

## Abstracts of Forthcoming Articles

*Standard Free Energy of Formation of  $YFeO_3$ ,  $Y_3Fe_5O_{12}$  and a New Compound  $YFe_2O_4$  in the  $Fe-Fe_2O_3-Y_2O_3$  System at  $1200^\circ C$ .* N. KIMIZUKA AND T. KATSURA. Department of Chemistry, Tokyo Institute of Technology, Ookayama, Meguro-ku, Tokyo, Japan, 152. The phase equilibria in the  $Fe-Fe_2O_3-Y_2O_3$  system have been established at  $1200^\circ C$ . The following phases were stable: Yttria, hematite, magnetite, wüstite, metallic iron, yttrium-iron perovskite, yttrium-iron garnet, and a new phase  $YFe_2O_4$  belonging to a rhombohedral crystal system. The  $YFe_2O_4$  compound has solid solution from  $YFe_2O_{3.905}$  to  $YFe_2O_{4.000}$ . The standard free energies of formation of  $YFe_2O_{3.905}$ ,  $YFeO_3$ ,  $Y_3Fe_5O_{12}$  have been determined to be  $-96\ 800 \pm 200$  cal,  $-59\ 800 \pm 200$  cal, and  $-143\ 700 \pm 600$  cal from metallic iron,  $Y_2O_3$ , and oxygen, respectively.

*Mössbauer Study of Tin Phosphides.* L. HÄGGSTRÖM, J. GULLMAN, T. ERICSSON, AND R. WÄPPLING. Institute of Physics, Uppsala University, Box 530, S-751 21 Uppsala, Sweden. A Mössbauer spectroscopic study of  $SnP_3$ ,  $Sn_3P_4$ , and  $Sn_4P_3$  has provided values for the isomer shifts close to one for  $\beta$ -Sn. The presence of small electric quadrupole interactions is indicated.

*Quantum Yield of  $Ce^{3+}$  and Energy Transfer Between  $Ce^{3+}$  and  $Tb^{3+}$  in Borax Glasses.* R. REISFELD AND J. HORMADALY. Department of Inorganic and Analytical Chemistry, The Hebrew University of Jerusalem, Israel. Quantum yields of  $Ce^{3+}$  in borax glasses were obtained by the comparative method and by lifetime measurements. Energy transfer from  $Ce^{3+}$  to  $Tb^{3+}$  was detected in borax glasses from the excitation spectrum. The transfer probabilities were calculated from the increase of the  $Tb^{3+}$  fluorescence in the presence of  $Ce^{3+}$  and the decrease of the  $Ce^{3+}$  fluorescence in the presence of  $Tb^{3+}$ . A linear dependence of the transfer probabilities was found with the squared sum of the concentrations of the donor and acceptor ions. This is consistent with dipolar mechanism and interactions of one  $Ce^{3+}$  donor with two  $Tb^{3+}$  acceptors in view of the Fong-Diestler theory.

*The Compounds and the Phase Diagram of  $MoO_3$ -Rich  $Bi_2O_3-MoO_3$  systems.* T. CHEN AND G. S. SMITH. Xerox Palo Alto Research Center, Palo Alto, California 94304. The equilibrium phase diagram between 0 and slightly above 50 mole %  $Bi_2O_3$  in the  $Bi_2O_3-MoO_3$  system has been studied by DTA and X-ray diffraction measurements on fused mixtures and single crystals. The results confirm the existence of the four compounds  $\alpha(Bi_2O_3 \cdot 3MoO_3)$ ,  $\beta(Bi_2O_3 \cdot 2MoO_3)$ ,  $\gamma(Bi_2O_3 \cdot MoO_3)$  and  $\epsilon(\sim 1.3Bi_2O_3 \cdot MoO_3)$  in the system. However, the phase diagram as well as the nature of melting of the  $\alpha$  and  $\gamma$  were found disagreed with previous results. The  $\gamma$  compound melts incongruently at  $947^\circ C$ , whereas the  $\alpha$  compound melts congruently at  $662^\circ C$ . The crystal class and lattice parameters of the compounds were determined based on the single crystal as well as powder pattern techniques. The results show that all four compounds have the monoclinic structure. The unit cell parameters of the  $\beta$ ,  $\gamma$  and  $\epsilon$  compounds were found to be quite different from previously reported data. The lattice parameters obtained from X-ray analysis were also verified by density measurements of the single crystals. The polymorphism of the compounds was also investigated with single crystal samples. No polymorphic transformations for the  $\alpha$ ,  $\beta$ , and  $\gamma$  phases were detected in the work.

*Magnetic and Crystallographic Properties of Spinels of the Type  $A_xB_2S_4$  Where  $A = Al, Ga$ , and  $B = Mo, V, Cr$ .* D. BRASEN, J. M. VANDENBERG, M. ROBBINS, R. H. WILLENS, W. A. REED, R. C. SHERWOOD, AND X. J. PINDER. Bell Laboratories, Murray Hill, New Jersey 07974. Spinels with the formula  $Ga_{0.67}Mo_2S_4$ ,  $Al_{0.75}Mo_2S_4$ ,  $Ga_{0.67}Cr_2S_4$ , and  $Ga_{0.5}V_2S_4$  have been prepared. Since the cation to anion ratio of these spinels is less than 3:4 they must contain cation vacancies. X-ray diffraction studies indicate that the Al, Ga, and vacancies occupy the A (tetrahedral) sites and Mo, V and Cr the B (octahedral) sites. All of the spinels are semiconductors and exhibit weak ferromagnetism. The magnetic properties are explained in terms of B site ferro- and antiferromagnetic superexchange interactions. An anomaly observed in the magnetic properties of  $Ga_{0.5}V_2S_4$  at  $\sim 46^\circ K$  would seem to indicate a possible phase transition.