

CHAPTER 1

INTRODUCTION



Powder Metallurgy is a technology of production generally used in industries nowadays due to its ability to solve many problems encountered in production in the past, especially for the special properties of high performance applications. This field of technology is very essential in the industrial production of common low technology to high technology, for example, production of machine parts, rocket parts, nuclear fuel pellets, and many components in nuclear reactor. It has been developed rapidly since the world war II until now especially in the developed country. In spite of being a producer of many important ores such as tungsten, tantalum, columbium, tin, antimony, etc., exported to the developed countries, there haven't been any person who initiates this field of metallurgy in Thailand. No work on Powder Metallurgy has been carried out in Metallurgical Engineering Department which was established in the university about ten years ago. So it is an appropriate chance to develop this field of technology. Due to the inadequacy of the equipment, and literature concerning the education and development to a complete field of study, only the study of the basic steps in Powder Metallurgy and the testing of some of its properties are carried out. Nuclear techniques are also applied to the determination of chemical compositions, density, etc..

Also study of the problems encountered in the basic experiments to improve the study in future on Tungsten and Copper powder to produce the electrical contact as a specimen is also a subject of the thesis.

Purpose of the research

The thesis deals with the studies of the steps generally used in the field of Powder Metallurgy for example, the determination of powder size distribution, powder shape, mixing and blending of powder, pressing, sintering process, changes in microstructure and mechanical properties, etc.. Nuclear techniques are applied in elemental analysis determination, these are: analysis of chemical compositions by Neutron Activation Analysis (NAA), Energy Dispersive X-ray fluorescence (EDX), Wavelength Dispersive X-rays fluorescence (WDX) techniques, density determination by gamma transmission. Direct application of the results would be the production of electrical contacts, sintered carbide tips, etc., and finally the production of nuclear fuel pellets.