Додаток А

Довжини зв’язків і валентні кути в структурах комплексів **1**-**27** та деякі рисунки структур комплексів купруму(I) з тіоамідними лігандами (**21**-**25**).

Таблиця А.1

Основні довжини зв’язків (*d*) та валентні кути (ω) в структурах π-комплексів **1-3**, що містять азометинові співліганди.

Зв’язок	*d*, Å	Кут	ω, °
сполука **1**, $[Cu\{(C_9H_{11}CH{=}N)_2C_6H_{10}\}(Ph\text{-}CH{=}CH_2)]PF_6$			
Cu-C(1)	2.00(1)	N(1)-Cu-N(2)	83.1(4)
Cu-C(2)	2.05(1)	C(1)-Cu-C(2)	38.7(5)
Cu-*m*	1.91(1)		
Cu-N(1)	2.00(1)	N(1)-Cu-*m*	137.4(5)
Cu-N(2)	1.99(1)	N(2)-Cu-*m*	139.0(5)
C(1)-C(2)	1.34(2)		
N(1)-C(15)	1.28(2)	Cu-N(1)-C(15)	128.2(8)
N(2)-C(25)	1.29(2)	Cu-N(2)-C(25)	121(1)
сполука **2**, $[Cu(2\text{-}гідроксихіноксалін)_2(CH_2{=}CH_2)]ClO_4$			
Cu-N(1)	2.013(4)	N(1)-Cu-N(1a)	102.5(2)
Cu-C(9)	2.046(6)	C(9)-Cu-C(9a)	37.5(3)
Cu-*m*	1.937(5)	N(1)-Cu-*m*	128.8(2)
C(9)-C(9a)	1.31(1)	Cu-N(1)-C(1)	119.8(4)
C(1)-C(2)	1.458(7)	Cu-N(1)-C(8)	121.7(3)
сполука **3**, $[Cu_2\{(C_3H_5\text{-}CH_2\text{-}N{=}C(CH_3))_2C_5H_3N\}_2][BPh_4]_2$			
Cu(1)-C(1A)	2.06(3)	N(8B)-Cu(1)-*m*(1)	141(1)
Cu(1)-C(2A)	2.13(4)	N(11B)-Cu(1)-*m*(1)	127(1)
Cu(1)-*m*(1)	1.99(4)	N(5A)-Cu(1)-*m*(1)	89(1)
Cu(1)-N(8B)	1.93(3)	N(8B)-Cu(1)-N(11B)	78(1)
Cu(1)-N(11B)	1.98(4)	N(8B)-Cu(1)-N(5A)	112(1)
Cu(1)-N(5A)	2.20(2)	N(11B)-Cu(1)-N(5A)	106.7(9)
C(1A)-C(2A)	1.29(5)	C(1A)-Cu(1)-C(2A)	35.9(14)

Продовження табл. А.1

Зв’язок	*d*, Å	Кут	ω, °
Cu(2)-C(1B)	2.31(6)	N(8A)-Cu(2)-*m*(2)	125(2)
Cu(2)-C(2B)	2.07(5)	N(11A)-Cu(2)-*m*(2)	131(2)
Cu(2)-*m*(2)[1]	2.06(5)	N(5B)-Cu(2)-*m*(2)	102(2)
Cu(2)-N(8A)	1.94(3)	N(8A)-Cu(2)-N(11A)	77(1)
Cu(2)-N(11A)	1.97(4)	N(8A)-Cu(2)-N(5B)	116(1)
Cu(2)-N(5B)	2.11(3)	N(11A)-Cu(2)-N(5B)	105(1)
C(1B)-C(2B)	1.48(8)	C(1B)-Cu(2)-C(2B)	39(2)

Таблиця А.2

Основні довжини зв’язків (*d*) та валентні кути (ω) в структурах купрогалогенідних π-комплексів **4**, **5**, **8**-**12** та **17** з протонованими азотистими основами.

Зв’язок	*d*, Å	Кут	ω, °
сполука **4**, $[Cu^{I}Cl_2(C_3H_5\text{-}NH_3)]$			
Cu-Cl(1)	2.2794(3)	Cl(1)-Cu-Cl(2)	106.89(4)
Cu-Cl(2)	2.2757(3)	Cl(1)-Cu-*m*	126.35(6)
Cu-Cl(1)'	2.7650(3)	Cl(2)-Cu-*m*	123.26(5)
Cu-C(1)	2.055(1)	Cl(1)'-Cu-Cl(1)	92.19(4)
Cu-C(2)	2.073(1)	Cl(1)'-Cu-Cl(2)	99.05(3)
Cu-*m*	1.950(1)	Cl(1)'-Cu-*m*	97.24(6)
C(1)-C(2)	1.352(2)	C(1)-Cu-C(2)	38.24(6)
сполука **5**, $[Cu^{I}Br_2(C_3H_5\text{-}NH_3)]$			
Cu(1)-Br(1)	2.385(2)	Br(1)-Cu(1)-Br(2)	111.1(1)
Cu(1)-Br(2)	2.372(2)	Br(1)-Cu(1)-*m*(1)	124.9(2)
Cu(1)…Br(4)	3.342(2)	Br(2)-Cu(1)-*m*(1)	123.9(2)
Cu(1)-C(1)	2.055(7)	Br(4)…Cu(1)-Br(1)	97.2(1)
Cu(1)-C(2)	2.083(8)	Br(4)…Cu(1)-Br(2)	85.6(1)
Cu(1)-*m*(1)	1.957(8)	Br(4)…Cu(1)-*m*(1)	90.1(2)
C(1)-C(2)	1.34(1)	C(1)-Cu(1)-C(2)	37.9(3)

Продовження табл. А.2

Зв’язок	*d*, Å	Кут	ω, °
Cu(2)-Br(2)	2.830(2)	Br(2)-Cu(2)-Br(3)	98.14(8)
Cu(2)-Br(3)	2.410(2)	Br(2)-Cu(2)-Br(4)	97.45(8)
Cu(2)-Br(4)	2.407(2)	Br(2)-Cu(2)-*m*(2)	98.3(2)
Cu(2)-C(4)	2.060(7)	Br(3)-Cu(2)-Br(4)	110.27(9)
Cu(2)-C(5)	2.115(7)	Br(3)-Cu(2)-*m*(2)	122.6(2)
Cu(2)-*m*(1)	1.977(7)	Br(4)-Cu(2)-*m*(2)	121.3(2)
C(4)-C(5)	1.35(1)	C(4)-Cu(2)-C(5)	37.5(3)
сполука **8**, $[Cu^{I}_{2}Cl_{3}(C_{3}H_{5}\text{-}NH_{3})_{2}]CuCl_{2}$			
Cu(1)-Cl(2)	2.129(2)	Cl(2)-Cu(1)-Cl(2)'	180.00(9)
Cu(2)-Cl(1)	2.288(2)	Cl(1)-Cu(2)-Cl(3)	107.46(9)
Cu(2)-Cl(3)	2.242(3)	Cl(1)-Cu(2)-*m*	126.4(3)
Cu(2)-Cl(1)'	3.079(1)	Cl(3)-Cu(2)-*m*	125.3(4)
Cu(2)-C(1)	2.067(9)	Cl(1)-Cu(2)-Cl(1)'	93.18(7)
Cu(2)-C(2)	2.04(1)	Cl(1)'-Cu(2)-Cl(3)	96.06(8)
Cu(2)-*m*	1.94(1)	Cl(1)'-Cu(2)-*m*	90.4(3)
C(1)-C(2)	1.39(2)	C(1)-Cu(2)-C(2)	39.6(6)
сполука **9**, $[Cu^{I}Cl_{2}(C_{3}H_{5}\text{-}NH_{2}\text{-}C_{3}H_{5})]$			
Cu-Cl(1)	2.624(2)	Cl(1)-Cu-Cl(2)	99.30(8)
Cu-Cl(2)	2.260(3)	Cl(1)-Cu-*m*	103.5(2)
Cu-Cl(1)'	2.401(2)	Cl(2)-Cu-*m*	127.1(2)
Cu-C(1)	2.02(1)	Cl(1)'-Cu-Cl(1)	96.39(8)
Cu-C(2)	2.07(1)	Cl(1)'-Cu-Cl(2)	103.36(9)
Cu-*m*	1.96(1)	Cl(1)'-Cu-*m*	120.4(3)
C(1)-C(2)	1.21(1)	C(1)-Cu-C(2)	34.0(4)
сполука **10**, $[Cu^{I}Br_{2}(C_{3}H_{5}\text{-}NH_{2}\text{-}C_{3}H_{5})]$			
Cu-Br(1)	2.405(2)	Br(1)-Cu-Br(2)	108.99(7)
Cu-Br(2)	2.382(2)	Br(1)-Cu-*m*	122.1(3)
Cu-Br(1)'	3.051(2)	Br(2)-Cu-*m*	125.1(3)

Продовження табл. А.2

Зв’язок	*d*, Å	Кут	ω, °
Cu-C(1)	2.08(1)	Br(1)'-Cu-Br(1)	98.71(6)
Cu-C(2)	2.08(1)	Br(1)'-Cu-Br(2)	99.33(6)
Cu-*m*	1.98(1)	Br(1)'-Cu-*m*	91.7(3)
C(1)-C(2)	1.34(2)	C(1)-Cu-C(2)	37.53(9)
сполука **11**, $[Cu_2^{I}Cl_3(C_3H_5\text{-}NH_2\text{-}C_3H_5)]$			
Cu(1)-Cl(1)	2.292(2)	Cl(1)-Cu(1)-Cl(1)'	95.94(6)
Cu(1)-Cl(3)	2.360(2)	Cl(1)-Cu(1)-Cl(3)	99.80(6)
Cu(1)-Cl(1)'	2.496(1)	Cl(1)'-Cu(1)-Cl(3)	99.64(6)
Cu(1)-C(1)	2.060(4)	Cl(1)-Cu(1)-*m*(1)	123.7(1)
Cu(1)-C(2)	2.092(4)	Cl(3)-Cu(1)-*m*(1)	122.0(1)
Cu(1)-*m*(1)	1.963(4)	Cl(1)'-Cu(1)-*m*(1)	110.5(1)
C(1)-C(2)	1.350(6)	C(1)-Cu(1)-C(2)	37.9(2)
Cu(2)-Cl(2)	2.307(2)	Cl(2)-Cu(2)-Cl(3)	103.28(6)
Cu(2)-Cl(3)	2.305(2)	Cl(2)-Cu(2)-Cl(2)'	101.82(6)
Cu(2)-Cl(2)'	2.569(1)	Cl(2)'-Cu(2)-Cl(3)	98.16(6)
Cu(2)-C(5)	2.101(4)	Cl(2)-Cu(2)-*m*(2)	125.6(1)
Cu(2)-C(6)	2.067(4)	Cl(3)-Cu(2)-*m*(2)	122.0(1)
Cu(2)-*m*(2)	1.971(4)	Cl(2)'-Cu(2)-*m*(2)	101.5(1)
C(5)-C(6)	1.353(6)	C(5)-Cu(2)-C(6)	37.9(2)
сполука **12**, $[Cu^{I}_2Br_3(C_3H_5\text{-}NH_2\text{-}C_3H_5)]$			
Cu(1)-Br(1)	2.505(5)	Br(1)-Cu(1)-Br(2)	101.8(2)
Cu(1)-Br(2)	2.596(4)	Br(1)-Cu(1)-Br(3)	103.9(2)
Cu(1)-Br(3)	2.406(5)	Br(1)-Cu(1)-*m*(1)	117.7(4)
Cu(1)-C(1)	2.09(1)	Br(2)-Cu(1)-Br(3)	99.7(2)
Cu(1)-C(2)	2.12(1)	Br(2)-Cu(1)-*m*(1)	108.2(3)
Cu(1)-*m*(1)	1.99(1)	Br(3)-Cu(1)-*m*(1)	123.3(4)
C(1)-C(2)	1.35(2)	C(1)-Cu(1)-C(2)	37.3(5)

Продовження табл. А.2

Зв’язок	*d*, Å	Кут	ω, °
Cu(2)-Br(1)	2.520(5)	Br(1)-Cu(2)-Br(2)	101.2(2)
Cu(2)-Br(2)	2.422(5)	Br(1)-Cu(2)-Br(3)	103.0(2)
Cu(2)-Br(3)	2.575(4)	Br(1)-Cu(2)-*m*(2)	118.7(4)
Cu(2)-C(5)	2.12(1)	Br(2)-Cu(2)-Br(3)	99.8(2)
Cu(2)-C(6)	2.10(1)	Br(2)-Cu(2)-*m*(2)	122.4(4)
Cu(2)-*m*(2)	2.00(1)	Br(3)-Cu(2)-*m*(2)	108.5(4)
C(5)-C(6)	1.35(2)	C(5)-Cu(2)-C(6)	37.3(5)
сполука **17**, $[Cu^{I}Cl_2(H^{+}C_{12}H_{13}NO)]\cdot H_2O$			
Cu-Cl(1)	2.253(1)	Cl(1)-Cu-Cl(2)	113.27(4)
Cu-Cl(2)	2.215(1)	Cl(1)-Cu-*m*	121.5(1)
Cu-Cl(1)'	2.738(1)	Cl(2)-Cu-*m*	120.5(1)
Cu-C(2)	2.065(3)	Cl(1)'-Cu-Cl(1)	92.77(3)
Cu-C(3)	2.051(3)	Cl(1)'-Cu-Cl(2)	102.40(4)
Cu-*m*	1.942(3)	Cl(1)'-Cu-*m*	96.6(1)
C(2)-C(3)	1.377(4)	C(2)-Cu-C(3)	39.1(1)

Таблиця А.3

Основні довжини зв’язків (*d*) та валентні кути (ω) в структурах π-комплексів $[Cu^{I}_{7}X_{9}(C_3H_5\text{-}NH_2\text{-}C_3H_5)_2]\cdot H_2O$ X = Cl (**13**) та X = Br (**14**).

Зв’язок	*d*, Å		Кут	ω, °	
	13	**14**		**13**	**14**
Cu(1)-X(2)	2.398(7)	2.503(4)	X(2)-Cu(1)-X(6)	106.3(2)	109.6(2)
Cu(1)-X(5)	2.304(7)	2.426(4)	X(2)-Cu(1)-X(6)'	106.3(2)	109.6(1)
Cu(1)-X(6)	2.371(6)	2.489(2)	X(2)-Cu(1)-X(5)	118.1(2)	116.2(1)
Cu(1)-X(6)'	2.371(6)	2.489(2)	X(5)-Cu(1)-X(6)	104.6(2)	101.7(1)
			X(5)-Cu(1)-X(6)'	104.6(2)	101.7(1)
			X(6)-Cu(1)-X(6)'	117.7(2)	117.5(1)
Cu(2)-X(2)	2.417(6)	2.533(3)	X(2)-Cu(2)-X(4)	104.0(2)	109.1(1)
Cu(2)-X(4)	2.337(7)	2.475(3)	X(2)-Cu(2)-X(6)	102.9(2)	106.7(1)
Cu(2)-X(6)	2.462(5)	2.554(3)	X(2)-Cu(2)-X(7)	114.6(2)	110.3(1)
Cu(2)-X(7)	2.270(6)	2.422(3)	X(4)-Cu(2)-X(6)	108.2(2)	110.0(1)
			X(4)-Cu(2)-X(7)	124.2(2)	120.6(1)
			X(6)-Cu(2)-X(7)	100.9(2)	98.7(1)
Cu(3)-X(1)	2.412(6)	2.532(3)	X(1)-Cu(3)-X(5)	95.9(2)	97.6(1)
Cu(3)-X(5)	2.471(6)	2.589(3)	X(1)-Cu(3)-X(7)'	102.9(2)	103.3(1)
Cu(3)-X(7)'	2.298(5)	2.423(3)	X(1)-Cu(3)-*m*(1)	120.1(7)	121.5(4)
Cu(3)-C(2)	2.06(2)	2.11(2)	X(5)-Cu(3)-X(7)'	95.5(2)	95.4(1)
Cu(3)-C(3)	2.09(2)	2.07(2)	X(5)-Cu(3)-*m*(1)	109.6(7)	108.5(4)
Cu(3)-*m*(1)	1.97(2)	1.99(2)	X(7)'-Cu(3)-*m*(1)	126.2(7)	124.1(4)
C(3)-C(2)	1.31(4)	1.34(3)	C(2)-Cu(3)-C(3)	36.7(7)	38.5(5)
Cu(4)-X(4)	3.018(7)	3.057(3)	X(4)-Cu(4)-X(3)	97.2(2)	96.7(1)
Cu(4)-X(3)	2.260(6)	2.395(3)	X(4)-Cu(4)-X(6)	93.4(2)	97.0(1)
Cu(4)-X(6)	2.280(5)	2.417(3)	X(4)-Cu(4)-*m*(2)	92.9(7)	93.9(4)
Cu(4)-C(5)	2.07(2)	2.10(1)	X(3)-Cu(4)-X(6)	108.6(2)	108.4(1)
Cu(4)-C(6)	2.09(2)	2.09(2)	X(3)-Cu(4)-*m*(2)	126.3(6)	126.4(4)
Cu(4)-*m*(2)	1.95(2)	1.99(2)	X(6)-Cu(4)-*m*(2)	123.4(6)	122.0(4)
C(6)-C(5)	1.40(3)	1.35(2)	C(5)-Cu(4)-C(6)	39.4(7)	37.4(5)

Таблиця А.4

Основні довжини зв’язків (*d*) та валентні кути (ω) в структурах π-комплексів $[Cu^{I}X_2\{C_3H_5\text{-}SC(\text{-}NH_2)_2\}]$ X = Cl (**15**) та X = Br (**16**).

Зв’язок	*d*, Å		Кут	ω, °	
	15	**16**		**15**	**16**
Cu-X(1)	2.320(1)	2.447(2)	X(1)-Cu-X(1)'	92.99(4)	96.99(8)
Cu-X(1)'	2.634(1)	2.748(3)	X(1)-Cu-X(2)	113.28(5)	111.98(9)
Cu-X(2)	2.281(1)	2.408(2)	X(1)'-Cu-X(2)	99.06(4)	99.61(8)
Cu-C(1)	2.107(4)	2.128(7)	X(1)-Cu-*m*	113.4(1)	114.2(2)
Cu-C(2)	2.078(4)	2.115(7)	X(1)'-Cu-*m*	104.4(1)	103.5(2)
Cu-*m*	1.979(4)	2.009(7)	X(2)-Cu-*m*	125.8(1)	124.6(2)
C(1)-C(2)	1.357(6)	1.363(9)	C(1)-Cu-C(2)	37.8(2)	37.5(3)

Таблиця А.5

Основні довжини зв’язків (*d*) та валентні кути (ω) в структурах деяких комплексів Cu(I) (**18**-**22**, **24**-**29**) з тіоамідними лігандами

Зв’язок	*d*, Å	Кут	ω, °
сполука **18**, $[CuCl(NH_2CSNH_2)_2]$			
Cu(1)-S(2)	2.254(5)	S(2)-Cu(1)-S(3)	113.2(2)
Cu(1)-S(3)	2.306(5)	S(2)-Cu(1)-S(4)	127.7(2)
Cu(1)-S(4)	2.244(5)	S(2)-Cu(1)-Cl(1)	93.8(2)
Cu(1)-Cl(1)	3.164(6)	S(3)-Cu(1)-S(4)	116.8(2)
Cu(2)-S(1)	2.229(5)	S(3)-Cu(1)-Cl(1)	104.0(2)
Cu(2)-S(2)	2.265(5)	S(4)-Cu(1)-Cl(1)	89.0(2)
Cu(2)-S(3)	2.309(5)	S(1)-Cu(2)-S(2)	118.3(2)
Cu(2)-Cl(2)	2.828(5)	S(1)-Cu(2)-S(3)	120.3(2)
C(1)-S(1)	1.64(2)	S(1)-Cu(2)-Cl(2)	107.2(2)
C(2)-S(2)	1.72(2)	S(2)-Cu(2)-S(3)	116.0(2)
C(3)-S(3)	1.74(2)	S(2)-Cu(2)-Cl(2)	98.4(2)
C(4)-S(4)	1.71(2)	S(3)-Cu(2)-Cl(2)	87.3(2)

Продовження табл. А.5

Зв’язок	*d*, Å	Кут	ω, °
сполука **19**, $[Cu(NH_2CSNH_2)_3]Cl$			
Cu-S(1)	2.43(4)	S(1)-Cu-S(2)	111
Cu-S(2)	2.27(8)	S(1)-Cu-S(3)	100
Cu-S(3)	2.34(6)	S(1)-Cu-S(1)'	114
Cu-S(1)'	2.37(9)	S(2)-Cu-S(3)	116
C-S	1.71-1.74	S(2)-Cu-S(1)'	107
		S(3)-Cu-S(1)'	109
сполука **20**, $[Cu(NH_2CSNH_2)_3]$*o*-$HOOCC_6H_4COO$			
Cu-S(1)	2.247(4)	S(1)-Cu-S(2)	119.8(1)
Cu-S(2)	2.230(4)	S(1)-Cu-S(3)	117.2(1)
Cu-S(3)	2.238(3)	S(2)-Cu-S(3)	123.0(1)
C-S	1.708(7)–1.721(6)		
сполука **21**, $[Cu(C_3H_5\text{-}NHCSNH_2)_3]NO_3$			
Cu-S	2.241(1)	SCuS'	118.79(4)
C-S	1.718(4)		
сполука **22**, $[Cu_2(NH_2CSNH_2)_6]SO_4 \cdot H_2O$			
Cu(1)-S(6)	2.2882(7)	S(6)-Cu(1)-S(4)	122.34(3)
Cu(1)-S(4)	2.2925(7)	S(6)-Cu(1)-S(2)	99.03(2)
Cu(1)-S(2)	2.3542(6)	S(4)-Cu(1)-S(2)	120.02(3)
Cu(1)-S(1)	2.4409(6)	S(6)-Cu(1)-S(1)	103.12(2)
Cu(2)-S(5)	2.2924(7)	S(4)-Cu(1)-S(1)	101.74(2)
Cu(2)-S(2)	2.3414(7)	S(2)-Cu(1)-S(1)	109.25(2)
Cu(2)-S(1)	2.3674(6)	S(5)-Cu(2)-S(2)	111.98(2)
Cu(2)-S(3)	2.3853(6)	S(5)-Cu(2)-S(1)	114.10(2)
S(1)-C(1)	1.741(2)	S(2)-Cu(2)-S(1)	109.36(2)
S(2)-C(2)	1.734(2)	S(5)-Cu(2)-S(3)	113.14(2)
S(3)-C(3)	1.719(2)	S(2)-Cu(2)-S(3)	107.47(2)

Продовження табл. А.5

Зв’язок	*d*, Å	Кут	ω, °
S(4)-C(4)	1.715(2)	S(1)-Cu(2)-S(3)	100.00(2)
S(5)-C(5)	1.716(2)	Cu(2)-S(1)-Cu(1)	142.98(2)
S(6)-C(6)	1.698(2)	Cu(2)-S(2)-Cu(1)	125.78(2)
сполука **24**, $[Cu_4Cl_4(C_3H_5\text{-}NHCSNH_2)_6]$			
Cu(1)-S(5)	2.258(3)	S(5)Cu(1)S(1)	111.3(1)
Cu(1)-S(1)	2.295(3)	S(5)Cu(1)S(3)	118.3(1)
Cu(1)-S(3)	2.308(3)	S(5)Cu(1)Cl(1)	105.8(1)
Cu(1)-Cl(1)	2.579(3)	S(1)Cu(1)S(3)	109.6(1)
C(1)-S(1)	1.70(1)	S(1)Cu(1)Cl(1)	105.9(1)
		S(3)Cu(1)Cl(1)	105.0(1)
Cu(2)-S(4)	2.280(3)	S(4)Cu(2)S(1)	98.9(1)
Cu(2)-S(1)	2.324(3)	S(4)Cu(2)S(2)	108.9(1)
Cu(2)-S(2)	2.337(3)	S(4)Cu(2)Cl(2)	115.7(1)
Cu(2)-Cl(2)	2.390(3)	S(1)Cu(2)S(2)	115.7(1)
C(2)-S(2)	1.72(1)	S(1)Cu(2)Cl(2)	110.7(1)
		S(2)Cu(2)Cl(2)	107.1(1)
Cu(3)-S(6)	2.294(3)	S(6)Cu(3)S(4)	121.5(1)
Cu(3)-S(4)	2.325(3)	S(6)Cu(3)S(3)	97.3(1)
Cu(3)-S(3)	2.330(3)	S(6)Cu(3)Cl(3)	111.3(1)
Cu(3)-Cl(3)	2.388(3)	S(4)Cu(3)S(3)	106.5(1)
C(3)-S(3)	1.71(1)	S(4)Cu(3)Cl(3)	106.0(1)
C(4)-S(4)	1.69(1)	S(3)Cu(3)Cl(3)	114.4(1)
Cu(4)-S(2)	2.288(3)	S(2)Cu(4)S(6)	108.5(1)
Cu(4)-S(6)	2.301(3)	S(2)Cu(4)S(5)	106.6(1)
Cu(4)-S(5)	2.322(3)	S(2)Cu(4)Cl(4)	112.1(1)
Cu(4)-Cl(4)	2.426(3)	S(6)Cu(4)S(5)	108.1(1)
C(5)-S(5)	1.71(1)	S(6)Cu(4)Cl(4)	112.8(1)
C(6)-S(6)	1.72(1)	S(5)Cu(4)Cl(4)	108.4(1)

Продовження табл. А.5

Зв’язок	*d*, Å	Кут	ω, °
сполука **25**, $[Cu_2(C_3H_5\text{-}NHCSNH\text{-}C_3H_5)_6](NO_3)_2$			
Cu-S(1)	2.298(5)	S(1)CuS(2)	120.8(2)
Cu-S(2)	2.288(5)	S(1)CuS(3)	97.1(2)
Cu-S(3)	2.367(5)	S(1)CuS(3)'	111.5(2)
Cu-S(3)'	2.431(4)	S(2)CuS(3)	117.2(2)
S(1)-C(10)	1.71(1)	S(2)CuS(3)'	102.4(2)
S(2)-C(20)	1.74(2)	S(3)CuS(3)'	107.6(2)
S(3)-C(30)	1.77(1)		
сполука **26**, $[Cu_2(C_3H_5\text{-}NHCSNH\text{-}C_3H_5)_6]SiF_6$			
Cu(1)-S(1)'	2.302(5)	S(1)-Cu(1)-S(2)	96.6(2)
Cu(1)-S(2)	2.264(5)	S(1)-Cu(1)-S(3)	101.2(2)
Cu(1)-S(3)	2.297(5)	S(1)-Cu(1)-S(1)'	93.2(2)
Cu(1)-S(1)	2.664(5)	S(1)'-Cu(1)-S(3)	114.7(2)
		S(1)'-Cu(1)-S(2)	119.0(2)
		S(2)-Cu(1)-S(3)	121.9(2)
Cu(2)-S(4)	2.257(5)	S(5)'-Cu(2)-S(5)	98.7(2)
Cu(2)-S(5)	2.275(5)	S(5)'-Cu(2)-S(4)	97.0(2)
Cu(2)-S(6)	2.281(6)	S(5)'-Cu(2)-S(6)	97.1(2)
Cu(2)-S(5)'	2.733(6)	S(4)-Cu(2)-S(5)	117.3(2)
		S(4)-Cu(2)-S(6)	114.7(2)
C-S	1.67(2)-1.72(2)	S(5)-Cu(2)-S(6)	122.8(2)
сполука **27**, $[Cu(C_3H_5\text{-}NHCSNH_2)(CH_3CN)]NO_3$			
Cu(1)-S(1)	2.265(2)	S(1)-Cu(1)-S(2)	103.5(1)
Cu(1)-S(2)	2.750(3)	S(1)-Cu(1)-N(5)	112.3(2)
Cu(1)-N(5)	1.944(7)	S(1)-Cu(1)-*m*(1)	115.0(3)
Cu(1)-C(1)	2.10(1)	S(2)-Cu(1)-N(5)	94.7(2)
Cu(1)-C(2)	2.083(8)	S(2)-Cu(1)-*m*(1)	97.0(3)
Cu(1)-*m*(1)	1.983(8)	N(5)-Cu(1)-*m*(1)	126.7(4)

Продовження табл. А.5

Зв’язок	*d*, Å	Кут	ω, °
C(1)-C(2)	1.33(1)	C(1)-Cu(1)-C(2)	37.2(4)
C(4)-S(1)	1.723(8)		
Cu(2)-S(2)	2.257(3)	S(1)-Cu(2)-S(2)	102.6(1)
Cu(2)-S(1)	2.788(3)	S(1)-Cu(2)-N(6)	97.5(2)
Cu(2)-N(6)	1.949(8)	S(1)-Cu(2)-*m*(2)	93.8(3)
Cu(2)-C(5)	2.10(1)	S(2)-Cu(2)-N(6)	109.7(2)
Cu(2)-C(6)	2.081(8)	S(2)-Cu(2)-*m*(2)	115.9(3)
Cu(2)-*m*(2)	1.983(8)	N(6)-Cu(2)-*m*(2)	129.1(3)
C(5)-C(6)	1.34(1)	C(5)-Cu(2)-C(6)	37.2(8)
C(8)-S(2)	1.729(9)		
сполука **28**, $[CuCl(CH_3O\text{-}CO\text{-}C(CH_3)=N\text{-}NHCSNH_2)_2]$			
Cu-S	2.228(3)	S-Cu-Cl	120.34(9)
Cu-Cl	2.273(3)		
C-S	1.71(1)		
сполука **29**, $[CuCl(PPh_3)_2(CH_3O\text{-}CO\text{-}C(CH_3)=N\text{-}NHCSNH_2)]\cdot 0.5Ph\text{-}CH_3$			
Cu-S	2.357(2)	S-Cu-Cl	109.9(1)
Cu-Cl	2.374(3)	S-Cu-P(1)	110.1(1)
Cu-P(1)	2.304(2)	S-Cu-P(2)	103.5(1)
Cu-P(2)	2.291(3)	Cl-Cu-P(1)	107.0(1)
C-S	1.694(9)	Cl-Cu-P(2)	102.6(1)
		P(1)-Cu-P(2)	123.2(1)

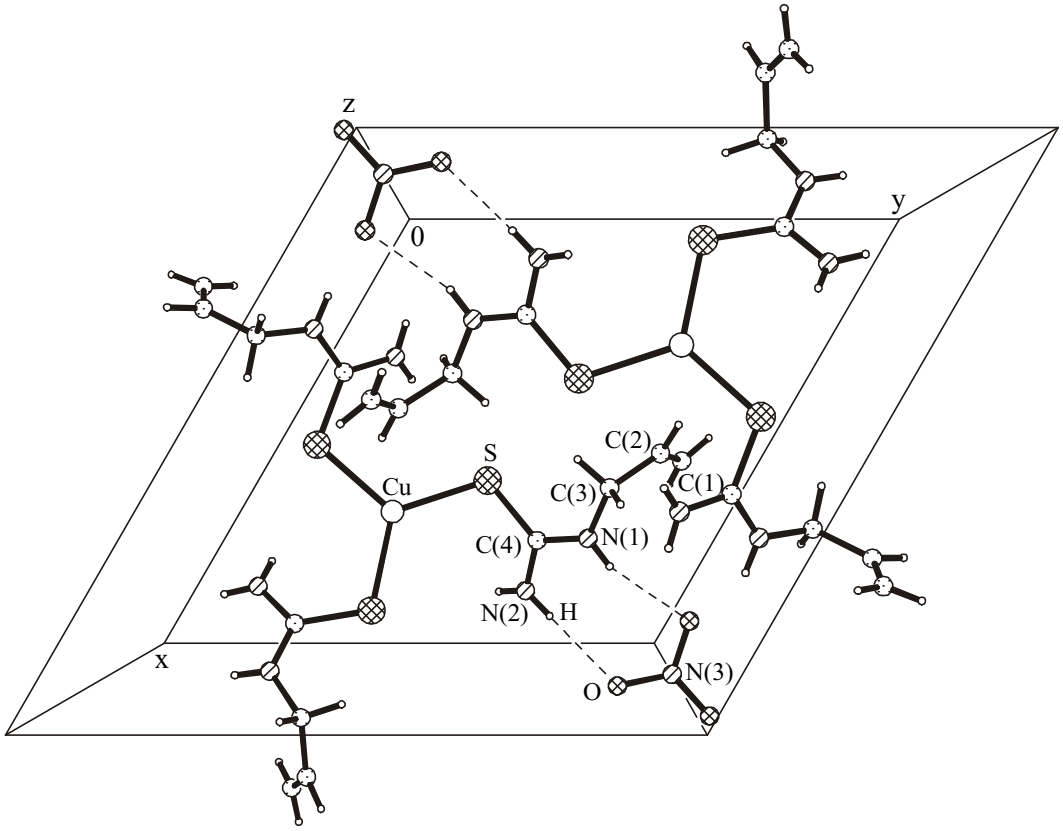

Рис. А.1. Фрагмент структури $[Cu(C_3H_5\text{-}NHCSNH_2)_3]NO_3$ (**21**).

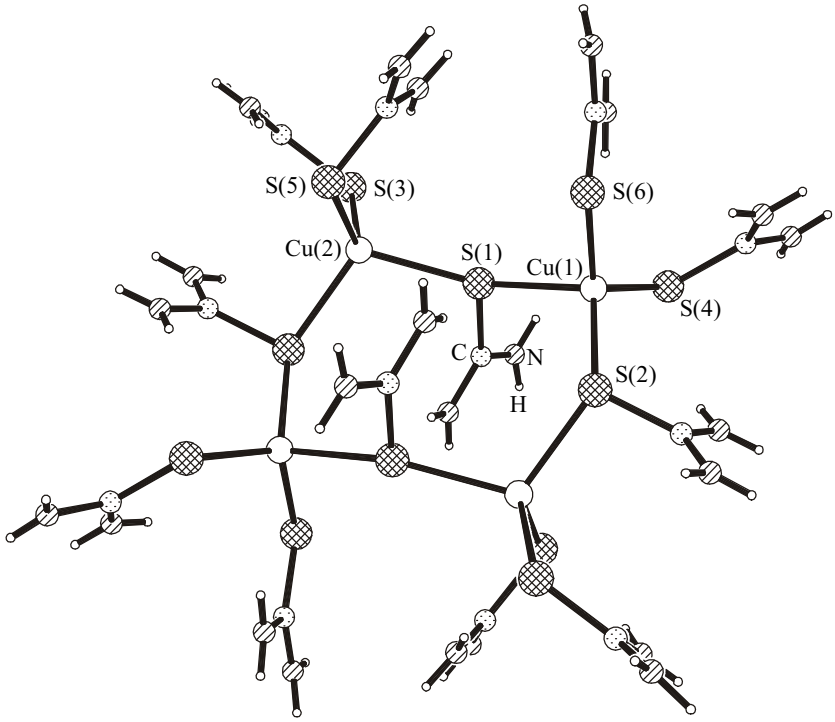

Рис. А.2. Катіон $[Cu_4(NH_2CSNH_2)_{12}]^{4+}$ в структурі **22**.

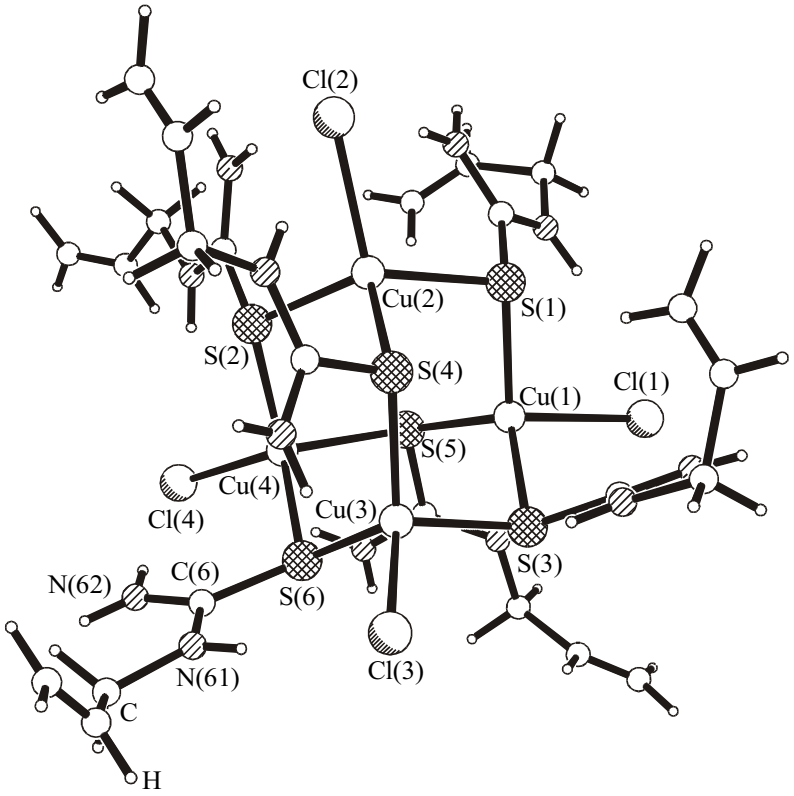

Рис. А.3. Тетраядерна асиметрична одиниця $[Cu_4Cl_4(C_3H_5\text{-}NHCSNH_2)_6]$ в структурі **23**.

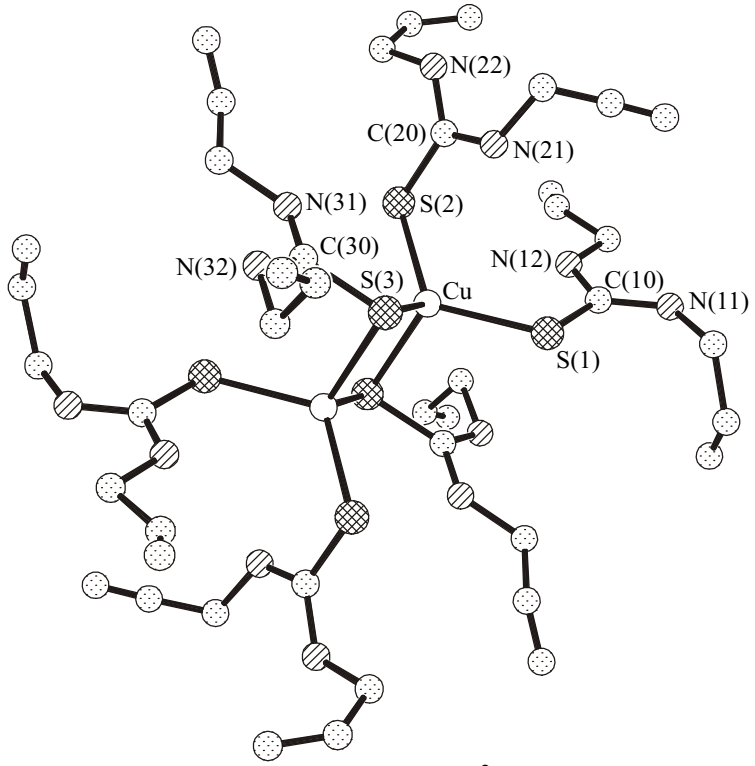

Рис. А.4. Катіон $[Cu_2(C_3H_5\text{-}NHCSNH\text{-}C_3H_5)_6]^{2+}$ в структурі **25**. Атоми Гідрогену не наведені.