Iranian Journal of Crystallography and Mineralogy, Vol.6, No.2, Autumn 1998

Detailed Microstructure and Mineralogical Investigation of Basic Refractories

Ebrahimi, K.

Industrial Mineralogist Ph.D, Geology Department

The Ferdowsi university of Mashhad

Key Word: *periclase (magnesia = MgO), forsterite, monticellite, merwinite, dicalcium and tricalcium silicates.*

Abstract: Vein and hydrothermal - sedimentary types of magnesite from eastern Iran probably originated from ascending hydrothermal solutions. The cryptocryistalline magnesite is very pure although it has a variable CaO/SiO_2 ratio. It is compact with a very fine and uniform texture. The mineralogy of samples of dead burned magnesites calcined at different temperatures and times are variable and can be predicted from phase equilibria studies. The textural relationships studied using scanning electron microscopy show that matrix is concentrated at periclase crystal boundaries particularly at the triple points. The periclase crystals are larger at increased calcination temperatures and times. The amount of periclase - Periclase grain contact reduces by increasing the amount of impurities.

Electron microprobe results confirm that CaO and FeO in periclase increase steadily with the increase in the CaO/SiO_2 ratio and FeO content of bulk chemistry respectively.

The mineral chemistry of forsterite, monticellite, merwinite, dicalcium silicate and tricalcium silicate in dead burned magnesite indicate some solid solution between some phases, although sometimes it is difficult to analyse single phases. This study indicates that high quality dead burned magnesia bricks can be produced from the Iranian natural magnesite with low CaO , SiO_2 and FeO impurities and by maintaining the CaO/SiO_2 ratio of around 2:1.