

Abstracts of Forthcoming Articles

Zur Kinetik der Spinellbildung von β -Ga₂O₃ mit zweiwertigen Oxiden. IV. Reaktionen 2. Art im System CoO- β -Ga₂O₃. W. LAQUA, B. KÜTER, AND B. REUTER. Institut für Anorganische und Analytische Chemie der Technischen Universität Berlin, Berlin, Germany. The solid-state reaction of the second kind in a sandwich type diffusion couple of Co_{1-y}Ga_{2+3y/3}O and β -Ga₂O₃ has been investigated between 1249 and 1550°C in air. The quantity z , which corresponds to the saturation concentration of β -Ga₂O₃ in CoO, was determined as a function of temperature by X-ray methods and the optical microscope; the homogeneity range of the spinel phase Co_{1-y}Ga_{2+3y/3}O₄ was investigated too. The growth of the thickness of the reaction layer follows a parabolic rate law; the activation energy is 71.6 kcal/mole. A comparison of reaction rate constants of the first and second kind in connection with experimental results, achieved with a modified marker technique, leads to confirmation of the Wagner mechanism for the formation of CoGa₂O₄ spinel as supposed previously. Reaction rate constants of the second kind, calculated from interdiffusion profiles in CoO- β -Ga₂O₃ diffusion couples, are in good agreement with experimental values. Presented data are used for estimating interdiffusion coefficients for the CoO- β -Ga₂O₃ system according to theoretical aspects developed by Pelton, Schmalzried, and Greskovich.

Les Bronzes de Tungstene-Germanium. M. PARMENTIER AND C. GLEITZER, Laboratoire de Chimie du Solide, Université de Nancy I, 54037 Nancy Cedex, France. Evidence is obtained for a series of tungsten-germanium bronzes, through reaction of germanium with tungsten trioxide at 620°C. The four phases characterized derive from WO₃ with the classical increase of symmetry: monoclinic, orthorhombic, tetragonal, and cubic-type perovskite.

Structural Determinations of Single-Crystal K β -Alumina and Cobalt Doped K β -Alumina. P. D. DERNIER AND J. P. REMEIKKA, Bell Laboratories, Murray Hill, New Jersey 07974. Single-crystal structural refinements of K β -alumina and Co²⁺ doped K β -alumina show that the distribution of potassium ions in the diffusing planes is very similar to that in the isomorphous compound Na β -alumina but quite different from Ag β -alumina. The Co²⁺ ions selectively fill the underbonded, tetrahedrally coordinated, Al(2) sites in the middle of the spinel block portion of the structure. This tends to support the aluminum vacancy mechanism of charge compensation. The positional parameters of the spinel block are well determined and appear insensitive to the diffusing plane ions and arrangement.

Préparations et Propriétés du Diarséniure de Beryllium: BeAs₂, et du Diantimoniure de Beryllium: BeSb₂. RENÉ GERARDIN AND JACQUES AUBRY, Laboratoire de Chimie du Solide, Université de Nancy I, 54037 Nancy Cedex, France. These compounds are obtained through solid-state reaction between the elements in sealed tubes. They remain unaltered with atmospheric moisture. X-ray diffraction gives evidence for pseudocubic symmetry. The atomic stacking is considered to be of disordered sphalerite type. BeAs₂ and BeSb₂ behave as semiconductors.

Distributions of OH in Synthetic and Natural Quartz Crystals. DIPAK CHAKRABORTY, Central Glass and Ceramic Research Institute, Jadavpur, Cal-700032, West Bengal, India, AND GERHARD LEHMANN, Institut für Physikalische Chemie der Universität Münster, 44 Münster, West Germany. The relative intensities of different OH vibration bands have been studied in synthetic quartz crystals with local OH concentration varying by more than a factor of 30 by means of infrared absorption measurements at 78°K. Local variations of OH concentration also have been measured for different directions in these samples as well as in two crystals of natural quartz from Brazil. Integral absorptions of the different bands in the 3400 cm⁻¹ region were all found to increase linearly with total OH concentration. Therefore, mechanical Q could be related to any one band of the spectrum as well as to the total OH concentration. Since for natural quartz no relation between total OH concentration and mechanical Q seems to exist the effect of OH defects characteristic for synthetic quartz must be high, while the OH defects characteristic for natural quartz (i.e., rock crystals and smoky quartz) have a small effect on the mechanical Q . OH concentrations in the Z- and +X-zones were found to be lower near the edge than near the seed. The concentration of OH varies in the order Z < +X \ll -X, suggesting that OH acts as a charge compensator for metal impurities, notably Al³⁺. In natural quartz, the OH concentrations near the edge were also lower than in the interior parts. The overall differences for different directions were much smaller than in the case of synthetic quartz.