CHAPTER 5

CONCLUSIONS

The selected stoichiometric composition is $Mg_{0.36}\,Cu_{0.24}\,Zn_{0.4}\,Fe_2O_4$. The MgCuZn ferrites have been synthesized by co-precipitation process and mixed oxide route. Summarizing the experimental results for co-precipitation process will obtain the following conclusions:

1. MgCuZn ferrite has been produced by the co-precipitation process from Mg^{2+}, Cu^{2+}, Zn^{2+} and Fe^{3+} chlorides solution. Synthesis of MgCuZn ferrite can be formed directly from dehydration process, which is produced directly from the 40 wash precursor and follow by dehydration at 180°C. However, further calcination is required to further improve the crystallinity of single spinel phase MgCuZn ferrite. The milled size of powder calcined at 650°C is about 0.28 μm.
2. The specimens prepared from powder with a calcination temperature of 650°C and a sintering temperature of 930°C shows the absence of second phases, highest density, lowest porosity, highest initial permeability and quality factor, good DC electrical resistivity and lowest loss factor value.

Summarizing the experimental results for mixed oxide route will obtain the following conclusions:

1. MgCuZn ferrite has been produced by the mixed oxide route from MgO, CuO, ZnO and Fe_2O_3 powders. The calcination temperature of 850°C or above is required for the formation of single spinel phase, while no secondary phase (hematite) is detected. The milled size of powder calcined at 850°C is about 0.33 μm.

2. The specimens prepared from powder with a calcination temperature of 850°C and a sintering temperature of 950°C shows the absence of second phases, highest density, lowest porosity, highest initial permeability, good quality factor and DC electrical resistivity and lowest loss factor value.

Ferrites synthesized by co-precipitation and mixed oxide route achieve approximately the same range of densification, but have different electromagnetic properties. Ferrites prepared by mixed oxide route show higher initial permeability and lower loss factor than ferrites prepared by the co-precipitation process. However, the trends of quality factor and AC electrical resistivity for co-precipitation and mixed oxide route with frequency range are different.