

Synthesis of Mg_2Cu Alloy as a Precursor of MgH_2 by Mechanical Alloying and its Characterization Using XRD and SEM

J.L. Iturbe García¹, B.E. López-Muñoz¹ and L. Escobar Alarcón²

¹Departamento de Química

²Departamento de Física

Instituto Nacional de Investigaciones Nucleares, Km 36.5 Carretera México-Toluca s/n, la marquesa

C.P. 52045, Ocoyoacac, Estado de México, Tel: (01-55) 53297200 ext. 12274, fax: (01-55) 53297301

mail: joseluis.iturbe@inin.gob.mx

ABSTRACT

In this work the synthesis of intermetallic Mg_2Cu is presented. Elemental particles of magnesium with a purity of 99.8% and Cu 99.9% were mixed in the desired quantity to reach a nominal composition from 40-60 up to 90 – 10 wt% respectively. The synthesis of compound was carried out by mechanical alloying technique with a high energy ball mill type spex which was constructed in our Institute. Then the Mg and Cu particles were put into a stainless steel vial and three stainless steel balls of 12.7 mm in diameter for milling and methanol as process control agent were used. The ball to particles weight ratio was 10:1. The milling time is a parameter essential in the preparation of materials for which a time period was defined only between 1 to 5 h, at room temperature. To avoid overheating of the milling system a ventilator was placed on the container, the temperature at the end of milling was 28°C. The metal powders were analyzed before and after milling by X-ray diffraction and electron scanning microscopy. The results obtained by XRD shows the formation of only phase Mg_2Cu . These results show that due to the high impact between the milling media, material and the control agent can be obtained this alloy easily and fast by mechanical alloying technique continuously. This compound is the precursor for the preparation of magnesium hydride compound which can absorb hydrogen up to 6.7wt%.

Keywords: Mg_2Cu Intermetallic, mechanical alloying, XRD-SEM techniques.

