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Simultaneous growing of crystals of topaz and quartz in presence in solutions of chrome and nickel ions

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Simultaneous growing of crystals of topaz and quartz in presence in solutions of chrome and nickel ions was carried out. The study was based on results of phase equilibrium and transfer of silica and alumina in supercritical water solutions received earlier. Crystals were grown under hydrothermal conditions in neutral and acid fluoride solutions of density from 0.05 to 0.5 g/cm^3 at temperatures from 450 to 720˚C. Nutrient of quartz and seeds of topaz were placed in the bottom zone of the autoclave, and nutrient of topaz and seeds of quartz – in the top zone. Chrome and nickel ions in solution have been obtained by a partial dissolution of walls of the autoclaves (alloy A437B). Duration of the crystal growth runs was from 1 to 2 months. As a result, in the bottom, hotter zone of the autoclave, topaz crystals of bluish-green colour were grown, and in the top, colder zone, quartz seeds were recovered by a new quartz layer of lilac-pink colour. Moreover, these crystals have got a pleochroism effect at different wavelength light. At incandescent light, the colour of topaz changes to reddish-violet, and quartz – to lilac. At ultra-violet radiation (337 nm), topaz demonstrates an intensive fluorescence of purple-red colour; but quartz remains inert. Optical and fluorescent spectres specify that primary colouring of as grown crystals of topaz and quartz, and also intensive fluorescence of topaz are connected with isomorphic occurrence of Cr^{+3} and Ni^{+2}, respectively. The content of such impurities in the crystals doesn't exceed 0.2-0.3 wt. %. The results show a selective capture of various impurities components by the crystals of topaz and quartz at their simultaneous growth from the same medium.