometries given are for idealized structures. In reality, the compounds are non-stoichiometric.

07.1-8 SURFACE MORPHOLOGY OF MELT GROWN Cd₁₂, SINGLE CRYSTALS.
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Cd₁₂ has been purified by the zone-refining technique by giving 20 passes. Single crystals of this material were grown by this technique. X-ray diffraction studies showed that the final ingot was single crystalline. These crystals were found to be the 4H polytype structure. Sections of crystals cleaved from the ingot were used to study the surface morphology of these crystals using an optical microscope. In the present investigation growth spirals have been observed in these melt grown crystals. Spiral growth has been observed very frequently only in solution and vapour grown Cd₁₂ single crystals. The presence of growth spirals has been investigated in relation to the growth mechanism of Cd₁₂ single crystals.

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