SYNTHESIS AND SPECTROSCOPIC CHARACTERISTIC OF MERCURY(II) COMPLEXES WITH 2-(2`-PYRIDYL)QUINOLINE

Hanan A. Qaseer,*[a] Nathir Al-Rawashdeh,[b] and Arab K. El-Qisairi[a]

[a]*Department of Chemistry, Faculty of Science, Mu'tah University, P.O. Box 37, Karak-Jordan. E-mail: aqaseer@mutah.edu.jo*

[b]*Departmet of Chemistry, Faculty of Science, Jordan University of Science and Technology, P.O.Box 3030, Irbid-Jordan*

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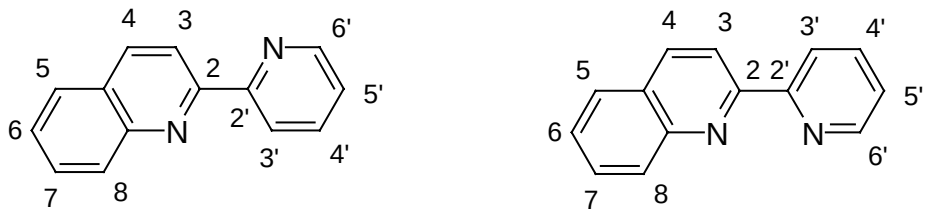
Abstract

Various complexes $Hg(PQ)X_2$ (PQ = 2-(2`-pyridyl)quinoline, X = $Cl^-$, $Br^-$, $I^-$, $N_3^-$, $NO_2^-$, $NO_3^-$, and $SCN^-$) have been synthesized by direct reaction of $HgX_2$ (X = $Cl^-$, $Br^-$, and $I^-$) with PQ or by the reaction of $HgCl_2$ with either $NaN_3$, $NaNO_2$, $NaNO_3$, or NaSCN followed by the addition of 2-(2`-pyridyl)quinoline solution to the reaction mixture. The new complexes have been characterized by elemental analysis, conductivity measurements, electronic absorption, IR, ^1H, and ^{13}C NMR.

Introduction

Heterocyclic nitrogen donor α-diimine represent an important class of ligands in coordination chemistry.[1,2] Aromatic nitrogen heterocyclic ligands such as 2,2`-bipyridine and 1,10-phenanthroline have been extensively used in both analytical and preparative coordination chemistry.[1,3]

The coordination compounds of the ligand 2-(2`-pyridyl)quinoline (Figure 1) has been quite rare and currently expected to be a subject of intense research, especially in preparation of model complexes for biochemistry studies.[1,3]



trans *cis*

Figure 1. Structure of 2-(2`-pyridyl)quinoline; PQ.

Of further interest, mercury(II) ion was used as a probe in bioinorganic studies. For example, the native zinc ion in carboxypeptidase has been replaced by mercury(II) and other metal ions.[4] Sulfur atom in position 4 of uridine of the nucleic acid RNA has been shown to be a good metal binding site for Hg(II) and Pt(II) ions.[5a] Moreover, mercury(II) ion was used by X-ray crystallographers and in electron microscopy to help to elucidate the structure of macromolecules.[5b]

The important role of 2-(2`-pyridyl)quinoline as α-diimine ligand and the use of mercury(II) ion as a probe in biochemistry encouraged us to prepare and characterize mercury(II) complexes of 2-(2`-pyridyl)quinoline which could be possibly used as model complexes in order to help in understanding the functions and structures of certain metalloproteins or metalloenzymes.

Results and discussion

The convenient synthetic routes used for the preparation of mercury(II) complexes are shown in equations 1 and 2.

$$HgX_2 + PQ \rightarrow Hg(PQ)X_2 \qquad X = Cl^-, Br^-, \text{and } I^- \qquad (1)$$

$$HgCl_2 + 2NaX + PQ \rightarrow Hg(PQ)X_2 + 2NaCl \qquad X = N_3^-, NO_2^-, NO_3^-, \text{and } SCN^- \qquad (2)$$

The analytical data of all complexes are consistent with the calculated values (experimental section). The isolated complexes were obtained in good yields (70-80%). The air insensitive complexes are insoluble in water and common organic solvents, but soluble in DMSO and DMF. In DMF, they behave as neutral complexes, as shown with low Λ_M values (experimental section).[6]

A summary of the IR spectral properties of the complexes is given in experimental section. Assignment was aided by consideration of earlier studies made on PQ and similar ligands and their complexes.[7] In the free ligand the nitrogen donor atoms are *trans*[8] but upon complexation they adopt a *cis* conformation as has been shown by X-ray structural studies as well as other physical measurements.[9,7b] The IR bands of coordinated PQ in the new complexes show the characteristic absorption of PQ skeleton.[7b,c,d] The strong bands in the range of 1640-1430 cm^{-1} were assigned as $\nu_{C=N}$ and $\nu_{C=C}$ stretching. These bands are shifted to higher frequencies, as compared to the free ligand, and thus indicating the involvement of both nitrogen atoms of PQ in bonding.[7b,d] The spectra were also examined in the low region using CsI pellets where

$\nu_{(M-X)}$ appears {x = halogen, and/ or nitrogen, (experimental section)}. The main points are given below:

(i) All complexes show strong bands in the range of 550-320 cm^{-1} due to Hg-N stretching.[10a,11] (ii) The IR spectrum of the complex $[Hg(PQ)Cl_2]$ shows band at 285 cm^{-1} which can be attributed to ν_{M-Cl}.[10b,11,12] On the other hand, the ν_{M-Br} and ν_{M-I} for $[Hg(PQ)Br_2]$ and $[Hg(PQ)I_2]$ were not seen because they vibrate below 200 cm^{-1}.[11,12] The complex $[Hg(PQ)(N_3)_2]$ exhibits two bands at 2128(vs) and 2036(vs) cm^{-1} which have been attributed to vibrations $\nu_{(N3)}$.[10c] The complex $[Hg(PQ)(SCN)_2]$ gives a very strong band at 2124 cm^{-1} due to CN stretching frequency and two bands at 721(m) and 468(m) cm^{-1} which may be attributed to the vibrations of ν_{CS} and δ_{NCS}, respectively. These bands confirm the presence of Hg-SCN bond.[10d] (iii) The appearance of three stretching NO bands at 1427, 1360, and 1004 cm^{-1} in the IR spectrum of $[Hg(PQ)(NO_3)_2]$ supports the presence of the unidentate NO_3 rather than the chelating bidentate group.[10e] The IR spectrum of the complex $[Hg(PQ)(NO_2)_2]$ shows absorption at 1350(m), 1321(m), and 1269(vs) cm^{-1} which indicates that this complex contains terminal nitro (—NO_2) group bonded to mercury.[10f]

The 400 MHz ^1H NMR spectral data of the 2-(2`-pyridyl)quinoline and its complexes are given in experimental part. The proposed structure, and the numbering of the ligand protons of the complexes are represented in Figure 1. Assignment of the peaks was made with the help of earlier studies.[7] As reported previously, a detailed comparison cannot be made. The free ligand PQ exists mainly in the *trans* conformation while a *cis* conformation is adopted by a coordinated ligand.[7] In *cis* conformation (Figure 1), the $H_{3,3`}$ protons are forced together, giving rise to a van der Waals deshielding interaction; the inductive effect of the metal deshields ring protons and the diamagnetic anisotropic effect of the aromatic ring of the adjacent ligand shields ring protons, in particularly, $H_{8,6`}$. However, in the halo complexes, the protons that are directed towards a halide ion ($H_{8,6`}$) are expected to be highly deshielded.[7b]

Therefore, one of the most evident features of the ^1H NMR spectra of the complexes is the signal of the two $H_{8,6`}$ protons. These two non-equivalent protons, which are directed toward the ligands X (Figure 2) are the most deshielded protons. They are found as doublet in the range 8.70-8.76 (area 1H) and 8.83-8.90 (area 1H) with coupling constant 8.0 and 4.7 Hz, respectively.

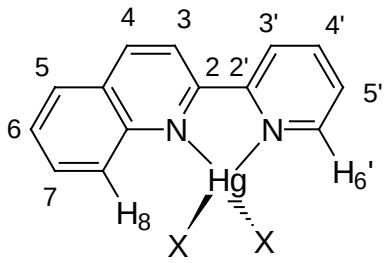


Figure 2. Proposed Structure of [Hg(PQ)X_2] Complexes.

Previously, we found that the chemical shifts for $H_{8,6`}$ protons were highly deshielded upon coordination to Pd(II) and Pt(II) to form *cis*- square planar geometry.[7b] The difference in the chemical shifts for $H_{8,6`}$ protons between that of the free ligand PQ and that of its complexes with Pd(II), Pt(II) was found to be in the range of 0.40 – 0.50 ppm.[7b,13] Similarly, in the present study, these two protons $H_{8,6`}$ show deshielded pattern upon coordination to Hg(II). Whereas, the difference in chemical shifts for $H_{8,6`}$ between that of free ligand PQ and that of its Hg(II) complexes are less affected, and were found to be in the range of 0.10 – 0.15 ppm. These results are in good agreement with those for the analogous mercury(II) complexes with 2-(2`-pyridyl)quinoxaline.[12b] The lower of the chemical shifts for these two $H_{8,6`}$ protons in Hg(PQ)X_2 (X = Cl^-, Br^-, I^-, N_3^-, NO_2^-, NO_3^-, and SCN^-) complexes compared to that of M(PQ)X_2 (M = Pd(II), Pt(II); X = Cl^-, Br^-) complexes can be explained by the formation of tetrahedral geometry around the central metal Hg(II), in which the $H_{8,6`}$ protons are located in a plane other than that plane of the more electronegative groups X. While in *cis* – square planar geometry around Pd(II) and Pt(II), the two $H_{8,6`}$ protons are directed toward the more electronegative groups X. The $H_{8,6`}$ protons and X groups are found to be in the same plane. Therefore, based upon similar results found for previously reported complexes[14,15] and on the basis of the difference in chemical shifts between the free ligand and its complexes, we concluded that all these complexes have distorted tetrahedral geometry. It may be possible that these complexes ([HgPQX_2]) have a five-coordinated dimer of a general formula, [HgPQX_2]$_2$. To distinguish between these two possibilities the X-ray crystal structure determination of the complexes will be required.

^{13}C NMR properties of the free PQ and its complexes are listed in experimental section. In each case the spectra clearly show the presence of fourteen different types of

carbon. The most deshielded chemical shifts is observed for C_2 and $C_{2`}$ which are close to the nitrogen atoms of the ligand PQ (Figure 1). In addition, the ^{13}C NMR spectrum of $[Hg(PQ)(SCN)_2]$ also shows signals at 117.2 and 117.4 ppm, which may be assigned to the non-equivalent carbon atoms of the thiocyanato groups.[16,17]

The electronic absorption spectra of the complexes were measured in DMF (experimental section). The UV absorption spectra of all complexes are dominated by strong, broad absorption bands with shoulders in the region of 240-360 nm. According to literature, the strong bands in this region correspond closely to the ligand π-π^* absorption.[7b,9,14] The broadness of the absorption bands possibly indicates the presence of MLCT bands underneath the π-π^* transitions. For the complex $Hg(PQ)(N_3)_2$, a weaker band is observed at longer wavelength (504 nm), which can be assigned to the metal-to-azide transitions.

Conclusions

Reaction of PQ with mercury(II) halides in varying molar ratio in water-ethanol solutions produces complexes formulated as $[HgPQX_2]$. The spectroscopic properties of these complexes have been investigated.

Experimental

Materials

2-(2`-Pyridyl)quinoline (hereafter noted PQ) was prepared according to a previously reported procedure,[9] or purchased from Laborat. All metal salts and AR grade solvents were obtained from common vender and used as commercially supplied without further purification.

Instrumentation

Elemental analysis for C, H, N, and S were performed by M-H-W Laboratories, Phoenix, Arizona, USA. IR spectra were taken on a Mattson 5000 FTIR spectrophotometer in the range 4000 to 500 cm^{-1} as KBr pellets and on a PYE-Unicam SP3-3000 a spectrophotometer as CsI pellets in the range 500 to 200 cm^{-1}. ^1H and ^{13}C NMR experiments were conducted on a Varian VXR-400 NMR spectrometer. Chemical shifts were referenced to TMS. All NMR spectra were obtained in deuterated

dimethylsulfoxide (DMSO-d_6). Conductivity measurements were determined with a Jenway conductivity meter model 4010 at 25 °C using 1.0×10^{-3} M in N,N-dimethylformamide (DMF). Electronic absorption spectra were measured on either a JASCO model V-550 double-beam UV-Vis spectrophotometer (Loyola University of Chicago, USA) or on a Specord M 500 Zeiss spectrophotometer.

Synthesis

All reaction mixtures were stirred at room temperature overnight. All of the products were washed with water, ethanol, and ether, then dried under vacuum at 35 °C.

[Hg(PQ)Cl_2]

To a stirred solution of $HgCl_2$ (0.10 g, 0.37 mmol) in water (20 mL) a solution of PQ (0.076 g, 0.37 mmol) in ethanol (5 mL) was added slowly. Immediately, a white precipitate was obtained. Mp 255 °C dec. IR: $\nu_{(C=C)}$ and $\nu_{(C=N)}$ 1638s, 1618vs, 1595s, 1555m, 1483vs, 1437vs; $\delta_{(C-H)}$ 837m, 792m, 781vs, 644m; $\nu_{(Hg-N)}$ 475s, 326vs cm^{-1}. ^1H NMR (400 MHz, DMSO-d_6) δ 8.90 (d, 1H, *J* 4.7 Hz), 8.72 (d, 1H, *J* 8.1 Hz), 8.63 (s, 2H), 8.26 (d, 1H, *J* 8.4 Hz), 8.15 (t, 1H, *J* 7.6 Hz), 8.11 (d, 1H, *J* 8.2 Hz), 7.89 (t, 1H, *J* 7.6 Hz), 7.73–7.66 (m, 2H). ^{13}C NMR (100 MHz, DMSO-d_6) δ 153.5, 153.2, 149.8, 147.5, 138.6, 138.2, 130.6, 128.7, 128.2, 128.1, 127.6, 125.5, 122.4, 118.8. UV (DMF) λ_{max} (log ε) 266 (4.11), 321 (3.82), 336 nm (3.64). Λ_M = 7.92 $ohm^{-1}cm^2mol^{-1}$. Anal. Calcd for $HgC_{14}H_{10}N_2Cl_2$: C 35.20, H 2.11, N 5.87. Found: C 35.45, H 2.10, N 5.82.

[Hg(PQ)Br_2]

This complex was prepared by dissolving (0.13 g, 0.37 mmol) of $HgBr_2$ in 20 mL ethanol. A solution containing (0.076 g, 0.37 mmol) of PQ in 5 mL ethanol was then added dropwise. A white product formed immediately. Mp 281 °C dec. IR: $\nu_{(C=C)}$ and $\nu_{(C=N)}$ 1638m, 1593vs, 1555w, 1512m, 1481vs, 1435vs; $\delta_{(C-H)}$ 835m, 810s, 779vs, 644m; $\nu_{(Hg-N)}$ 470vs, 350m cm^{-1}. ^1H NMR (400 MHz, DMSO-d_6) δ 8.95 (dd, 1H, *J* 1.0, 4.9 Hz), 8.76 (dt, 1H, *J* 1.0, 7.9 Hz), 8.71 (d, 1H, *J* 8.8 Hz), 8.67 (d, 1H, *J* 8.6 Hz), 8.31 (d, 1H, *J* 8.1 Hz), 8.21 (dt, 1H, *J* 1.7, 7.8 Hz), 8.14 (dd, 1H, *J* 1.0, 8.2 Hz), 7.93 (dt, 1H, *J* 1.5, 7.7 Hz), 7.76 (dt, 1H, *J* 1.3, 4.7 Hz), 7.74 (dt, 1H, *J* 1.1, 7.0 Hz). ^{13}C NMR (100 MHz, DMSO-d_6) δ 152.6, 152.2, 150.0, 146.0, 139.3, 138.8, 130.4, 128.4, 128.3, 128.2, 127.8,

125.9, 123.1, 119.1. UV (DMF) λ_{max} (log ε) 266 (4.36), 321 (3.92), 336 nm (3.74). Λ_M = 7.77 $ohm^{-1}cm^2mol^{-1}$. Anal. Calcd for $HgC_{14}H_{10}N_2Br_2$: C 29.68, H 1.78, N 4.95. Found: C 29.80, H 1.75, N 5.00.

[Hg(PQ)I_2]

This compound was isolated as white precipitate by mixing an ethanolic solution (20 mL) of HgI_2 and PQ (5 mL) in a ratio of 1:1 of HgI_2 to PQ, respectively. Mp 261 °C dec. IR: $\nu_{(C=C)}$ and $\nu_{(C=N)}$ 1638s, 1591vs, 1557w, 1509s, 1476vs, 1433vs; $\delta_{(C-H)}$ 826w, 803s, 777vs, 642m; $\nu_{(Hg-N)}$ 460vs, 330vs cm^{-1}. ^{1}H NMR (400 MHz, DMSO-*d*$_6$) δ 8.83 (d, 1H, *J* 4.0 Hz), 8.70 (d, 1H, *J* 8.0 Hz), 8.63 (s, 2H), 8.21 (d, 1H, *J* 8.4 Hz), 8.11 (dt, 2H, *J* 1.6, 7.6 Hz), 7.70 (dt, 1H, *J* 1.0, 7.6 Hz), 7.64 (dd, 2H, *J* 4.8, 6.4 Hz). ^{13}C NMR (100 MHz, DMSO-*d*$_6$) δ 153.7, 153.4, 149.5, 146.6, 138.3, 138.1, 130.5, 128.7, 128.2, 128.1, 127.5, 125.3, 122.1, 118.8. UV (DMF) λ_{max} (log ε) 266 (4.38), 300 (4.27), 336 nm (3.66). Λ_M = 5.30 $ohm^{-1}cm^2mol^{-1}$. Anal. Calcd for $HgC_{14}H_{10}N_2I_2$: C 25.46, H 1.53, N 4.24. Found: C 25.55, H 1.51, N 4.24.

[Hg(PQ)X_2] (X = N_3^-, NO_2^-, NO_3^-, and SCN^-)

These complexes were prepared as follows: A sodium salt of azide (0.120 g, 1.85 mmol), nitrite (0.138 g, 1.85 mmol), nitrate (0.157 g, 1.85 mmol), or thiocyanate (0.150 g, 1.85 mmol) in 2 mL water was added slowly to an aqueous solution (10 mL) of $HgCl_2$ (0.10 g, 0.37 mmol). After a few minutes of stirring, a solution of PQ (0.076 g, 0.37 mmol) in ethanol (5 mL) was added to the mixture, resulting in an immediate formation of white precipitate. Analytical data for these complexes as follow.

[Hg(PQ)(N_3)$_2$]: Mp 207 °C dec. IR: $\nu_{(N3)}$ 2128vs, 2036vs; $\nu_{(C=C)}$ and $\nu_{(C=N)}$ 1637m, 1595vs, 1556w, 1502s, 1481s, 1435vs; $\delta_{(C-H)}$ 816m, 785s, 779vs, 642m; $\nu_{(Hg-N)}$ 445vs, 345s, 325s cm^{-1}. ^{1}H NMR (400 MHz, DMSO-*d*$_6$) δ 8.82 (d, 1H, *J* 4.8 Hz), 8.66 (d, 1H, *J* 8.0 Hz), 8.52 (d, 2H, *J* 2.4 Hz), 8.19 (d, 1H, *J* 8.0 Hz), 8.08 (dt, 2H, *J* 1.6, 7.8 Hz), 7.85 (dt, 1H, *J* 0.8, 7.8 Hz), 7.68 (t, 1H, *J* 7.6 Hz), 7.61 (d, 1H, *J* 7.8 Hz). ^{13}C NMR (100 MHz, DMSO-*d*$_6$) δ 154.3, 154.1, 150.0, 147.2, 138.9, 138.4, 131.1, 129.5, 128.7, 127.8, 125.0, 122.9, 122.4, 119.0. UV (DMF) λ_{max} (log ε) 289 (4.15), 321sh (3.96), 335 (3.84),

504 nm (2.26). Λ_M = 5.53 $ohm^{-1}cm^2mol^{-1}$. Anal. Calcd for $HgC_{14}H_{10}N_8$: C 34.26, H 2.05, N 22.83. Found: C 34.60, H 2.10, N 22.75.

[Hg(PQ)(NO$_2$)$_2$]: Mp 250 ^oC dec. IR: $\nu_{(C=C)}$ and $\nu_{(C=N)}$ 1641s, 1618vs, 1585s, 1559m, 1505s, 1483vs, 1437vs; $\delta_{(C-H)}$ = 835m, 803s, 779vs, 644m; $\nu_{(—NO2)}$ 1378s, 1350m, 1321s, 1269vs; $\delta_{(ONO)}$ 841m, 824m; $\rho_{w(NO2)}$ 400s, 380m; $\nu_{(Hg-N)}$ 462vs, 320vs cm^{-1}. ^{1}H NMR (400 MHz, DMSO-*d*$_6$) δ 8.92 (d, 1H, *J* 4.8 Hz), 8.75 (d, 1H, *J* 8.0 Hz), 8.64 (s, 2H), 8.28 (d, 1H, *J* 8.0 Hz), 8.13 (t, 2H, *J* 7.8 Hz), 7.92 (t, 1H, *J* 7.8 Hz), 7.74 (t, 2H, *J* 7.8 Hz). ^{13}C NMR (100 MHz, DMSO-*d*$_6$) δ 152.8, 152.0, 150.8, 146.2, 140.0, 139.5, 131.3, 128.7, 128.5, 128.2, 126.7, 126.1, 123.7, 119.6. UV (DMF) λ_{max} (log ε) 285 (4.55), 313 (4.28), 337 nm (3.86). Λ_M = 10.5 $ohm^{-1}cm^2mol^{-1}$. Anal. Calcd for $HgC_{14}H_{10}N_4O_4$: C 33.71, H 2.02, N 11.24. Found: C 34.10, H 2.00, N 11.18.

[Hg(PQ)(NO$_3$)$_2$]: Mp 190 °C dec. IR: $\nu_{(C=C)}$ and $\nu_{(C=N)}$ 1641s, 1618vs, 1585s, 1559m, 1505s, 1483vs; $\delta_{(C-H)}$ 835m, 803s, 779vs, 643m; $\nu_{(—NO2)}$ 1427m, 1360vs; $\delta_{(NO)}$ 1004w; $\rho_{w(NO2)}$ 400m.br; $\nu_{(Hg-N)}$ 460vs, 312-300vs.br cm^{-1}. ^{1}H NMR (400 MHz, DMSO-*d*$_6$) δ 8.92 (d, 1H, *J* 4.7 Hz), 8.73 (d, 1H, *J* 7.9 Hz), 8.65 (s, 2H), 8.27 (d, 1H, *J* 8.4 Hz), 8.15 (dd, 2H, *J* 8.6, 12.0 Hz), 7.91 (t, 1H, *J* 7.8 Hz), 7.72 (dd, 2H, *J* 5.2, 12.0 Hz). ^{13}C NMR (100 MHz, DMSO-*d*$_6$) δ 154.1, 153.7, 150.4, 147.0, 139.2, 138.7, 131.3, 129.4, 129.0, 128.9, 128.2, 126.5, 123.1, 119.2. UV (DMF) λ_{max} (log ε) 280 (4.38), 296sh (4.35), 320sh (4.20), 336 nm (3.99). Λ_M = 10.2 $ohm^{-1}cm^2mol^{-1}$. Anal. Calcd for $HgC_{14}H_{10}N_4O_6$: C 31.68, H 1.90, N 10.55. Found: C 31.56, H 1.89, N 10.55.

[Hg(PQ)(SCN)$_2$]: Mp 200 °C dec. IR: $\nu_{(SCN)}$ 2124vs; $\nu_{(C=C)}$ and $\nu_{(C=N)}$ 1635s, 1618vs, 1586s, 1500m, 1483vs, 1437vs; $\delta_{(C-H)}$ 835m, 803s, 779vs, 642m; $\nu_{(Hg-N)}$ 460vs, 300s cm^{-1}. ^{1}H NMR (400 MHz, DMSO-*d*$_6$) δ 8.98 (d, 1H, *J* 4.2 Hz), 8.78 (d, 1H, *J* 7.5 Hz), 8.70 (d, 2H, *J* 5.1 Hz), 8.31 (t, 2H, *J* 8.0 Hz), 8.16 (d, 1H, *J* 8.1 Hz), 7.94 (t, 1H, *J* 7.6 Hz), 7.77 (dd, 2H, *J* 4.8, 7.1 Hz). ^{13}C NMR (100 MHz, DMSO-*d*$_6$) δ 152.9, 152.3, 150.7, 146.2, 140.0, 139.4, 131.7, 129.0, 128.5, 128.4, 128.2, 126.5, 123.8, 119.4, 117.4, 117.2. UV (DMF) λ_{max} (log ε) 280 (4.29), 340br (3.96), 350sh nm (3.86). Λ_M = 10.2 $ohm^{-1}cm^2mol^{-1}$. Anal. Calcd for $HgC_{16}H_{10}N_4S_2$: C 36.74, H 1.93, N 10.71, S 12.26. Found: C 37.05, H 1.87, N 10.67, S 12.17.

2-(2`-Pyridyl)quinoline (PQ): IR: $\nu_{(C=C)}$ and $\nu_{(C=N)}$ 1597vs, 1555m, 1503s, 1490s, 1420s; $\delta_{(C-H)}$ 847s, 796s, 779vs, 743vs cm^{-1}. ^1H NMR (400 MHz, DMSO-d_6) δ 8.76 (d, 1H, *J* 4.8 Hz), 8.62 (d, 1H, *J* 8.1 Hz), 8.58 (dd, 1H, *J* 1.5, 8.6 Hz), 8.51 (m, 1H), 8.13 (d, 1H, *J* 8.6 Hz), 8.02 (dt, 2H, *J* 1.6, 8.1 Hz), 7.82 (t, 1H, *J* 7.6 Hz), 7.65 (t, 1H, *J* 7.6 Hz), 7.53 (t, 1H, *J* 6.4 Hz). ^{13}C NMR (100 MHz, DMSO-d_6) δ 155.4, 155.2, 149.3, 147.2, 137.4, 137.2, 130.0, 129.2, 128.0, 127.9, 127.0, 124.6, 121.1, 118.4. UV (DMF) λ_{max} (log ε) 272 (4.20), 320 sh (3.99), 336sh nm (3.83).

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Povzetek

Komplekse $Hg(PQ)X_2$ (PQ = 2-(2`-piridil)kinolin, X = $Cl^-$, $Br^-$, $I^-$, $N_3^-$, $NO_2^-$, $NO_3^-$, in $SCN^-$) smo pripravili z reakcijo med $HgX_2$ (X = $Cl^-$, $Br^-$, and $I^-$) in PQ ali z reakcijo med $HgCl_2$ in $NaN_3$, $NaNO_2$, $NaNO_3$, in NaSCN in z dodatkom raztopine 2-(2`-piridil)kinolina v reakcijsko zmes. Pripravljene komplekse smo karakterizirali z elementno analizo, meritvami prevodnosti, elektronskimi spektri, IR spektroskopijo in ^1H in ^{13}C NMR spektroskopijo.