

## LIST OF TABLES

Table 2.1	Table of $^1\text{H}$ -NMR and $^{13}\text{C}$ -NMR chemical shifts of 2- <i>N</i> -ethylaminopyrimidine ( <b>L1</b> )	13
Table 2.2	Table of $^1\text{H}$ -NMR and $^{13}\text{C}$ -NMR chemical shifts of 2- <i>N</i> -anilinopyrimidine ( <b>L2</b> )	15
Table 2.3	Table of crystal data and structure refinement for 2- <i>N</i> -anilinopyrimidine ( <b>L2</b> )	17
Table 2.4	Table of hydrogen-bond geometry ( $\text{\AA}$ , $^\circ$ ) for 2- <i>N</i> -anilinopyrimidine ( <b>L2</b> )	17
Table 2.5	Table of $^1\text{H}$ -NMR and $^{13}\text{C}$ -NMR chemical shifts of 2- <i>N</i> -( <i>p</i> -methylanilino)pyrimidine ( <b>L3</b> )	19
Table 2.6	Table of $^1\text{H}$ -NMR and $^{13}\text{C}$ -NMR chemical shifts of 2- <i>N</i> -( <i>m</i> -methylanilino)pyrimidine ( <b>L4</b> )	21
Table 2.7	Table of crystal data and structure refinement for 2- <i>N</i> -( <i>m</i> -methylanilino)pyrimidine ( <b>L4</b> )	23
Table 2.8	Table of hydrogen-bond geometry ( $\text{\AA}$ , $^\circ$ ) for 2- <i>N</i> -( <i>m</i> -methylanilino)pyrimidine ( <b>L4</b> )	23
Table 2.9	Table of $^1\text{H}$ -NMR and $^{13}\text{C}$ -NMR chemical shifts of 2- <i>N</i> -methylanilinopyrimidine ( <b>L5</b> )	25
Table 2.10	Table of $^1\text{H}$ -NMR and $^{13}\text{C}$ -NMR chemical shifts of 2- <i>N</i> -piperidinopyrimidine ( <b>L6</b> )	27
Table 2.11	Table of analytical data and some physical properties for complexes <b>CuL1</b> , <b>CuL2</b> , <b>CuL3</b> and <b>CuL4</b>	28

Table 2.12	Table of infrared spectral data for 2- <i>N</i> -ethylaminopyrimidine ( <b>L1</b> ) and its copper complex, <b>CuL1</b>	29
Table 2.13	Table of crystal data and structure refinement for tetra- $\mu$ -acetato- $\kappa^8 O:O'$ -bis{[ <i>N</i> -ethylpyrimidin-2-amine]copper(II)} ( <b>CuL1</b> )	30
Table 2.14	Table of selected bond lengths (Å) and angles (°) for tetra- $\mu$ -acetato- $\kappa^8 O:O'$ -bis{[ <i>N</i> -ethylpyrimidin-2-amine]copper(II)} ( <b>CuL1</b> )	32
Table 2.15	Table of hydrogen-bond geometry (Å, °) for tetra- $\mu$ -acetato- $\kappa^8 O:O'$ -bis{[ <i>N</i> -ethylpyrimidin-2-amine]copper(II)} ( <b>CuL1</b> )	32
Table 2.16	Table of infrared spectral data for 2- <i>N</i> -anilinopyrimidine ( <b>L2</b> ) and its copper complex, <b>CuL2</b>	34
Table 2.17	Table of crystal data and structure refinement for tetra- $\mu$ -acetato- $\kappa^8 O:O'$ -bis{[ <i>N</i> -(pyrimidin-2-yl)aniline- $\kappa N$ ]copper(II)} ( <b>CuL2</b> )	35
Table 2.18	Table of selected bond lengths (Å) and angles (°) for tetra- $\mu$ -acetato- $\kappa^8 O:O'$ -bis{[ <i>N</i> -(pyrimidin-2-yl)aniline- $\kappa N$ ]copper(II)} ( <b>CuL2</b> )	37
Table 2.19	Table of hydrogen-bond geometry (Å, °) for tetra- $\mu$ -acetato- $\kappa^8 O:O'$ -bis{[ <i>N</i> -(pyrimidin-2-yl)aniline- $\kappa N$ ]copper(II)} ( <b>CuL2</b> )	37
Table 2.20	Table of infrared spectral data for 2- <i>N</i> -( <i>p</i> -methylanilino)pyrimidine ( <b>L3</b> ) and its copper complex, <b>CuL3</b>	38
Table 2.21	Table of crystal data and structure refinement for tetra- $\mu$ -acetato- $\kappa^8 O:O'$ -bis{[ <i>N</i> -(pyrimidin-2-yl)4-methylaniline- $\kappa N$ ]copper(II)} ( <b>CuL3</b> )	39

Table 2.22	Table of selected bond lengths (Å) and angles (°) for tetra- $\mu$ -acetato- $\kappa^8$ O:O $\phi$ -bis{[N-(pyrimidin-2-yl)4-methylaniline- $\kappa$ N]copper(II)} ( <b>CuL3</b> )	41
Table 2.23	Table of hydrogen-bond geometry (Å, °) for tetra- $\mu$ -acetato- $\kappa^8$ O:O $\phi$ -bis{[N-(pyrimidin-2-yl)4-methylaniline- $\kappa$ N]copper(II)} ( <b>CuL3</b> )	41
Table 2.24	Table of infrared spectral data for 2- <i>N</i> -( <i>m</i> -methylanilino)pyrimidine and its copper complex, <b>CuL4</b>	42
Table 2.25	Table of crystal data and structure refinement for tetra- $\mu$ -acetato- $\kappa^8$ O:O'-bis{[N-(pyrimidin-2-yl)3-methylaniline- $\kappa$ N]copper(II)} ( <b>CuL4</b> )	43
Table 2.26	Table of selected bond lengths (Å) and angles (°) for tetra- $\mu$ -acetato- $\kappa^8$ O:O $\phi$ -bis{[N-(pyrimidin-2-yl)3-methylaniline- $\kappa$ N]copper(II)} ( <b>CuL4</b> )	45
Table 2.27	Table of hydrogen-bond geometry (Å, °) for tetra- $\mu$ -acetato- $\kappa^8$ O:O $\phi$ -bis{[N-(pyrimidin-2-yl)3-methylaniline- $\kappa$ N]copper(II)} ( <b>CuL4</b> )	45
Table 2.28	Table of fluorescence characteristics of pyrimidine derivatives in capped and uncapped conditions in methanol and DMSO ( $M \acute{e} 2.5 \times 10^{-4} \text{ mol dm}^{-3}$ ).	46
Table 2.29	Table of fluorescence characteristics of selected pyrimidine derivatives and their copper complexes in methanol and DMSO ( $M \acute{e} 2.5 \times 10^{-4} \text{ mol dm}^{-3}$ ).	58

## LIST OF FIGURES

Scheme 1	Single step synthesis of pyrimidine derivatives	1
Figure 1.1	Some well-known pyrimidine compounds	2
Figure 1.2	Some typical fluorophores	7
Figure 2.1	Preparation of pyrimidine based ligands	11
Figure 2.2	ORTEP diagram of 2- <i>N</i> -anilinopyrimidine ( <b>L2</b> )	16
Figure 2.3	ORTEP diagram of 2- <i>N</i> -( <i>m</i> -methylanilino)pyrimidine ( <b>L4</b> )	22
Figure 2.4	ORTEP diagram of tetra- $\mu$ -acetato- $\kappa^8 O:O'$ -bis {[ <i>N</i> -ethylpyrimidin-2-amine]copper(II)} ( <b>CuL1</b> )	31
Figure 2.5	Supramolecular array of tetra- $\mu$ -acetato- $\kappa^8 O:O'$ -bis {[ <i>N</i> -ethylpyrimidin-2-amine]copper(II)} ( <b>CuL1</b> ) in <i>bc</i> plane	33
Figure 2.6	ORTEP diagram of tetra- $\mu$ -acetato- $\kappa^8 O:O'$ -bis {[ <i>N</i> -(pyrimidin-2-yl)aniline- $\kappa N$ ]copper(II)} ( <b>CuL2</b> )	36
Figure 2.7	ORTEP diagram of tetra- $\mu$ -acetato- $\kappa^8 O:O'$ -bis {[ <i>N</i> -(pyrimidin-2-yl)4-methylaniline- $\kappa N$ ]copper(II)} ( <b>CuL3</b> )	40
Figure 2.8	ORTEP diagram of tetra- $\mu$ -acetato- $\kappa^8 O:O'$ -bis {[ <i>N</i> -(pyrimidin-2-yl)3-methylaniline- $\kappa N$ ]copper(II)} ( <b>CuL4</b> )	44
Figure 2.9	Fluorescence spectrum of 2- <i>N</i> -ethylaminopyrimidine ( <b>L1</b> ) and 2- <i>N</i> -piperidinopyrimidine ( <b>L6</b> ) in capped samples in methanol ( $M \acute{e} 2.5 \times 10^{-4} \text{ mol dm}^{-3}$ )	47

Figure 2.10	Fluorescence spectrum of 2- <i>N</i> -( <i>p</i> -methylanilino)pyrimidine ( <b>L3</b> ), 2- <i>N</i> -( <i>m</i> -methylanilino)pyrimidine ( <b>L4</b> ), 2- <i>N</i> -methylanilinopyrimidine ( <b>L5</b> ) and 2- <i>N</i> -anilinopyrimidine ( <b>L2</b> ) in capped samples in methanol ( $M \acute{e} 2.5 \times 10^{-4} \text{ mol dm}^{-3}$ )	48
Figure 2.11	Flipping of piperidino ring in 2- <i>N</i> -piperidinopyrimidine ( <b>L6</b> )	49
Figure 2.12	Structures of 2- <i>N</i> -piperidinopyrimidine ( <b>L6</b> ) and 2- <i>N</i> -anilinopyrimidine ( <b>L2</b> )	49
Figure 2.13	Fluorescence spectrum of pyrimidine derivatives in capped samples in DMSO ( $M \acute{e} 2.5 \times 10^{-4} \text{ mol dm}^{-3}$ )	51
Figure 2.14	Fluorescence intensities of pyrimidine derivatives in capped samples in methanol and DMSO ( $M \acute{e} 2.5 \times 10^{-4} \text{ mol dm}^{-3}$ )	52
Figure 2.15	Formation of hydrogen bonded of 2- <i>N</i> -ethylaminopyrimidine ( <b>L1</b> )	53
Figure 2.16	Fluorescence intensities of pyrimidine derivatives in DMSO ( $M \acute{e} 2.5 \times 10^{-4} \text{ mol dm}^{-3}$ )	54
Figure 2.17	Fluorescence intensities of pyrimidine derivatives in capped and uncapped samples in methanol ( $M \acute{e} 2.5 \times 10^{-4} \text{ mol dm}^{-3}$ )	56
Figure 2.18	Fluorescence intensities of pyrimidine derivatives in capped and uncapped samples in DMSO ( $M \acute{e} 2.5 \times 10^{-4} \text{ mol dm}^{-3}$ )	57
Figure 2.19	Fluorescence spectra of 2- <i>N</i> -ethylaminopyrimidine, <b>L1</b> and its copper complex, <b>CuL1</b> in methanol and DMSO ( $M \acute{e} 2.5 \times 10^{-4} \text{ mol dm}^{-3}$ )	59
Figure 2.20	Fluorescence spectra of 2- <i>N</i> -anilinopyrimidine, <b>L2</b> and its copper complex, <b>CuL2</b> in methanol and DMSO ( $M \acute{e} 2.5 \times 10^{-4} \text{ mol dm}^{-3}$ )	60

Figure 2.21	Fluorescence spectra of 2- <i>N</i> -( <i>p</i> -methylanilino)pyrimidine, <b>L3</b> and its copper complex, <b>CuL3</b> in methanol and DMSO ( $M \acute{e} 2.5 \times 10^{-4} \text{ mol dm}^{-3}$ )	60
Figure 2.22	Fluorescence spectra of 2- <i>N</i> -( <i>m</i> -methylanilino)pyrimidine, <b>L4</b> and its copper complex, <b>CuL4</b> in methanol and DMSO ( $M \acute{e} 2.5 \times 10^{-4} \text{ mol dm}^{-3}$ )	61
Figure 2.23	Fluorescence intensities of selected pyrimidine derivatives and their copper complexes in methanol ( $M \acute{e} 2.5 \times 10^{-4} \text{ mol dm}^{-3}$ )	62
Figure 2.24	Fluorescence intensities of selected pyrimidine derivatives and their copper complexes in methanol ( $M \acute{e} 2.5 \times 10^{-4} \text{ mol dm}^{-3}$ )	63
Figure 2.25	Fluorescence intensities of selected pyrimidine derivatives and their copper complexes in DMSO ( $M \acute{e} 2.5 \times 10^{-4} \text{ mol dm}^{-3}$ )	63