## E1-12 : ELECTRICAL CONDUCTIVITY VARIATION OF $Na_2SO_4$(I) SOLID SOLUTION WITH CONCENTRATION OF $Na_2WO_4$

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Upon heating, $Na_2SO_4$ transforms into the hexagonal phase denoted by $Na_2SO_4$(I) at 241°C which is stable up to the melting point. The $Na_2SO_4$(I) phase shows a $Na^+$ ion conductivity due to the migration of thermally generated Frenkel defects. One interesting feature of the $Na_2SO_4$(I) phase is the ability of making solid solution with a large number of cations as well as anions. In the present study, the ionic conductivity variation of the $Na_2SO_4$(I) solid solution as a function of $Na_2WO_4$ concentration was investigated by means of a complex impedance technique.

The ionic conductivity of $Na_2SO_4$(I) increase as $WO_4^{-2}$ ions are dissolved in the crystal structure and reaches to a maximum for the composition of 80 mol% Na2SO4 and 20 mol% $Na_2WO_4$. The ionic conductivity of the solid solution with 20 mol% $WO_4$ substitution is $4 \times 10^{-4}$ S cm $^{-1}$ at 450°C which is an enhancement of about 4 times compared to that of pure $Na_2SO_4$ at the same temperature. This enhancement

may be attributed to the increased interstitial space within the $Na_2SO_4$(I) structure due to the substitution of smaller $SO_4^{-2}$ ions by larger $WO4^{-2}$ ions.