# Palladium(II) complexes of highly basic imidazolin-2-imines and their reactivity toward small bio-molecules

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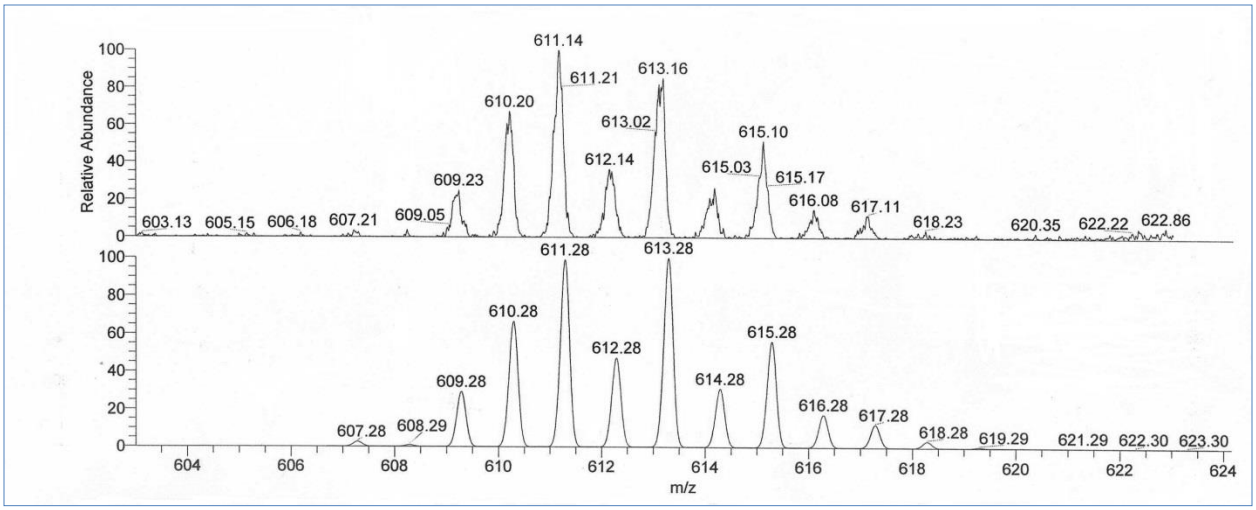


**Figure S1.** Isotopic patterns of the peak around m/z = 611, which belongs to the $[Pd(DACH(Im^{iPr})_2)Cl_2]$ complex, without one chloride ion, *ie.* $[Pd(DACH(Im^{iPr})_2)Cl]^+$.

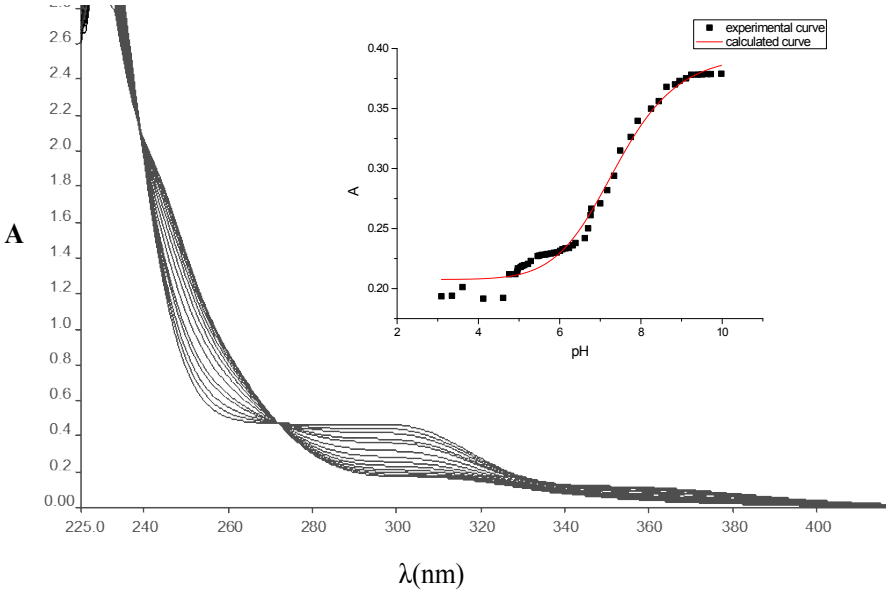


**Figure S2.** UV-vis spectra recorded for 0.1 mM $[Pd(DMEAIm^{iPr})(H_2O)_2]^{2+}$in the pH range 2 to 12 at 25 $^{o}$C. Insert: Plot of absorbance *vs* pH at 255 nm (experimental and calculated curve).

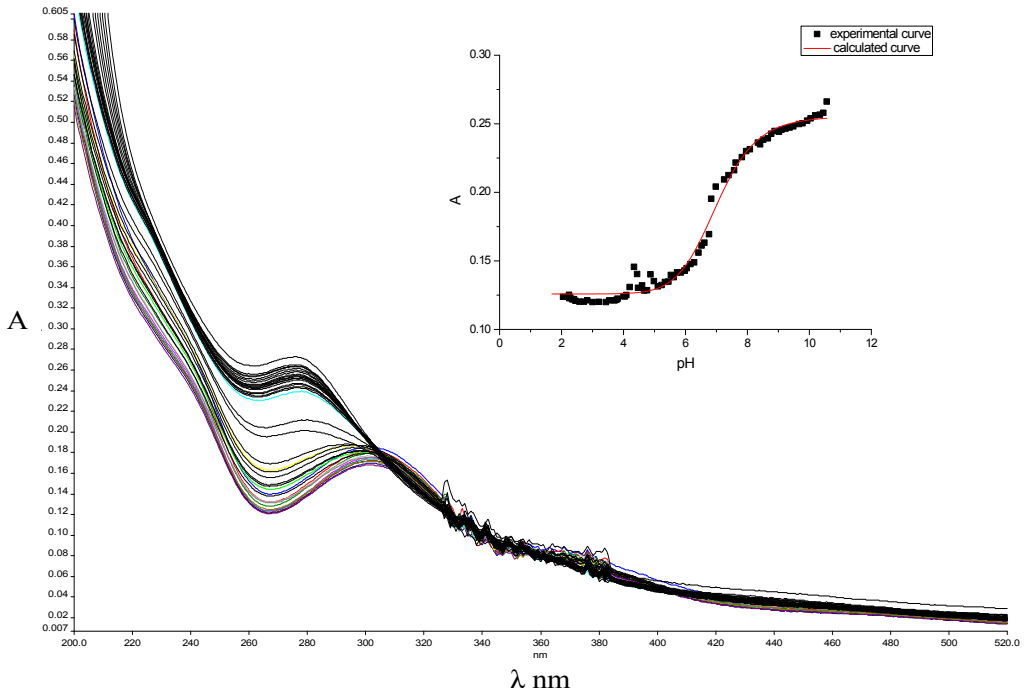


**Figure S3.** UV-vis spectra recorded for 0.1 mM $[Pd(EAIm^{iPr})(H_2O)_2]^{2+}$in the pH range 2 to 11 at 25 $^{o}$C. Insert: Plot of absorbance *vs* pH at 270 nm (experimental and calculated curve).

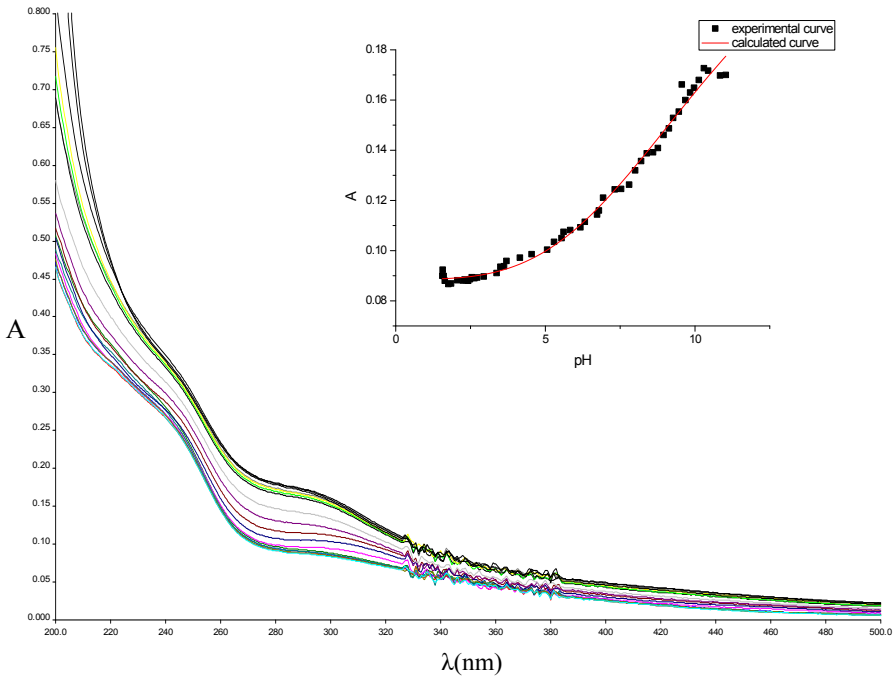


**Figure S4.** UV-vis spectra recorded for 0.1 mM $[Pd(DACH(Im^{iPr})_2)(H_2O)_2]^{2+}$ in the pH range 2 to 11 at 25 °C. Insert: Plot of absorbance *vs* pH at 280 nm (experimental and calculated curve).

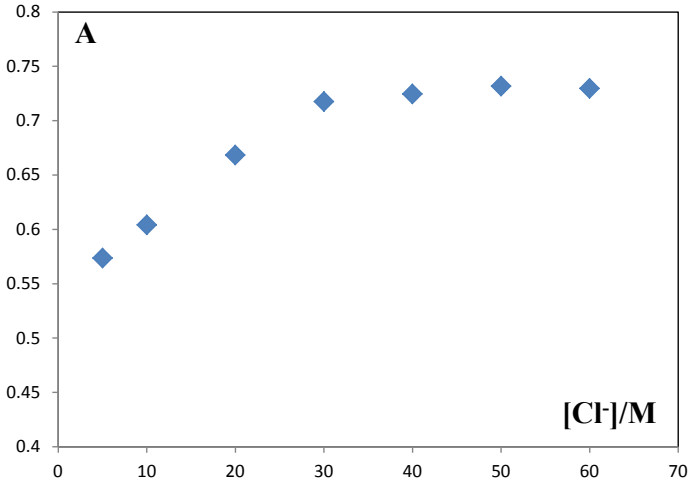


**Figure S5.** The effect of different concentrations of chloride ions on the change in absorbance in the solution of the complex [Pd(DMEAIm$^{iP}$)$Cl_2$] in 25 mM Hepes buffer (pH ≈ 7,2) at 270 nm.

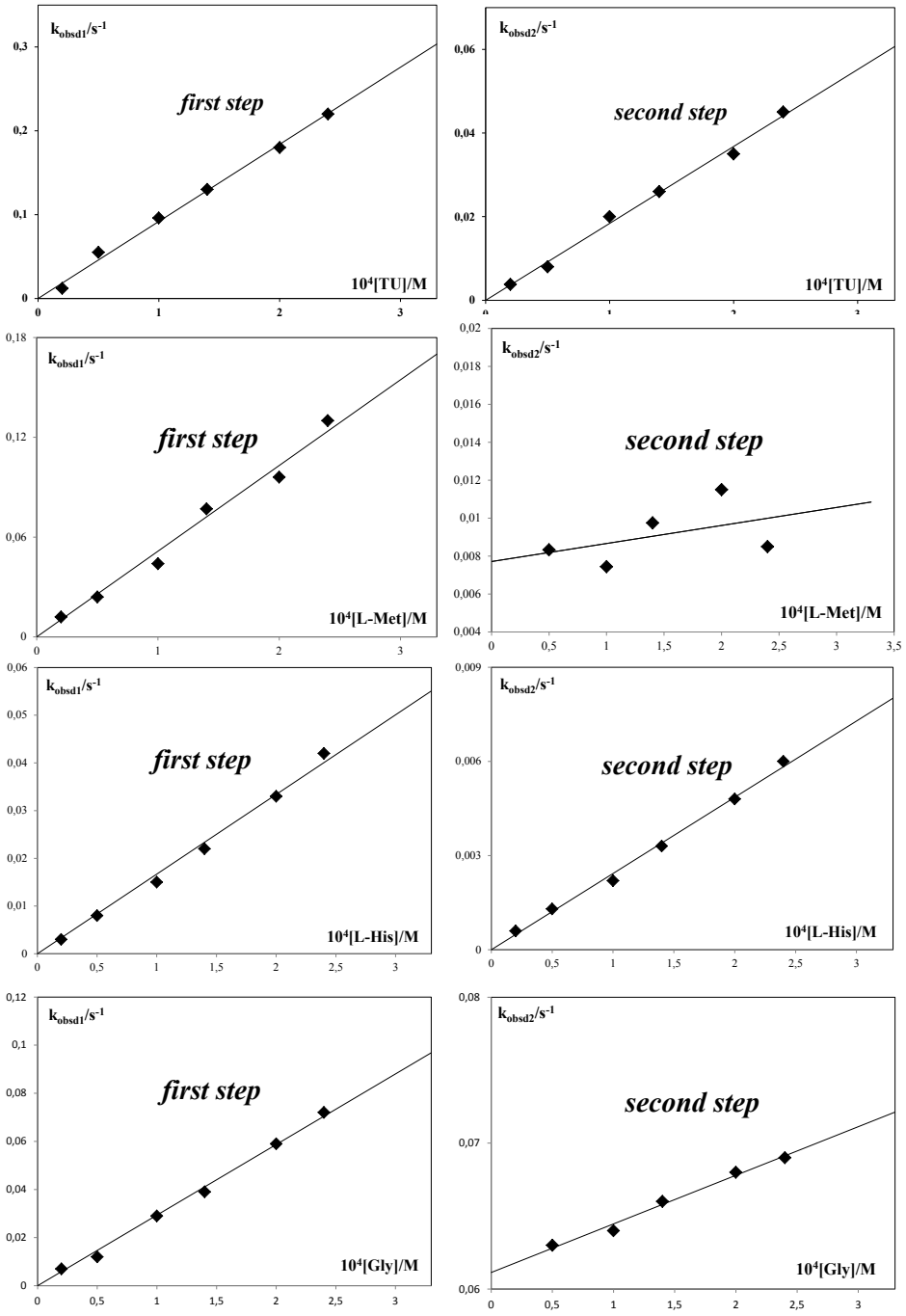


**Figure S6.** *Pseudo*-first-order rate constants plotted as a function of nucleophile concentration for the first and second step of the substitution reactions of the [Pd(BL$^{i\text{Pr}}$)Cl$_2$] complexes with TU, L-Met, L-His and Gly at pH = 7.2 and 310 K in 25 mM Hepes buffer and 30 mM NaCl.

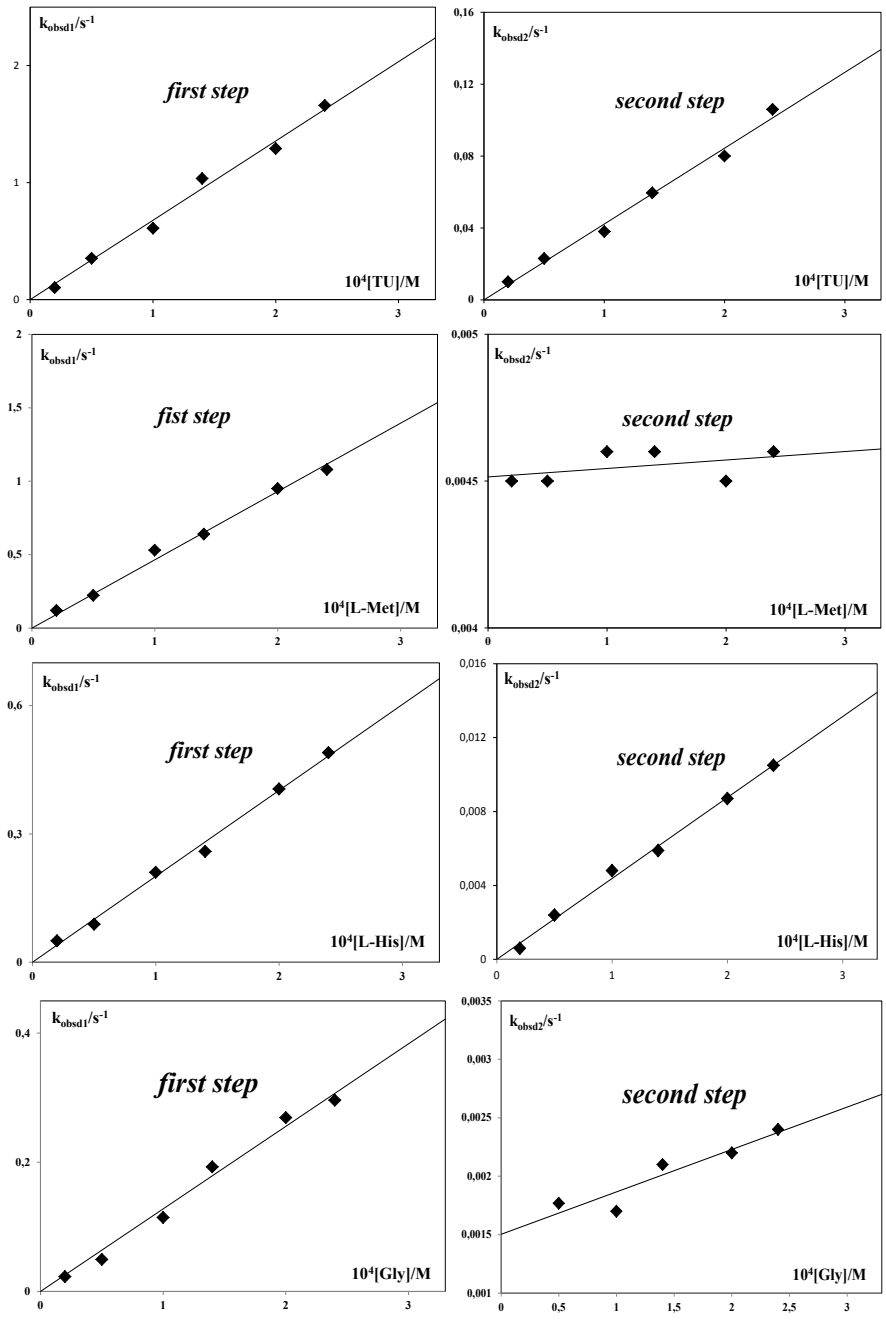


**Figure S7.** *Pseudo*-first-order rate constants plotted as a function of nucleophile concentration for the first and second step of the substitution reactions of the [Pd(DMEAIm$^{i\text{Pr}}$)$Cl_2$] complexes with TU, L-Met, L-His and Gly at pH = 7.2 and 310 K in 25 mM Hepes buffer and 30 mM NaCl.

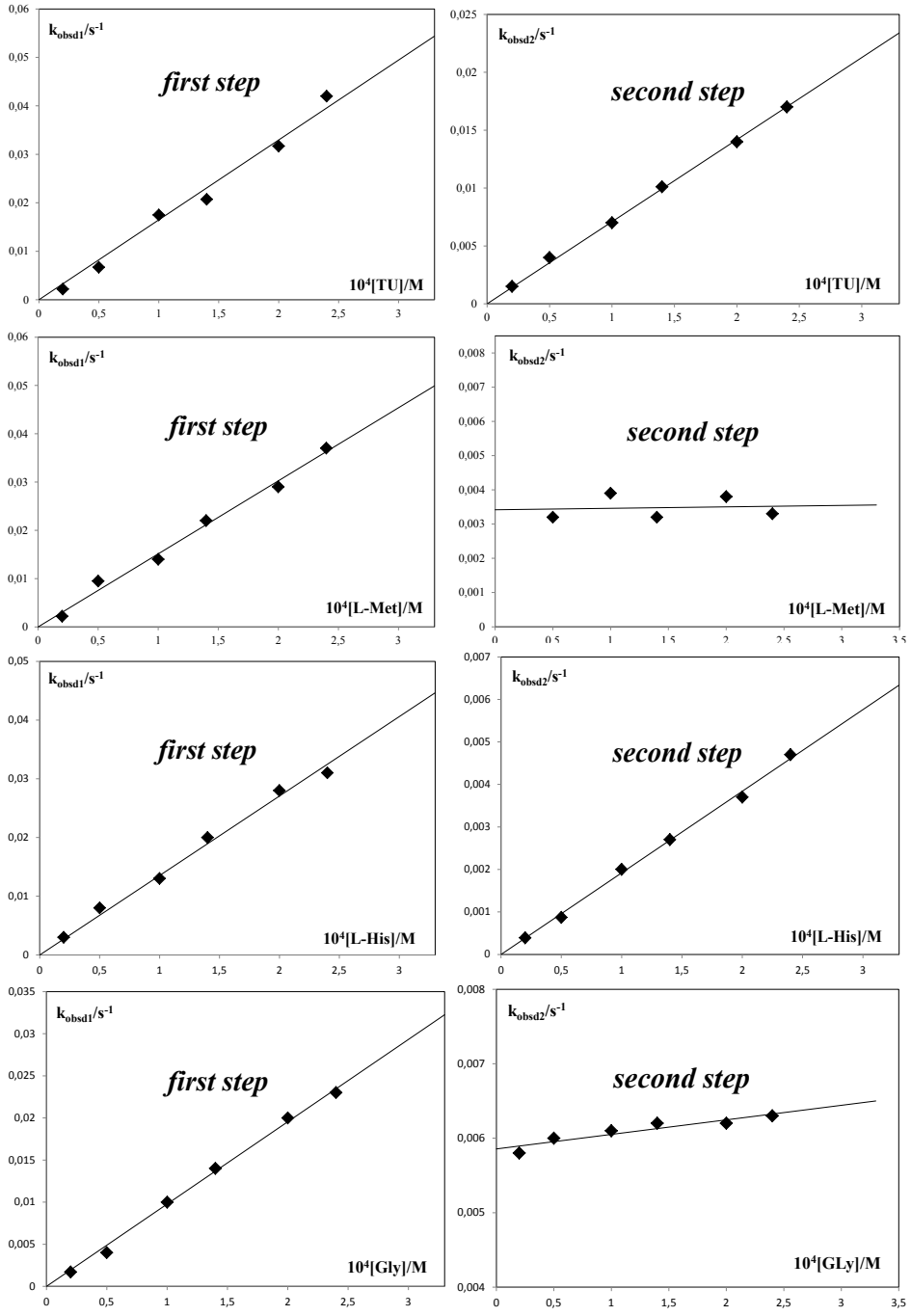


**Figure S8.** *Pseudo*-first-order rate constants plotted as a function of nucleophile concentration for the first and second step of the substitution reactions of the [Pd(DACH(Im$^{i\text{Pr}}$)$_2$)Cl$_2$] complexes with TU, L-Met, L-His and Gly at pH = 7.2 and 310 K in 25 mM Hepes buffer and 30 mM NaCl.

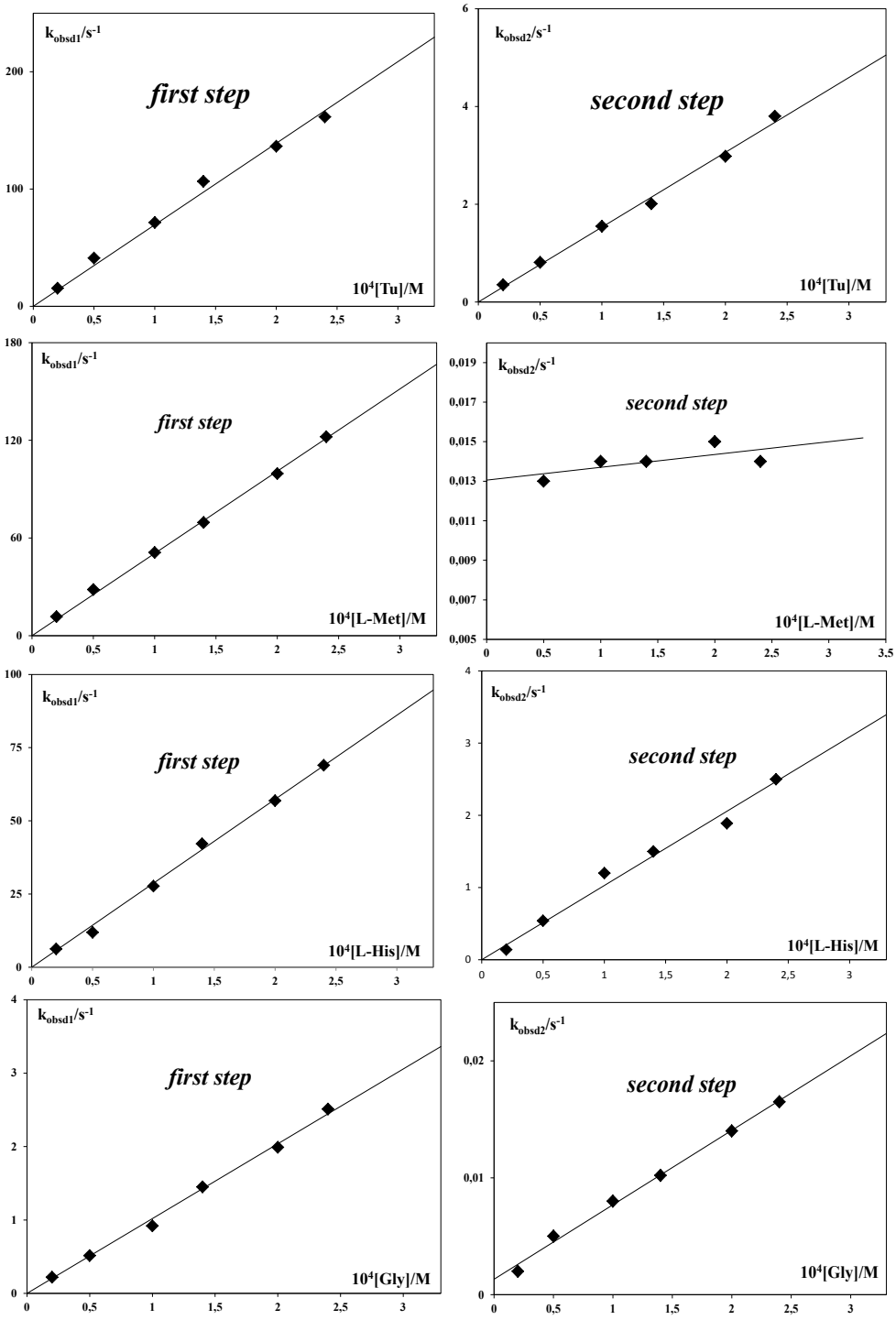


**Figure S9.** *Pseudo*-first-order rate constants plotted as a function of nucleophile concentration for the first and second step of the substitution reactions of the $[Pd(en)Cl_2]$ complexes with TU, L-Met, L-His and Gly at pH = 7.2 and 310 K in 25 mM Hepes buffer and 30 mM NaCl.

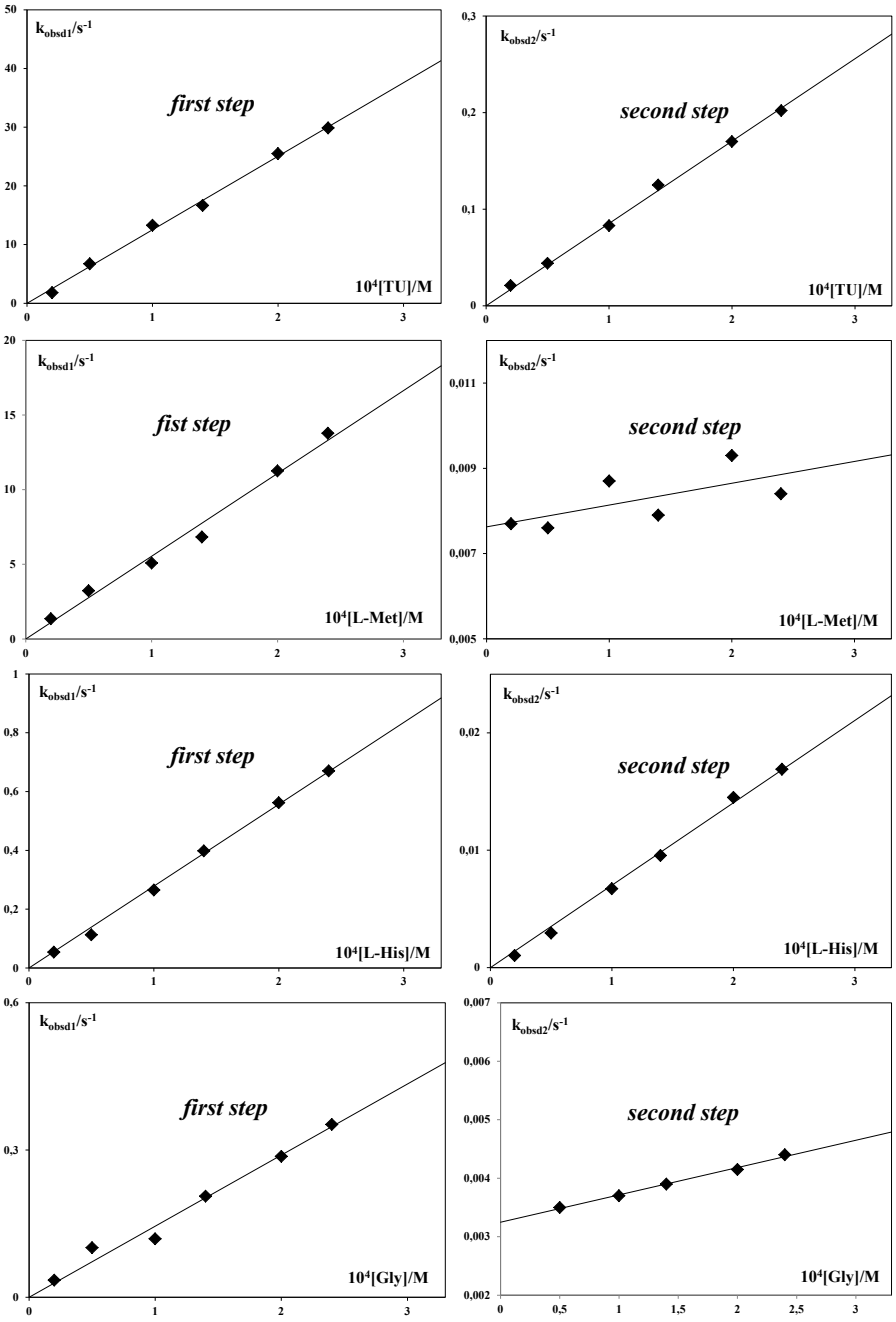


**Figure S10.** *Pseudo*-first-order rate constants plotted as a function of nucleophile concentration for the first and second step of the substitution reactions of the $[Pd(EAIm^{iPr})Cl_2]$ complexes with TU, L-Met, L-His and Gly at pH = 7.2 and 310 K in 25 mM Hepes buffer and 30 mM NaCl.

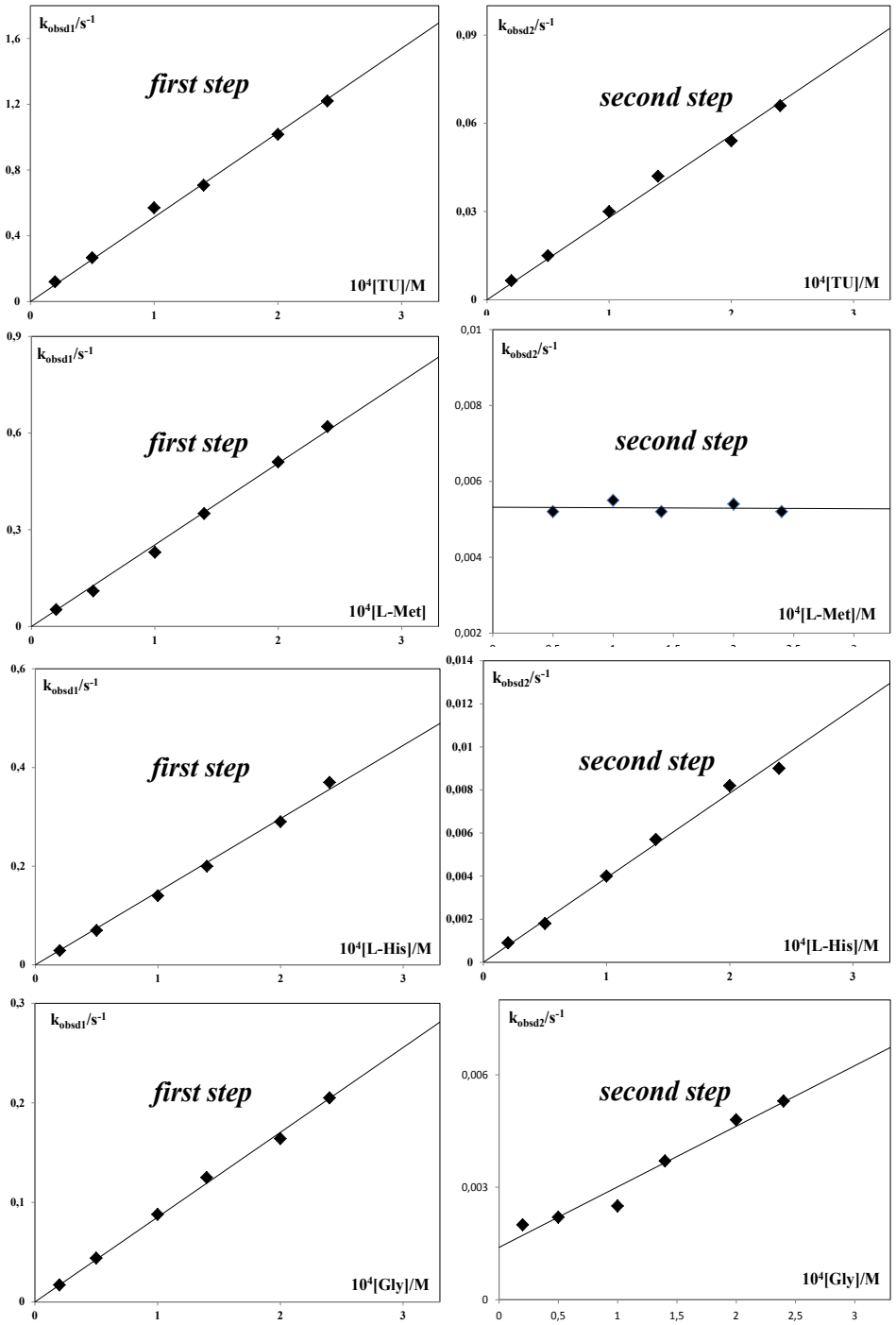


**Figure S11.** *Pseudo*-first-order rate constants plotted as a function of nucleophile concentration for the first and second step of the substitution reactions of the [Pd(DPENIm$^{i\text{Pr}}$)Cl$_2$] complexes with TU, L-Met, L-His and Gly at pH = 7.2 and 310 K in 25 mM Hepes buffer and 30 mM NaCl.

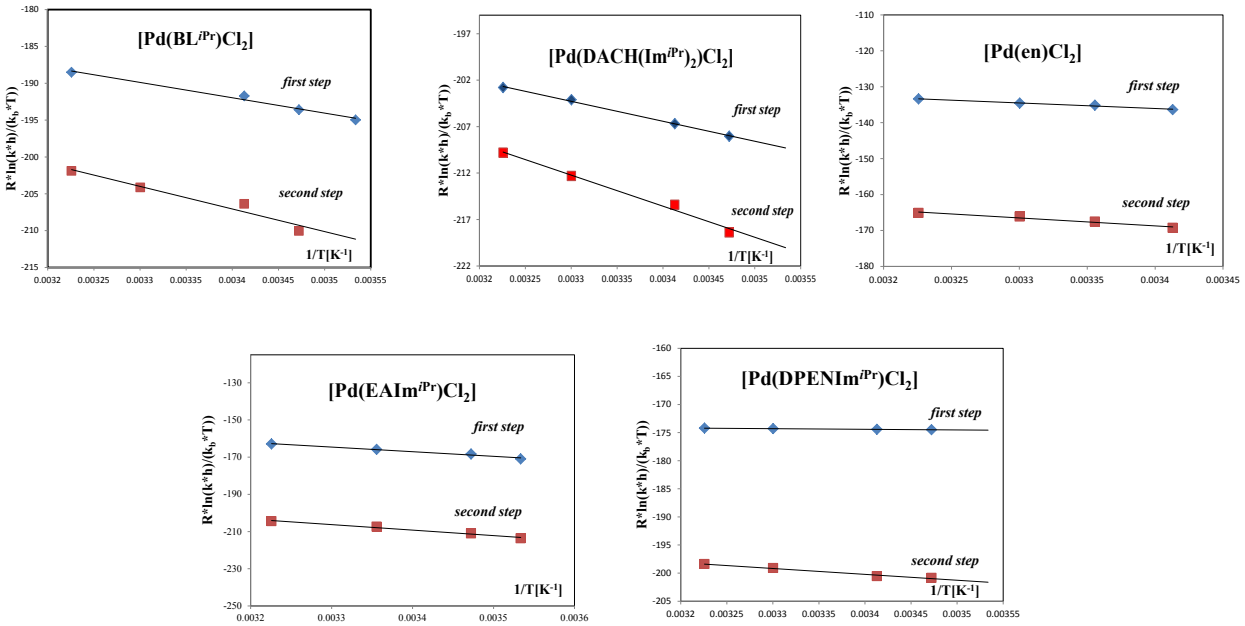


**Figure S12.** Eyring plots for the two reaction steps of the studied Pd(II) complexes with TU in 25 mM Hepes buffer, 30 mM NaCl at pH = 7.2.

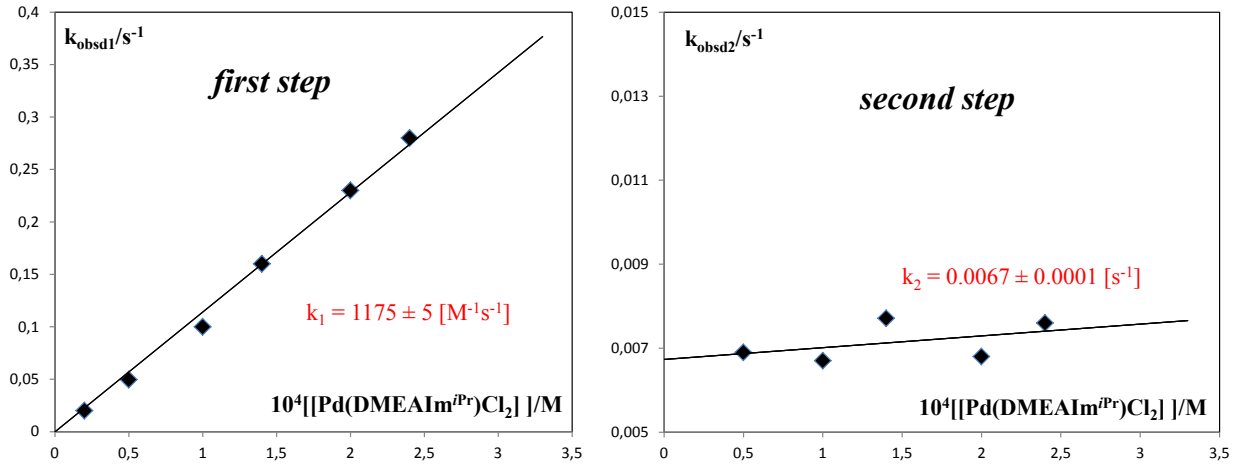


**Figure S13.** *Pseudo*-first-order rate constants plotted as a function of complex concentration for the first and second step of the substitution reactions of the [Pd(DMEAIm$^{iPr}$)Cl$_2$] complexes with Gly at pH = 7.2 and 310 K in 25 mM Hepes buffer and 30 mM NaCl.

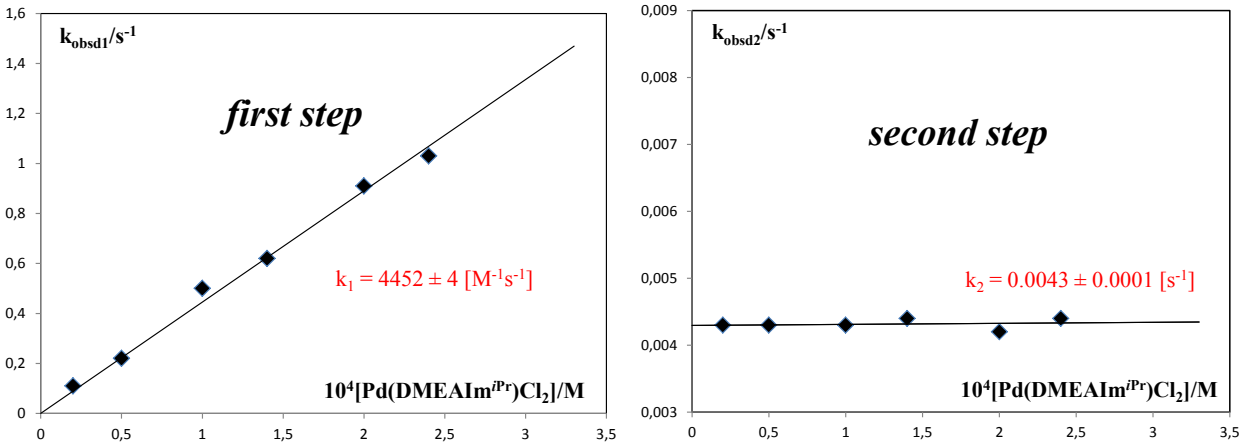


**Figure S14.** *Pseudo*-first-order rate constants plotted as a function of complex concentration for the first and second step of the substitution reactions of the [Pd(DMEAIm$^{iPr}$)Cl$_2$] complexes with L-Met at pH = 7.2 and 310 K in 25 mM Hepes buffer and 30 mM NaCl.

**Table S1.** The rate constants obtained for the substitution reactions of aqua Pt(II) complexes with TU at 298 K.[26]

| | ***first step*** $k_1$ ($M^{-1}$ $s^{-1}$) | ***second step*** $k_2$ ($M^{-1}$ $s^{-1}$) |
|---|---|---|
| $[Pt(en)(H_2O)_2]^{2+}$ | 34.0 ± 0.4 | 10.2 ± 0.2 |
| $[Pt(dach)(H_2O)_2]^{2+}$ | 21 ± 1 | 11.5 ± 0.5 |
| $[Pt(amp)(H_2O)_2]^{2+}$<br>amp = aminomethylpyridine | 233 ± 5 | 38 ± 1 |
| $[Pt(bpy)(H_2O)_2]^{2+}$<br>Bpy = N,N'-bipyridine | 5081 ± 275 | 1119 ± 22 |

**Table S2.** Activation parameters for the first and the second reaction steps between investigated Pd(II) complexes and TU at pH = 7.2, 25 mM Hepes buffer and 30 mM NaCl.

| | ***first step*** | | ***second step*** | |
|---|---|---|---|---|
| | $\Delta H_1^{\neq}$ [kJ mol$^{-1}$] | $\Delta S_1^{\neq}$ [JK$^{-1}$ mol$^{-1}$] | $\Delta H_2^{\neq}$ [kJ mol$^{-1}$] | $\Delta S_2^{\neq}$ [JK$^{-1}$ mol$^{-1}$] |
| [Pd(en)$Cl_2$] | 15 ± 1 | -84 ± 4 | 22 ± 3 | -93 ± 9 |
| [Pd(EAIm$^{i\text{Pr}}$)$Cl_2$] | 25 ± 2 | -82 ± 8 | 30 ± 2 | -109 ± 9 |
| [Pd(DMEAIm$^{i\text{Pr}}$)$Cl_2$] | 28 ± 2 | -80 ± 8 | 25 ± 2 | -114 ± 6 |
| [Pd(DPENIm$^{i\text{Pr}}$)$Cl_2$] | 11 ± 1 | -170 ± 2 | 10 ± 1 | -165 ± 3 |
| [Pd(BL$^{i\text{Pr}}$)$Cl_2$] | 20 ± 2 | -121 ± 6 | 30 ± 5 | -103 ± 16 |
| [Pd(DACH(Im$^{i\text{Pr}}$)$_2$)$Cl_2$] | 22 ± 1 | -133 ± 3 | 33 ± 3 | -101 ± 9 |

**Table S3** Observed *pseudo*-first order rate constants as a function of nucleophile concentration and temperature for the reaction between complex $[Pd(en)Cl_2]$ and TU at pH = 7.2 (25 mM Hepes buffer) in the presence of 30 mM NaCl at 310 K.

| T(K) | $10^4\,C_{TU}$/M | first step $k_{obsd1}/s^{-1}$ | second step $k_{obsd2}/s^{-1}$ |
|---|---|---|---|
| 310.0 | 2.40 | 161.52(6) | 3.80(6) |
| | 2.00 | 136.49(6) | 2.98(6) |
| | 1.40 | 106.49(6) | 2.01(6) |
| | 1.00 | 71.36(6) | 1.55(6) |
| | 0.50 | 41.10(5) | 0.81(5) |
| | 0.20 | 15.33(4) | 0.35(4) |

[a]Number of runs in parentheses

**Table S4** Observed *pseudo*-first order rate constants as a function of nucleophile concentration and temperature for the reaction between complex $[Pd(en)Cl_2]$ and L-Met at pH = 7.2 (25 mM Hepes buffer) in the presence of 30 mM NaCl at 310 K.

| T(K) | $10^4\,C_{L\text{-}Met}$/M | first step $k_{obsd1}/s^{-1}$ | second step $k_{obsd2}/s^{-1}$ |
|---|---|---|---|
| 310.0 | 2.40 | 122.14(6) | 0.014(6) |
| | 2.00 | 99.52(6) | 0.015(6) |
| | 1.40 | 69.54(6) | 0.014(6) |
| | 1.00 | 51.12(6) | 0.014(6) |
| | 0.50 | 28.33(5) | 0.013(5) |
| | 0.20 | 11.65(5) | / |

**Table S5** Observed *pseudo*-first order rate constants as a function of nucleophile concentration and temperature for the reaction between complex [Pd(en)$Cl_2$] and L-His at pH = 7.2 (25 mM Hepes buffer) in the presence of 30 mM NaCl at 310 K.

| T(K) | $10^4\, C_{L\text{-}His}$/M | first step $k_{obsd1}/s^{-1}$ | second step $k_{obsd2}/s^{-1}$ |
|---|---|---|---|
| 310.0 | 2.40 | 68.98(6) | 2.50(6) |
| | 2.00 | 56.88(6) | 1.89(6) |
| | 1.40 | 42.15(6) | 1.50(6) |
| | 1.00 | 27.66(6) | 1.20(6) |
| | 0.50 | 11.89(5) | 0.54(5) |
| | 0.20 | 6.22(5) | 0.14(5) |

**Table S6** Observed *pseudo*-first order rate constants as a function of nucleophile concentration and temperature for the reaction between complex [Pd(en)$Cl_2$] and Gly at pH = 7.2 (25 mM Hepes buffer) in the presence of 30 mM NaCl at 310 K.

| T(K) | $10^4\, C_{Gly}$/M | first step $k_{obsd1}/s^{-1}$ | second step $k_{obsd2}/s^{-1}$ |
|---|---|---|---|
| 310.0 | 2.40 | 2.51(6) | 0.017(6) |
| | 2.00 | 1.99(6) | 0.014(6) |
| | 1.40 | 1.45(6) | 0.010(6) |
| | 1.00 | 0.92(6) | 0.008(6) |
| | 0.50 | 0.52(6) | 0.005(6) |
| | 0.20 | 0.22(5) | 0.002(5) |

**Table S7** Observed *pseudo*-first order rate constants as a function of nucleophile concentration and temperature for the reaction between complex [Pd(EAIm$^{i\text{Pr}}$)Cl$_2$] and TU at pH = 7.2 (25 mM Hepes buffer) in the presence of 30 mM NaCl at 310 K.

| T(K) | $10^4\, C_{Gly}$/M | first step $k_{obsd1}/s^{-1}$ | second step $k_{obsd2}/s^{-1}$ |
|---|---|---|---|
| 310.0 | 2.40 | 29.89(6) | 0.20(6) |
| | 2.00 | 25.49(6) | 0.17(6) |
| | 1.40 | 16.65(6) | 0.13(6) |
| | 1.00 | 13.27(6) | 0.083(6) |
| | 0.50 | 6.71(6) | 0.044(6) |
| | 0.20 | 1.80(5) | 0.021(5) |

**Table S8** Observed *pseudo*-first order rate constants as a function of nucleophile concentration and temperature for the reaction between complex [Pd(EAIm$^{i\text{Pr}}$)Cl$_2$] and L-Met at pH = 7.2 (25 mM Hepes buffer) in the presence of 30 mM NaCl at 310 K.

| T(K) | $10^4\, C_{L\text{-}Met}$/M | first step $k_{obsd1}/s^{-1}$ | second step $k_{obsd2}/s^{-1}$ |
|---|---|---|---|
| 310.0 | 2.40 | 13.78(6) | 0.0084(6) |
| | 2.00 | 11.25(6) | 0.0093(6) |
| | 1.40 | 6.83(6) | 0.0087(6) |
| | 1.00 | 5.08(6) | 0.0076(6) |
| | 0.50 | 3.23(6) | 0.0079(6) |
| | 0.20 | 1.35(5) | 0.0077(5) |

**Table S9** Observed *pseudo*-first order rate constants as a function of nucleophile concentration and temperature for the reaction between complex [Pd(EAIm$^{i\text{Pr}}$)Cl$_2$] and L-His at pH = 7.2 (25 mM Hepes buffer) in the presence of 30 mM NaCl at 310 K.

| T(K) | $10^4\, C_{L\text{-}His}$/M | first step $k_{obsd1}/s^{-1}$ | second step $k_{obsd2}/s^{-1}$ |
|---|---|---|---|
| 310.0 | 2.40 | 0.67(6) | 0.017(6) |
| | 2.00 | 0.56(6) | 0.014(6) |
| | 1.40 | 0.40(6) | 0.010(6) |
| | 1.00 | 0.26(6) | 0.007(6) |
| | 0.50 | 0.11(6) | 0.003(6) |
| | 0.20 | 0.05(5) | 0.001(5) |

**Table S10** Observed *pseudo*-first order rate constants as a function of nucleophile concentration and temperature for the reaction between complex [Pd(EAIm$^{i\text{Pr}}$)Cl$_2$] and Gly at pH = 7.2 (25 mM Hepes buffer) in the presence of 30 mM NaCl at 310 K.

| T(K) | $10^4\, C_{Gly}$/M | first step $k_{obsd1}/s^{-1}$ | second step $k_{obsd2}/s^{-1}$ |
|---|---|---|---|
| 310.0 | 2.40 | 0.35(6) | 0.0044(6) |
| | 2.00 | 0.29(6) | 0.0041(6) |
| | 1.40 | 0.21(6) | 0.0039(6) |
| | 1.00 | 0.12(6) | 0.0037(6) |
| | 0.50 | 0.10(6) | 0.0035(6) |
| | 0.20 | 0.03(5) | / |

**Table S11** Observed *pseudo*-first order rate constants as a function of nucleophile concentration and temperature for the reaction between complex [Pd(DPENIm$^{i\text{Pr}}$)$Cl_2$] and TU at pH = 7.2 (25 mM Hepes buffer) in the presence of 30 mM NaCl at 310 K.

| T(K) | $10^4\, C_{TU}$/M | first step $k_{obsd1}/s^{-1}$ | second step $k_{obsd2}/s^{-1}$ |
|---|---|---|---|
| 310.0 | 2.40 | 1.22(6) | 0.066(6) |
| | 2.00 | 1.02(6) | 0.054(6) |
| | 1.40 | 0.71(6) | 0.042(6) |
| | 1.00 | 0.57(6) | 0.030(6) |
| | 0.50 | 0.27(6) | 0.015(6) |
| | 0.20 | 0.12(5) | 0.006(6) |

**Table S12** Observed *pseudo*-first order rate constants as a function of nucleophile concentration and temperature for the reaction between complex [Pd(DPENIm$^{i\text{Pr}}$)$Cl_2$] and L-Met at pH = 7.2 (25 mM Hepes buffer) in the presence of 30 mM NaCl at 310 K.

| T(K) | $10^4\, C_{L\text{-}Met}$/M | first step $k_{obsd1}/s^{-1}$ | second step $k_{obsd2}/s^{-1}$ |
|---|---|---|---|
| 310.0 | 2.40 | 0.62(6) | 0.0052(6) |
| | 2.00 | 0.51(6) | 0.0054(6) |
| | 1.40 | 0.35(6) | 0.0055(6) |
| | 1.00 | 0.23(6) | 0.0052(6) |
| | 0.50 | 0.11(6) | 0.0052(6) |
| | 0.20 | 0.05(5) | / |

**Table S13** Observed *pseudo*-first order rate constants as a function of nucleophile concentration and temperature for the reaction between complex [Pd(DPENIm$^{i\text{Pr}}$)$Cl_2$]and L-His at pH = 7.2 (25 mM Hepes buffer) in the presence of 30 mM NaCl at 310 K.

| T(K) | $10^4\, C_{L\text{-}His}$/M | first step $k_{obsd1}/s^{-1}$ | second step $k_{obsd2}/s^{-1}$ |
|---|---|---|---|
| 310.0 | 2.40 | 0.37(6) | 0.009(6) |
| | 2.00 | 0.29(6) | 0.008(6) |
| | 1.40 | 0.20(6) | 0.006(6) |
| | 1.00 | 0.14(6) | 0.004(6) |
| | 0.50 | 0.07(6) | 0.002(6) |
| | 0.20 | 0.03(5) | 0.001(6) |

**Table S14** Observed *pseudo*-first order rate constants as a function of nucleophile concentration and temperature for the reaction between complex [Pd(DPENIm$^{i\text{Pr}}$)$Cl_2$]and Gly at pH = 7.2 (25 mM Hepes buffer) in the presence of 30 mM NaCl at 310 K.

| T(K) | $10^4\, C_{Gly}$/M | first step $k_{obsd1}/s^{-1}$ | second step $k_{obsd2}/s^{-1}$ |
|---|---|---|---|
| 310.0 | 2.40 | 0.20(6) | 0.0053(6) |
| | 2.00 | 0.16(6) | 0.0048(6) |
| | 1.40 | 0.12(6) | 0.0037(6) |
| | 1.00 | 0.09(6) | 0.0025(6) |
| | 0.50 | 0.04(6) | 0.0022(6) |
| | 0.20 | 0.02(5) | 0.0020(6) |

**Table S15** Observed *pseudo*-first order rate constants as a function of nucleophile concentration and temperature for the reaction between complex [Pd(DMEAIm$^{iPr}$)Cl$_2$] and TU at pH = 7.2 (25 mM Hepes buffer) in the presence of 30 mM NaCl at 310 K.

| T(K) | $10^4\,C_{TU}$/M | first step $k_{obsd1}/s^{-1}$ | second step $k_{obsd2}/s^{-1}$ |
|---|---|---|---|
| 310.0 | 2.40 | 1.66(6) | 0.106(6) |
| | 2.00 | 1.29(6) | 0.080(6) |
| | 1.40 | 1.03(6) | 0.059(6) |
| | 1.00 | 0.61(6) | 0.038(6) |
| | 0.50 | 0.35(6) | 0.023(6) |
| | 0.20 | 0.10(5) | 0.010(6) |

**Table S16** Observed *pseudo*-first order rate constants as a function of nucleophile concentration and temperature for the reaction between complex [Pd(DMEAIm$^{iPr}$)Cl$_2$] and L-Met at pH = 7.2 (25 mM Hepes buffer) in the presence of 30 mM NaCl at 310 K.

| T(K) | $10^4\,C_{L\text{-}Met}$/M | first step $k_{obsd1}/s^{-1}$ | second step $k_{obsd2}/s^{-1}$ |
|---|---|---|---|
| 310.0 | 2.40 | 1.08(6) | 0.0046(6) |
| | 2.00 | 0.95(6) | 0.0045(6) |
| | 1.40 | 0.64(6) | 0.0046(6) |
| | 1.00 | 0.53(6) | 0.0045(6) |
| | 0.50 | 0.22(6) | 0.0045(6) |
| | 0.20 | 0.12(5) | 0.0045(6) |

**Table S17** Observed *pseudo*-first order rate constants as a function of nucleophile concentration and temperature for the reaction between complex [Pd(DMEAIm$^{i\text{Pr}}$)$Cl_2$] and L-His at pH = 7.2 (25 mM Hepes buffer) in the presence of 30 mM NaCl at 310 K.

| T(K) | $10^4\, C_{\text{L-His}}$/M | first step $k_{obsd1}/s^{-1}$ | second step $k_{obsd2}/s^{-1}$ |
|---|---|---|---|
| 310.0 | 2.40 | 1.08(6) | 0.0046(6) |
| | 2.00 | 0.95(6) | 0.0045(6) |
| | 1.40 | 0.64(6) | 0.0046(6) |
| | 1.00 | 0.53(6) | 0.0045(6) |
| | 0.50 | 0.22(6) | 0.0045(6) |
| | 0.20 | 0.12(5) | 0.0045(6) |

**Table S18** Observed *pseudo*-first order rate constants as a function of nucleophile concentration and temperature for the reaction between complex [Pd(DMEAIm$^{i\text{Pr}}$)$Cl_2$] and Gly at pH = 7.2 (25 mM Hepes buffer) in the presence of 30 mM NaCl at 310 K.

| T(K) | $10^4\, C_{\text{Gly}}$/M | first step $k_{obsd1}/s^{-1}$ | second step $k_{obsd2}/s^{-1}$ |
|---|---|---|---|
| 310.0 | 2.40 | 1.08(6) | 0.0046(6) |
| | 2.00 | 0.95(6) | 0.0045(6) |
| | 1.40 | 0.64(6) | 0.0046(6) |
| | 1.00 | 0.53(6) | 0.0045(6) |
| | 0.50 | 0.22(6) | 0.0045(6) |
| | 0.20 | 0.12(5) | 0.0045(6) |

**Table S19** Observed *pseudo*-first order rate constants as a function of nucleophile concentration and temperature for the reaction between complex [Pd(BL$^{iPr}$)Cl$_2$] and TU at pH = 7.2 (25 mM Hepes buffer) in the presence of 30 mM NaCl at 310 K.

| T(K) | $10^4$ $C_{TU}$/M | first step $k_{obsd1}/s^{-1}$ | second step $k_{obsd2}/s^{-1}$ |
|---|---|---|---|
| 310.0 | 2.40 | 0.22(6) | 0.045(6) |
| | 2.00 | 0.18(6) | 0.035(6) |
| | 1.40 | 0.13(6) | 0.026(6) |
| | 1.00 | 0.10(6) | 0.020(6) |
| | 0.50 | 0.05(6) | 0.008(6) |
| | 0.20 | 0.01(5) | 0.004(6) |

**Table S20** Observed *pseudo*-first order rate constants as a function of nucleophile concentration and temperature for the reaction between complex [Pd(BL$^{iPr}$)Cl$_2$] and L-Met at pH = 7.2 (25 mM Hepes buffer) in the presence of 30 mM NaCl at 310 K.

| T(K) | $10^4$ $C_{L\text{-}Met}$/M | first step $k_{obsd1}/s^{-1}$ | second step $k_{obsd2}/s^{-1}$ |
|---|---|---|---|
| 310.0 | 2.40 | 0.130(6) | 0.0085(6) |
| | 2.00 | 0.096(6) | 0.0115(6) |
| | 1.40 | 0.077(6) | 0.0097(6) |
| | 1.00 | 0.044(6) | 0.0074(6) |
| | 0.50 | 0.024(6) | 0.0083(6) |
| | 0.20 | 0.012(5) | / |

**Table S21** Observed *pseudo*-first order rate constants as a function of nucleophile concentration and temperature for the reaction between complex [Pd(BL$^{iPr}$)Cl$_2$] and L-His at pH = 7.2 (25 mM Hepes buffer) in the presence of 30 mM NaCl at 310 K.

| T(K) | $10^4$ $C_{L\text{-}His}$/M | first step $k_{obsd1}$/$s^{-1}$ | second step $k_{obsd2}$/$s^{-1}$ |
|---|---|---|---|
| 310.0 | 2.40 | 0.042(6) | 0.0060(6) |
| | 2.00 | 0.033(6) | 0.0048(6) |
| | 1.40 | 0.022(6) | 0.0033(6) |
| | 1.00 | 0.015(6) | 0.0022(6) |
| | 0.50 | 0.008(6) | 0.0013(6) |
| | 0.20 | 0.003(5) | 0.0006(6) |

**Table S22** Observed *pseudo*-first order rate constants as a function of nucleophile concentration and temperature for the reaction between complex [Pd(BL$^{iPr}$)Cl$_2$] and Gly at pH = 7.2 (25 mM Hepes buffer) in the presence of 30 mM NaCl at 310 K.

| T(K) | $10^4$ $C_{Gly}$/M | first step $k_{obsd1}$/$s^{-1}$ | second step $k_{obsd2}$/$s^{-1}$ |
|---|---|---|---|
| 310.0 | 2.40 | 0.072(6) | 0.069(6) |
| | 2.00 | 0.059(6) | 0.068(6) |
| | 1.40 | 0.039(6) | 0.066(6) |
| | 1.00 | 0.029(6) | 0.064(6) |
| | 0.50 | 0.012(6) | 0.063(6) |
| | 0.20 | 0.007(5) | / |

**Table S23** Observed *pseudo*-first order rate constants as a function of nucleophile concentration and temperature for the reaction between complex [Pd(DACH(Im$^{i\text{Pr}}$)$_2$)Cl$_2$] and TU at pH = 7.2 (25 mM Hepes buffer) in the presence of 30 mM NaCl at 310 K.

| T(K) | $10^4\, C_{TU}$/M | first step $k_{obsd1}/s^{-1}$ | second step $k_{obsd2}/s^{-1}$ |
|---|---|---|---|
| 310.0 | 2.40 | 0.042(6) | 0.017(6) |
| | 2.00 | 0.032(6) | 0.014(6) |
| | 1.40 | 0.021(6) | 0.010(6) |
| | 1.00 | 0.017(6) | 0.007(6) |
| | 0.50 | 0.007(6) | 0.004(6) |
| | 0.20 | 0.002(5) | 0.001(6) |

**Table S24** Observed *pseudo*-first order rate constants as a function of nucleophile concentration and temperature for the reaction between complex [Pd(DACH(Im$^{i\text{Pr}}$)$_2$)Cl$_2$] and L-Met at pH = 7.2 (25 mM Hepes buffer) in the presence of 30 mM NaCl at 310 K.

| T(K) | $10^4\, C_{L\text{-}Met}$/M | first step $k_{obsd1}/s^{-1}$ | second step $k_{obsd2}/s^{-1}$ |
|---|---|---|---|
| 310.0 | 2.40 | 0.037(6) | 0.0033(6) |
| | 2.00 | 0.029(6) | 0.0038(6) |
| | 1.40 | 0.022(6) | 0.0032(6) |
| | 1.00 | 0.014(6) | 0.0039(6) |
| | 0.50 | 0.009(6) | 0.0032(6) |
| | 0.20 | 0.002(5) | / |

**Table S25** Observed *pseudo*-first order rate constants as a function of nucleophile concentration and temperature for the reaction between complex [Pd(DACH(Im$^{i\text{Pr}}$)$_2$)Cl$_2$] and L-His at pH = 7.2 (25 mM Hepes buffer) in the presence of 30 mM NaCl at 310 K.

| T(K) | $10^4\, C_{\text{L-His}}$/M | first step $k_{obsd1}/s^{-1}$ | second step $k_{obsd2}/s^{-1}$ |
|---|---|---|---|
| 310.0 | 2.40 | 0.031(6) | 0.0047(6) |
| | 2.00 | 0.028(6) | 0.0037(6) |
| | 1.40 | 0.020(6) | 0.0027(6) |
| | 1.00 | 0.013(6) | 0.0020(6) |
| | 0.50 | 0.008(6) | 0.0009(6) |
| | 0.20 | 0.003(5) | 0.0004(6) |

**Table S26** Observed *pseudo*-first order rate constants as a function of nucleophile concentration and temperature for the reaction between complex [Pd(DACH(Im$^{i\text{Pr}}$)$_2$)Cl$_2$] and Gly at pH = 7.2 (25 mM Hepes buffer) in the presence of 30 mM NaCl at 310 K.

| T(K) | $10^4\, C_{\text{Gly}}$/M | first step $k_{obsd1}/s^{-1}$ | second step $k_{obsd2}/s^{-1}$ |
|---|---|---|---|
| 310.0 | 2.40 | 0.023(6) | 0.0063(6) |
| | 2.00 | 0.020(6) | 0.0062(6) |
| | 1.40 | 0.014(6) | 0.0061(6) |
| | 1.00 | 0.010(6) | 0.0060(6) |
| | 0.50 | 0.004(6) | 0.0062(6) |
| | 0.20 | 0.002(5) | 0.0058(6) |

**Table S27** The rate constants obtained for the substitution reactions of $[Pd(en)Cl_2]$ complexes with TU at a few differente temperatures.

| T(K) | first step $k_1[M^{-1} s^{-1}]$ | second step $k_2[M^{-1} s^{-1}]$ |
|---|---|---|
| 310.0 | $(6.95 \pm 0.10)\ 10^5$ | $(1.53 \pm 0.20)\ 10^4$ |
| 303.0 | $(5.91 \pm 0.10)\ 10^5$ | $(1.32 \pm 0.10)\ 10^4$ |
| 298.0 | $(5.40 \pm 0.10)\ 10^5$ | $(1.10 \pm 0.10)\ 10^4$ |
| 293.0 | $(4.59 \pm 0.10)\ 10^5$ | $(0.88 \pm 0.10)\ 10^4$ |

**Table S28** The rate constants obtained for the substitution reactions of $[Pd(EAIm^{iPr})Cl_2]$ complexes with TU at a few differente temperatures.

| T(K) | first step $k_1[M^{-1} s^{-1}]$ | second step $k_2[M^{-1} s^{-1}]$ |
|---|---|---|
| 310.0 | $(1.25 \pm 0.20)\ 10^5$ | $(8.52 \pm 0.10)\ 10^2$ |
| 298.0 | $(8.49 \pm 0.10)\ 10^4$ | $(5.71 \pm 0.10)\ 10^2$ |
| 288.0 | $(6.10 \pm 0.10)\ 10^4$ | $(3.58 \pm 0.10)\ 10^2$ |
| 283.0 | $(4.37 \pm 0.20)\ 10^4$ | $(2.56 \pm 0.10)\ 10^2$ |

**Table S29** The rate constants obtained for the substitution reactions of [Pd(DMEAIm$^{i\text{Pr}}$)$Cl_2$] complexes with TU at a few differente temperatures.

| T(K) | first step $k_1$[$M^{-1}$ $s^{-1}$] | second step $k_2$[$M^{-1}$ $s^{-1}$] |
|---|---|---|
| 310.0 | (6.78 ± 0.20) $10^3$ | (4.22 ± 0.10) $10^2$ |
| 303.0 | (4.90 ± 0.10) $10^3$ | (3.20 ± 0.10) $10^2$ |
| 293.0 | (3.14 ± 0.20) $10^3$ | (2.08 ± 0.10) $10^2$ |
| 288.0 | (2.54 ± 0.10) $10^3$ | (1.78 ± 0.10) $10^2$ |
| 283.0 | (2.21 ± 0.10) $10^3$ | (1.55 ± 0.10) $10^2$ |

**Table S30** The rate constants obtained for the substitution reactions of [Pd(DPENIm$^{i\text{Pr}}$)$Cl_2$] complexes with TU at a few differente temperatures.

| T(K) | first step $k_1$[$M^{-1}$ $s^{-1}$] | second step $k_2$[$M^{-1}$ $s^{-1}$] |
|---|---|---|
| 310.0 | (5.13 ± 0.20) $10^3$ | (2.80 ± 0.20) $10^2$ |
| 303.0 | (4.97 ± 0.10) $10^3$ | (2.51 ± 0.10) $10^2$ |
| 293.0 | (4.72 ± 0.20) $10^3$ | (2.04 ± 0.10) $10^2$ |
| 288.0 | (4.61 ± 0.10) $10^3$ | (1.93 ± 0.10) $10^2$ |

**Table S31** The rate constants obtained for the substitution reactions of [Pd(BL$^{iPr}$)Cl$_2$] complexes with TU at a few differente temperatures.

| T(K) | first step $k_1$[M$^{-1}$ s$^{-1}$] | second step $k_2$[M$^{-1}$ s$^{-1}$] |
|---|---|---|
| 310.0 | (5.13 ± 0.20) $10^3$ | (2.80 ± 0.20) $10^2$ |
| 303.0 | (4.97 ± 0.10) $10^3$ | (2.51 ± 0.10) $10^2$ |
| 293.0 | (4.72 ± 0.20) $10^3$ | (2.04 ± 0.10) $10^2$ |
| 288.0 | (4.61 ± 0.10) $10^3$ | (1.93 ± 0.10) $10^2$ |

**Table S32** The rate constants obtained for the substitution reactions of [Pd(DACH(Im$^{iPr}$)$_2$)Cl$_2$] complexes with TU at a few differente temperatures.

| T(K) | first step $k_1$[M$^{-1}$ s$^{-1}$] | second step $k_2$[M$^{-1}$ s$^{-1}$] |
|---|---|---|
| 310.0 | (1.64 ± 0.20) $10^2$ | (0.71 ± 0.10) $10^2$ |
| 303.0 | (1.37 ± 0.10) $10^2$ | (0.51 ± 0.10) $10^2$ |
| 293.0 | (0.34 ± 0.10) $10^2$ | (0.34 ± 0.10) $10^2$ |
| 288.0 | (0.23 ± 0.20) $10^2$ | (0.23 ± 0.10) $10^2$ |