

CHAPTER 5 CONCLUSIONS AND SUGGESTIONS FOR FUTURE WORKS

5.1 Conclusions

Three Schiff bases, H₂L1, H₂L2 and H₂L3 were successfully prepared from the reactions between 2-hydroxybenzaldehyde and 1,8-diaminooctane, 1,10-diaminodecane and 1,3-diaminopentane, respectively. These Schiff bases reacted with [M(CH₃(CH₂)₁₄COO)₂] (M = Cu, Ni, Co, Fe; R = to form 16 complexes showing differences in structures and properties (magnetic, thermal, and mesomorphic).

H₂L1 formed mononuclear square planar or distorted square complexes with Cu(II), Ni(II) and Co(II) (general formula, [M(L1)]), and formed dinuclear octahedral complex with Fe(II), [Fe₂(CH₃(CH₂)₁₄COO)₂(L1)(H₂O)₄].2.5H₂O. All complexes, except Ni(II), were paramagnetic. Their decomposition temperatures ranged from 198°C to 313°C. However, these complexes did not exhibit liquid crystal properties.

H₂L2 formed mononuclear Cu(II) complexes (general formula [M(L2)]) by both one-pot and step-wise methods. The complexes were square planar, magnetic and thermally stable. For Ni(II), the step-wise method formed a mononuclear complex, [Ni(L2)].CH₃CH₂OH, while the one-pot method formed a dinuclear Ni(II) complex, [Ni₂(L2)(HL2)₂].H₂O. Both complexes were square planar (hence diamagnetic). The mononuclear complex has a higher thermal stability than the dinuclear complex. For Co(II), the step-wise method formed a dinuclear Co(II) complex, [Co₂(L2)(HL2)₂(EtOH)₄], while one-pot method formed a mononuclear Co(III) complex, [Co(L2)(HL2)]. The geometry of Co(II) and Co(III) was octahedral. The thermal stability of both complexes were almost similar (T_{dec} = 205°C). The dinuclear complex was paramagnetic while the mononuclear complex was diamagnetic. For Fe(II), both methods formed dinuclear mixed-valence complexes in good yields. The difference in the two complexes was the presence of coordinated and non-coordinated solvent. The magnetic susceptibility and thermal stability for the complex formed from

the one-pot method were slightly higher than from the step-wise method. All of these complexes did not exhibit liquid crystal properties

H₂L3 formed a dinuclear Cu(II) complex, [Cu₂(CH₃(CH₂)₁₄COO)(L3)(HL₃)], and mononuclear complexes with Ni(III), Co(II) and Fe(III) complexes. These complexes were paramagnetic, with thermal decomposition temperatures in the range of 142 °C to 209 °C. However, these complexes also did not have liquid crystal properties.

5.2 Suggestions for Future Works

All hexadecanoato-Schiff base complexes were not mesomorphic. However, they may be made to be mesogenic by reacting them with neutral N-donor amide ligands, such as shown in **Figure 5.1**.

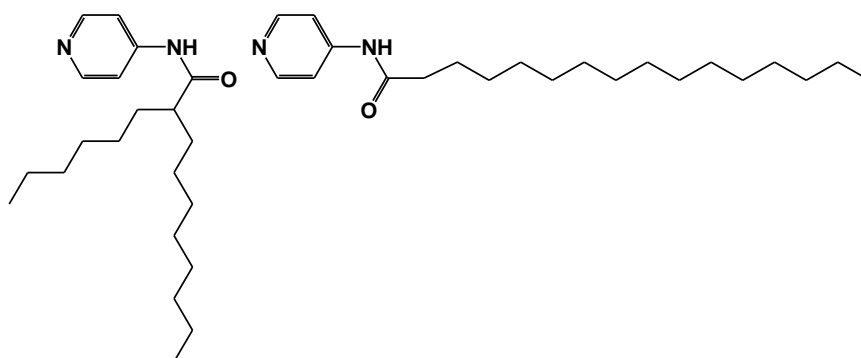


Figure 5.1 Structural formulae of neutral N-donor ligands

The thermal SCO behavior of cobalt(II) and iron(II) complexes should be further probed using SQUID magnetometer on both heating and cooling cycles. It would also be interesting to know the thermoelectric behavior of Co(III) and mixed-valence Fe complexes by measuring their electronic conductivities at different temperatures. Lastly, the potential uses of these complexes, especially Co(II), Fe(II), as catalysts and dye-sensitized cell materials, should be explored.