

# Estimating Limits of Detection and Quantification of Ibuprofen by TLC-densitometry at Different Chromatographic Conditions

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**Table S1.** Results obtained in RP-TLC system using methanol:water (40:10, v/v) as mobile phase and RP-2F<sub>254</sub> plates.

Amount of ibuprofen spotted onto chromatographic plate [μg/spot]	1.00	2.00	3.00
Measured spot area of ibuprofen [AU]	3501	5410	7020
	3490	5518	7000
	3347	5398	6998
Average value of measured spot area of ibuprofen [AU]	3446	5442	7006
Standard deviation [σ]	85.91	66.09	12.16
Coefficient of variation [CV, %]	2.49	1.21	0.17
Parameters of calibration curve AU = S·x+b		Results	
Slope (S)		1780.0	
Intercept (b)		1738.0	
Correlation coefficient (r)		0.998	
Standard deviation of slope (σ <sub>a</sub> )		124.7	
Standard deviation of intercept (σ <sub>b</sub> )		269.4	
Residual standard deviation of calibration curve (σ <sub>xy</sub> )		176.4	

**Table S2.** Results obtained in RP-TLC system using methanol:water (40:10, v/v) as mobile phase and RP-8F<sub>254</sub> plates.

Amount of ibuprofen spotted onto chromatographic plate [μg/spot]	2.00	3.00	4.00
Measured spot area of ibuprofen [AU]	6116	9090	1039
	6002	8708	1075
	6081	8890	1115
Average value of measured spot area of ibuprofen [AU]	6067	8896	1076
Standard deviation [σ]	58.40	191.07	38.01
Coefficient of variation [CV, %]	0.96	2.15	3.53

Parameters of calibration curve AU = S·x+b	Results
Slope (S)	2346.5
Intercept (b)	1534.8
Correlation coefficient (r)	0.993
Standard deviation of slope (σ <sub>a</sub> )	278.6
Standard deviation of intercept (σ <sub>b</sub> )	866.1
Residual standard deviation of calibration curve (σ <sub>xy</sub> )	393.9

**Table S3.** Results obtained in RP-TLC system using methanol:water (40:10, v/v) as mobile phase and RP-18F<sub>254</sub> plates.

Amount of ibuprofen spotted onto chromatographic plate [μg/spot]	0.20	0.30	0.40
Measured spot area of ibuprofen [AU]	778	1100	1714
	788	1236	1713
	780	1160	1703
Average value of measured spot area of ibuprofen [AU]	782	1165	1710
Standard deviation [σ]	5.29	68.16	6.08
Coefficient of variation [CV, %]	0.68	5.85	0.36

Parameters of calibration curve AU = S·x+b	Results
Slope (S)	4640.0
Intercept (b)	-173.0
Correlation coefficient (r)	0.995
Standard deviation of slope (σ <sub>a</sub> )	467.7
Standard deviation of intercept (σ <sub>b</sub> )	145.4
Residual standard deviation of calibration curve (σ <sub>xv</sub> )	66.1

**Table S4.** Results obtained in RP-TLC system using ethanol:water (40:10, v/v) as mobile phase and RP-2F<sub>254</sub> plates.

Amount of ibuprofen spotted onto chromatographic plate [μg/spot]	0.40	0.50	0.60
Measured spot area of ibuprofen [AU]	1718	2059	2235
	1745	2144	2398
	1764	2176	2466
Average value of measured spot area of ibuprofen [AU]	1742	2126	2366
Standard deviation [σ]	23.11	60.47	118.71
Coefficient of variation [CV, %]	1.33	2.84	5.02
Parameters of calibration curve AU = S·x+b		Results	
Slope (S)		3120.0	
Intercept (b)		518.0	
Correlation coefficient (r)		0.991	
Standard deviation of slope (σ <sub>a</sub> )		415.7	
Standard deviation of intercept (σ <sub>b</sub> )		210.6	
Residual standard deviation of calibration curve (σ <sub>xy</sub> )		58.8	

**Table S5.** Results obtained in RP-TLC system using ethanol:water (40:10, v/v) as mobile phase and RP-8F<sub>254</sub> plates.

Amount of ibuprofen spotted onto chromatographic plate [μg/spot]	0.30	0.40	0.50
Measured spot area of ibuprofen [AU]	1050	1360	1600
	999	1345	1630
	950	1368	1595
Average value of measured spot area of ibuprofen [AU]	1000	1358	1608
Standard deviation [σ]	50.00	11.68	18.93
Coefficient of variation [CV, %]	5.00	0.86	1.18
Parameters of calibration curve AU = S·x+b		Results	
Slope (S)		3040.0	
Intercept (b)		106.0	
Correlation coefficient (r)		0.995	
Standard deviation of slope (σ <sub>a</sub> )		311.8	
Standard deviation of intercept (σ <sub>b</sub> )		127.3	
Residual standard deviation of calibration curve (σ <sub>xy</sub> )		44.1	

**Table S6.** Results obtained in RP-TLC system using ethanol:water (40:10, v/v) as mobile phase and RP-18F<sub>254</sub> plates.

Amount of ibuprofen spotted onto chromatographic plate [μg/spot]	1.00	2.00	3.00
Measured spot area of ibuprofen [AU]	3190	6100	7890
	3188	6102	7967
	3197	6105	7936
Average value of measured spot area of ibuprofen [AU]	3192	6102	7931
Standard deviation [σ]	4.73	2.52	38.74
Coefficient of variation [CV, %]	0.15	0.04	0.49
Parameters of calibration curve AU = S·x+b		Results	
Slope (S)		2369.5	
Intercept (b)		1002.7	
Correlation coefficient (r)		0.991	
Standard deviation of slope (σ <sub>a</sub> )		312.0	
Standard deviation of intercept (σ <sub>b</sub> )		674.1	
Residual standard deviation of calibration curve (σ <sub>xy</sub> )		441.3	

**Table S7.** Results obtained in RP-TLC system using propan-1-ol:water (40:10, v/v) as mobile phase and RP-2F<sub>254</sub> plates.

Amount of ibuprofen spotted onto chromatographic plate [μg/spot]	1.00	2.00	3.00
Measured spot area of ibuprofen [AU]	1920	3010	4663
	1903	3002	4690
	1900	2950	4638
Average value of measured spot area of ibuprofen [AU]	1907	2990	4663
Standard deviation [σ]	10.78	32.58	26.00
Coefficient of variation [CV, %]	0.56	1.09	0.56
Parameters of calibration curve AU = S·x+b		Results	
Slope (S)		1378.0	
Intercept (b)		430.7	
Correlation coefficient (r)		0.992	
Standard deviation of slope (σ <sub>a</sub> )		170.3	
Standard deviation of intercept (σ <sub>b</sub> )		367.9	
Residual standard deviation of calibration curve (σ <sub>xy</sub> )		240.9	

**Table S8.** Results obtained in RP-TLC system using propan-1-ol:water (40:10, v/v) as mobile phase and RP-8F<sub>254</sub> plates.

Amount of ibuprofen spotted onto chromatographic plate [µg/spot]	1.00	2.00	3.00
Measured spot area of ibuprofen [AU]	3892	5500	7618
	3842	5462	7598
	3880	5490	7640
Average value of measured spot area of ibuprofen [AU]	3871	5484	7618
Standard deviation [σ]	26.10	19.70	21.00
Coefficient of variation [CV, %]	0.67	0.36	0.28
Parameters of calibration curve AU = S·x+b		Results	
Slope (S)		1873.5	
Intercept (b)		1910.7	
Correlation coefficient (r)		0.997	
Standard deviation of slope (σ <sub>a</sub> )		150.4	
Standard deviation of intercept (σ <sub>b</sub> )		324.9	
Residual standard deviation of calibration curve (σ <sub>xv</sub> )		212.7	

**Table S9.** Results obtained in RP-TLC system using propan-1-ol:water (40:10, v/v) as mobile phase and RP-18F<sub>254</sub> plates.

Amount of ibuprofen spotted onto chromatographic plate [μg/spot]	1.00	2.00	3.00
Measured spot area of ibuprofen [AU]	3608	5850	8059
	3570	5523	7793
	3678	5405	7925
Average value of measured spot area of ibuprofen [AU]	3618	5464	7926
Standard deviation [σ]	54.80	208.00	133.00
Coefficient of variation [CV, %]	1.51	3.81	1.68
Parameters of calibration curve AU = S·x+b		Results	
Slope (S)		2154.0	
Intercept (b)		1361.3	
Correlation coefficient (r)		0.997	
Standard deviation of slope (σ <sub>a</sub> )		177.8	
Standard deviation of intercept (σ <sub>b</sub> )		384.1	
Residual standard deviation of calibration curve (σ <sub>xv</sub> )		251.5	

**Table S10.** Results obtained in NP-TLC system using *n*-hexane:ethyl acetate:glacial acetic acid (36:12:2, v/v/v) as mobile phase and silica gel 60F<sub>254</sub> plates (1.05554).

Amount of ibuprofen spotted onto chromatographic plate [μg/spot]	1.00	2.00	3.00
Measured spot area of ibuprofen [AU]	3372	5109	6642
	3294	5400	6533
	3173	5096	6420
Average value of measured spot area of ibuprofen [AU]	3280	5202	6531
Standard deviation [σ]	100.27	171.9	111.0
Coefficient of variation [CV, %]	3.06	3.30	1.70
Parameters of calibration curve AU = S·x+b		Results	
Slope (S)		1625.5	
Intercept (b)		1753.3	
Correlation coefficient (r)		0.994	
Standard deviation of slope (σ <sub>a</sub> )		171.2	
Standard deviation of intercept (σ <sub>b</sub> )		369.8	
Residual standard deviation of calibration curve (σ <sub>xy</sub> )		242.1	

**Table S11.** Results obtained in NP-TLC system using *n*-hexane:ethyl acetate:glacial acetic acid (36:12:2, v/v/v) as mobile phase and silica gel 60F<sub>254</sub> plates with concentrating zone (1.05583).

Amount of ibuprofen spotted onto chromatographic plate [μg/spot]	0.20	0.30	0.40
Measured spot area of ibuprofen [AU]	1174	1401	1676
	1168	1490	1683
	1180	1446	1679
Average value of measured spot area of ibuprofen [AU]	1174	1446	1679
Standard deviation [σ]	6.00	44.51	3.51
Coefficient of variation [CV, %]	0.51	3.08	0.21

Parameters of calibration curve AU = S·x+b	Results
Slope (S)	2825.0
Intercept (b)	565.5
Correlation coefficient (r)	0.995
Standard deviation of slope (σ <sub>a</sub> )	285.8
Standard deviation of intercept (σ <sub>b</sub> )	88.8
Residual standard deviation of calibration curve (σ <sub>xy</sub> )	40.4

**Table S12.** Results obtained in NP-TLC system using *n*-hexane:ethyl acetate:glacial acetic acid (36:12:2, v/v/v) as mobile phase and silica gel 60F<sub>254</sub> plates (1.05570).

Amount of ibuprofen spotted onto chromatographic plate [µg/spot]	0.30	0.40	0.50
Measured spot area of ibuprofen [AU]	1664	1930	2395
	1750	1940	2290
	1680	1960	2295
Average value of measured spot area of ibuprofen [AU]	1699	1943	2326
Standard deviation [σ]	45.74	15.28	59.23
Coefficient of variation [CV, %]	2.69	0.78	2.55
Parameters of calibration curve AU = S·x+b		Results	
Slope (S)		3135.0	
Intercept (b)		735.3	
Correlation coefficient (r)		0.992	
Standard deviation of slope (σ <sub>a</sub> )		401.2	
Standard deviation of intercept (σ <sub>b</sub> )		163.8	
Residual standard deviation of calibration curve (σ <sub>xv</sub> )		56.7	

**Table S13.** Results obtained in NP-TLC system by using *n*-hexane:ethyl acetate:glacial acetic acid (36:12:2, v/v/v) as mobile phase and silica gel 60F<sub>254</sub> plates (1.05715).

Amount of ibuprofen spotted onto chromatographic plate [µg/spot]	1.00	2.00	3.00
Measured spot area of ibuprofen [AU]	3346	5317	6496
	3240	5060	6335
	3351	5200	6230
Average value of measured spot area of ibuprofen [AU]	3312	5192	6354
Standard deviation [σ]	62.70	128.70	134.00
Coefficient of variation [CV, %]	1.89	2.48	2.11
Parameters of calibration curve AU = S·x+b		Results	
Slope (S)		1910.7	
Intercept (b)		1521.0	
Correlation coefficient (r)		0.991	
Standard deviation of slope (σ <sub>a</sub> )		207.3	
Standard deviation of intercept (σ <sub>b</sub> )		447.8	
Residual standard deviation of calibration curve (σ <sub>xy</sub> )		293.1	

**Table S14.** Results obtained in NP-TLC system using *n*-hexane:ethyl acetate:glacial acetic acid (36:12:2, v/v/v) as mobile phase and Lux silica gel 60F<sub>254</sub> plates (1.05805).

Amount of ibuprofen spotted onto chromatographic plate [µg/spot]	1.00	2.00	3.00
Measured spot area of ibuprofen [AU]	2770	4254	5023
	2757	4268	5127
	2806	4047	5050
Average value of measured spot area of ibuprofen [AU]	2778	4190	5067
Standard deviation [σ]	25.38	123.75	53.97
Coefficient of variation [CV, %]	0.91	2.95	1.06
Parameters of calibration curve AU = S·x+b		Results	
Slope (S)		1144.5	
Intercept (b)		1722.7	
Correlation coefficient (r)		0.991	
Standard deviation of slope (σ <sub>a</sub> )		154.4	
Standard deviation of intercept (σ <sub>b</sub> )		333.6	
Residual standard deviation of calibration curve (σ <sub>xv</sub> )		218.4	

**Table S15.** Results obtained in NP-TLC system using toluene:ethyl acetate:glacial acetic acid (27:21:2, v/v/v) as mobile phase and silica gel 60F<sub>254</sub> plates (1.05554).

Amount of ibuprofen spotted onto chromatographic plate [µg/spot]	0.20	0.30	0.40
Measured spot area of ibuprofen [AU]	579	900	1090
	592	910	1074
	580	890	1086
Average value of measured spot area of ibuprofen [AU]	584	900	1084
Standard deviation [σ]	7.23	10.00	8.33
Coefficient of variation [CV, %]	1.24	1.11	0.77

Parameters of calibration curve AU = S·x+b	Results
Slope (S)	2500.0
Intercept (b)	106.0
Correlation coefficient (r)	0.989
Standard deviation of slope (σ <sub>a</sub> )	381.0
Standard deviation of intercept (σ <sub>b</sub> )	118.5
Residual standard deviation of calibration curve (σ <sub>xy</sub> )	53.9

**Table S16.** Results obtained in NP-TLC system using toluene:ethyl acetate:glacial acetic acid (27:21:2, v/v/v) as mobile phase and silica gel 60F<sub>254</sub> plates with concentrating zone (1.05583).

Amount of ibuprofen spotted onto chromatographic plate [μg/spot]	1.00	2.00	3.00
Measured spot area of ibuprofen [AU]	2149	2992	4300
	2108	2978	4367
	2126	3164	4319
Average value of measured spot area of ibuprofen [AU]	2128	3045	4329
Standard deviation [σ]	20.55	103.60	34.53
Coefficient of variation [CV, %]	0.96	3.40	0.80
Parameters of calibration curve AU = S·x+b		Results	
Slope (S)		1100.5	
Intercept (b)		966.3	
Correlation coefficient (r)		0.995	
Standard deviation of slope (σ <sub>a</sub> )		105.9	
Standard deviation of intercept (σ <sub>b</sub> )		228.9	
Residual standard deviation of calibration curve (σ <sub>xy</sub> )		149.8	

**Table S17.** Results obtained in NP-TLC system using toluene:ethyl acetate:glacial acetic acid (27:21:2, v/v/v) as mobile phase and silica gel 60F<sub>254</sub> plates (1.05570).

Amount of ibuprofen spotted onto chromatographic plate [μg/spot]	0.20	0.30	0.40
Measured spot area of ibuprofen [AU]	704	1228	1495
	760	1200	1502
	740	1183	1520
Average value of measured spot area of ibuprofen [AU]	736	1204	1506
Standard deviation [σ]	28.38	22.72	12.90
Coefficient of variation [CV, %]	3.86	1.89	0.86
Parameters of calibration curve AU = S·x+b		Results	
Slope (S)		3850.0	
Intercept (b)		-6.333	
Correlation coefficient (r)		0.992	
Standard deviation of slope (σ <sub>a</sub> )		479.2	
Standard deviation of intercept (σ <sub>b</sub> )		149.0	
Residual standard deviation of calibration curve (σ <sub>xy</sub> )		67.8	

**Table S18.** Results obtained in NP-TLC system using toluene:ethyl acetate:glacial acetic acid (27:21:2, v/v/v) as mobile phase and silica gel 60F<sub>254</sub> plates (1.05715).

Amount of ibuprofen spotted onto chromatographic plate [μg/spot]	0.20	0.30	0.40
Measured spot area of ibuprofen [AU]	689	851	1140
	647	848	1140
	645	846	1074
Average value of measured spot area of ibuprofen [AU]	660	848	1109
Standard deviation [σ]	24.85	2.52	38.10
Coefficient of variation [CV, %]	3.76	0.30	3.44
Parameters of calibration curve AU = S·x+b		Results	
Slope (S)		2245.0	
Intercept (b)		198.8	
Correlation coefficient (r)		0.996	
Standard deviation of slope (σ <sub>a</sub> )		65.5	
Standard deviation of intercept (σ <sub>b</sub> )		210.7	
Residual standard deviation of calibration curve (σ <sub>xv</sub> )		29.8	

**Table S19.** Results obtained in NP-TLC system using toluene:ethyl acetate:glacial acetic acid (27:21:2, v/v/v) as mobile phase and Lux silica gel 60F<sub>254</sub> plates (1.05805).

Amount of ibuprofen spotted onto chromatographic plate [μg/spot]	0.30	0.40	0.50
Measured spot area of ibuprofen [AU]	703	940	1050
	684	890	1095
	653	924	1100
Average value of measured spot area of ibuprofen [AU]	680	918	1081
Standard deviation [σ]	25.24	25.53	27.54
Coefficient of variation [CV, %]	3.71	2.78	2.55
Parameters of calibration curve AU=S·x+b		Results	
Slope (S)		2005.0	
Intercept (b)		91.0	
Correlation coefficient (r)		0.994	
Standard deviation of slope (σ <sub>a</sub> )		216.5	
Standard deviation of intercept (σ <sub>b</sub> )		88.9	
Residual standard deviation of calibration curve (σ <sub>xy</sub> )		30.6	