THE INFLUENCE OF CONVENTIONAL AND LOW-PRESSURE HEAT TREATMENT ON THE COURSE OF CHRYSOTILE ASBESTOS DECOMPOSITION

Dr. Kujawa Magdalena
Dr. Kusiorowski Robert
Dr. Gerle Anna
Łukasiewicz Research Network – Institute of Ceramics and Building Materials, Cracow, **Poland**

ABSTRACT

Recycling of chrysotile asbestos materials is a global problem. Even though the materials containing asbestos have good properties like resistance to elevated temperatures, high elasticity and mechanical strength, or abrasion resistance, it has been proven to be carcinogenic and banned in over 70 countries. Standard disposal of asbestos products - storing them in appropriately designated areas (landfills) - is a risk-taking method due to the possibility of secondary pollution of the surrounding environment and the waste of natural resources. One of the popular methods of neutralisation asbestos fibres is their thermal treatment. This study aimed to investigate the effect of thermal treatment in the range 25-1000°C in conventional parameters and under reduced pressure of -0.1 and -0.5 bar on the dehydroxylation process of chrysotile. The thermal decomposition course of chrysotile studied by differential thermal analysis (DTA) and thermogravimetric measurements (TG-DTG) showed the possibility of using low pressure to increase the efficiency of the thermal treatment process.

Keywords: asbestos, chrysotile, thermal decomposition, low vacuum

INTRODUCTION

Asbestos materials are commonly called silicate minerals from the amphiboles and serpentine groups with a fibrous structure. Among them, chrysotile deserves special attention, because of its wide application in industry, which on a global scale constitutes approx. 93% of the total mass of asbestos products. Chrysotile (white asbestos) is a hydrated magnesium silicate ($Mg_3(OH)_4Si_2O_5$), belonging to the group of serpentine minerals, characterised by a fibrous form of occurrence [1]. As is commonly known, asbestos materials, despite their undeniable, excellent properties, including high resistance to elevated temperatures, high mechanical strength, thermal insulation properties, and resistance to chemical compounds [2], are also characterised by carcinogenicity [3], which undoubtedly negates all the best features of this material. Therefore, for many years, especially in European countries, a policy of absolute ban on producing and withdrawing products containing asbestos has been applied. Following the regulations and commitment to the European Union, in 2002, Poland adopted a long-term program to remove asbestos and products containing asbestos. The mass of all asbestos products found in Poland is estimated at 15 million tons, and it should be noted that these materials are not subject to natural degradation. Standard disposal of asbestos products involves wrapping them in polyethylene foil and storing them in appropriately designated areas (landfills) [4], [5]. However, this procedure cannot be considered the final solution