

## **Physico-chemical foundations of malachite synthesis and study its structural-morphological characteristics and properties**

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Malachite is one of the most popular jeweler's and semi-precious stones. It has got world popularity owing to the Ural deposits. Now these deposits practically are completely fulfilled. It appreciably stimulated carrying out of researches directed on malachite synthesis to create complete analogous of the natural mineral. Many attempts to synthesize malachite similar to natural mineral using copper-carbonate, copper-bicarbonate and copper-sulphate solutions has not been successful. Only water-ammonium solutions were found as the most promising for synthesis of semi-precious malachite because of its high solubility in such solutions. We have determined tenorite, malachite, azurite stability fields and conditions of malachite synthesis in water-ammonium solutions in the system  $\text{CuO-CO}_2\text{-H}_2\text{O-NH}_3$  theoretically and experimentally at temperature up to  $100^\circ\text{C}$  and pressure of 0.1 MPa. On base of these data was developed two methods (in open flow and in closed recycling-evaporating systems) of production of man-made jewelry malachite. These methods allowed synthesizing nearly all natural textural varieties of malachite, including banded, silky, bud-like malachite. In chemistry, color, density, hardness, optical properties, and X-ray diffraction, the synthetic malachite proved virtually identical to the natural material. Thus, synthetic malachite is advanced material for use in jewelry and stone-cutting trade.