CHAPTER 1

INTRODUCTION

1.1 Background of problem

This study is about some of ferrites which are nickel zinc ferrite. Ferrites are the mixed of metal oxides and other component. Ferrite can be classified into three classes based on three different types of crystal which are the spinel type (spinel ferrite), garnet type (garnet ferrites) and lastly the magnetoplumbite type (hexagonal ferrites).

All ferrites above can divide into two classes of ferrites which are soft ferrite and hard ferrite. Spinel ferrites and garnet ferrites come under soft ferrite while, hexagonal ferrite is determine as hard ferrite. Soft ferrites have low coercive field and easy in magnetization and demagnetization. Magnetism is retained in soft ferrites. Soft ferrites mostly contain divalent or trivalent metal ions (nickel, zinc, manganese, yttrium,) trivalent. For hard ferrites it will retain their magnetization once it magnetized, having large coercive field and are used for permanent magnet. The used of soft ferrites are to construct electromagnet.

The nickel zinc ferrite which is spinel type of ferrite. Ni–Zn ferrite system is the best system from the viewpoint in wide potential and advantages of application such as high Curie temperature, resistivity, low dielectric loss, high permeability and others (Deka, 2006)

There are several types of method or process to prepare and synthesis the nickel zinc ferrite. The type of processes that always used for synthesis of ferrite which are conventional ceramic method, precipitation, hydrothermal, microwave hydrothermal, plasma assisted synthesis, radio-frequency thermal, reverse micelle synthesis and others.
(Deka and Joy, 2006). Some the processes above will give some drawback that can affect the ferrite. Most ferrite have some drawback when prepared by the conventional ceramic processing method (Zahi et al., 2006). This is because ceramic method process used high temperature and long time for sintered due to ferrite properties sensitivity to the technique preparation that have above criteria.

Nickel zinc ferrite properties are more sensitive to the technique of preparation, temperature for sintered, chemical composition and time for sintered. Most ferrite has some drawback when prepared by the conventional processing method. Wet chemical method is used to overcome the drawbacks, (Zahi et. al., 2006).

1.2 Statement of the problem

Nickel zinc ferrites have a lot of method can used to preparation and synthesis such as ceramic processing method, precipitation and other. However, some of the method or process can give drawback to the ferrite such as ceramic process because of the uses of high temperature, chemical composition and time for sintered in preparation. In this study, the best method or process needs to choose to overcome the above affect. In able to overcome the drawback, the method of sol gel is choose and better properties can be obtained using these method (Zahi et al., 2007). Besides that, to continue the research, we need to know how to prepare the nickel zinc ferrite samples in different composition using the solid state technique.

Lastly, after that we get the right way in preparation of nickel zinc ferrite samples, the other problems are to know the structural and physical properties of Ni$_{1-x}$Zn$_x$Fe$_2$O$_4$
1.3 Objectives of research

There are two objectives proposed of this research. There are

- to prepare $\text{Ni}_{1-x}\text{Zn}_x\text{Fe}_2\text{O}_4$ (x = 0, 0.2, 0.4, 0.6, 0.8, 1.0) using solid states method
- to study the physical and structural properties of $\text{Ni}_{1-x}\text{Zn}_x\text{Fe}_2\text{O}_4$

1.4 Statement of contribution

The scope of this study is to know, what are the best process to prepare the nickel zinc ferrite between a few of process. Besides that, to study how to prepare the of $\text{Ni}_{1-x}\text{Zn}_x\text{Fe}_2\text{O}_4$ samples different composition. Furthermore to study the characteristic properties such as magnetic, physical and structural of the nickel zinc ferrite. In this research, nickel zinc ferrite will be prepared by using solid states technique. XRD is used to find structural and crystalline size properties, SEM is used to characterize the grain size of ferrite and FTIR analysis.