This work is focused on preparation and characterization of cobalt chromite nanoparticles embedded in silica matrix. The preparation of nanocomposites is based on preparation of molecular precursor, which is transformed to inorganic-organic xerogel using sol-gel process and subsequently pyrolysed and annealed at temperatures up to 1300 °C. The molecular precursor was prepared by reaction of dianhydride of ethylenediaminetetraacetic acid with (3-aminopropyl)trimethoxysilane and by subsequent complexation of Co^{2+} and Cr^{3+} and therefore, it contains both the precursor for nanoparticles and silica matrix. The system with Fe^{3+} was used to study an influence of the cations on the rate of condensation of the gel. A specially modified molecular precursor was prepared for the investigations of the complexation using UV-Vis spectroscopy. This precursor does not contain $–Si(OR)_3$ groups to avoid the problems with formation of the gel, which would cause the inhomogeneities in the absorbing medium. Cobalt and chromium distribution in the xerogel was studied by EDS and ICP-AES. The results of powder X-ray diffraction showed that the oxides of cobalt and chromium reacted only partialy during the pyrolysis, which caused that nanocomposite contained except for the $CoCr_2O_4$ nanoparticles with a length of coherently diffracting domain shorter than 5 nm also the Cr_2O_3 crystallites with the size of about 100 nm. Course of the reaction of these oxides was followed by powder X-ray diffraction. The annealing at the high temperatures the incorporation of chromium oxide into the spinel structure of $CoCr_2O_4$, which caused an increase of the lattice parameter in the temperature range from 500 °C to 1000 °C. At the higher temperatures the lattice parameter remained constant. The pure $CoCr_2O_4$ in the silica matrix was prepared by annealing at 1200 or 1300 °C. The process of crystalization of the silica matrix occured at 1300 °C. The removal of the matrix did not cause any change of the lattice parameter. The Rietveld analysis of the diffraction profiles indicated a bimodal size distribution of $CoCr_2O_4$ crystallites. Transmission electron microscopy confirmed a presence of the large particles of Cr_2O_3 as well as the nanoparticles of $CoCr_2O_4$ in the nanocomposite after the annealing.