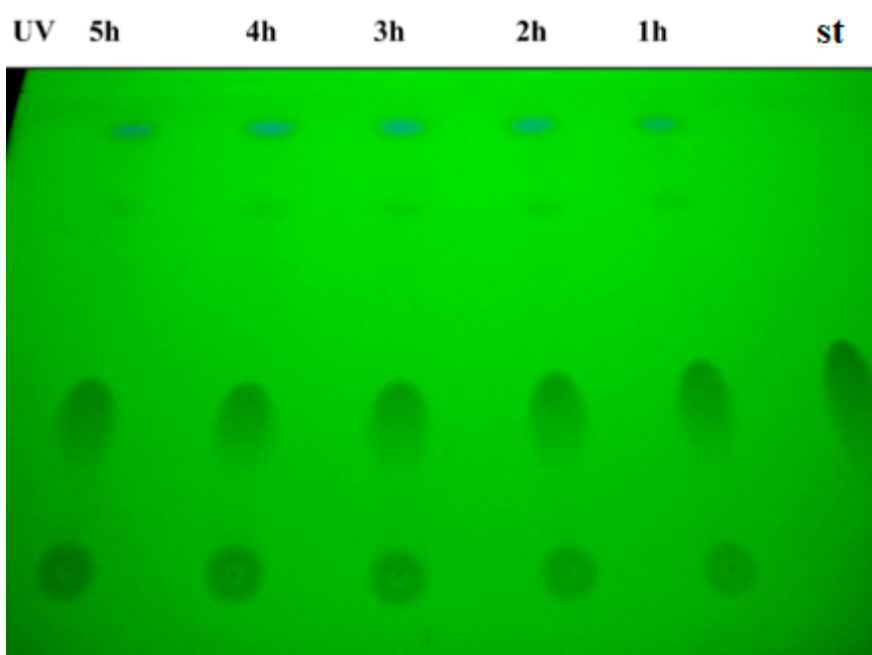


# Rapid TLC with Densitometry for Evaluation of Naproxen Stability

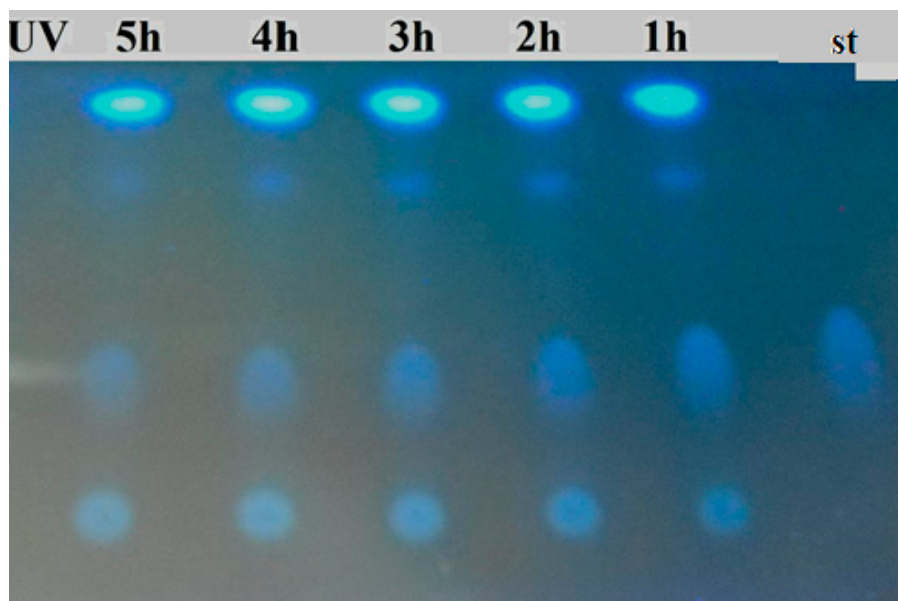
Wioletta Parys\*, Małgorzata Dołowy, Alina Pyka-Pająk

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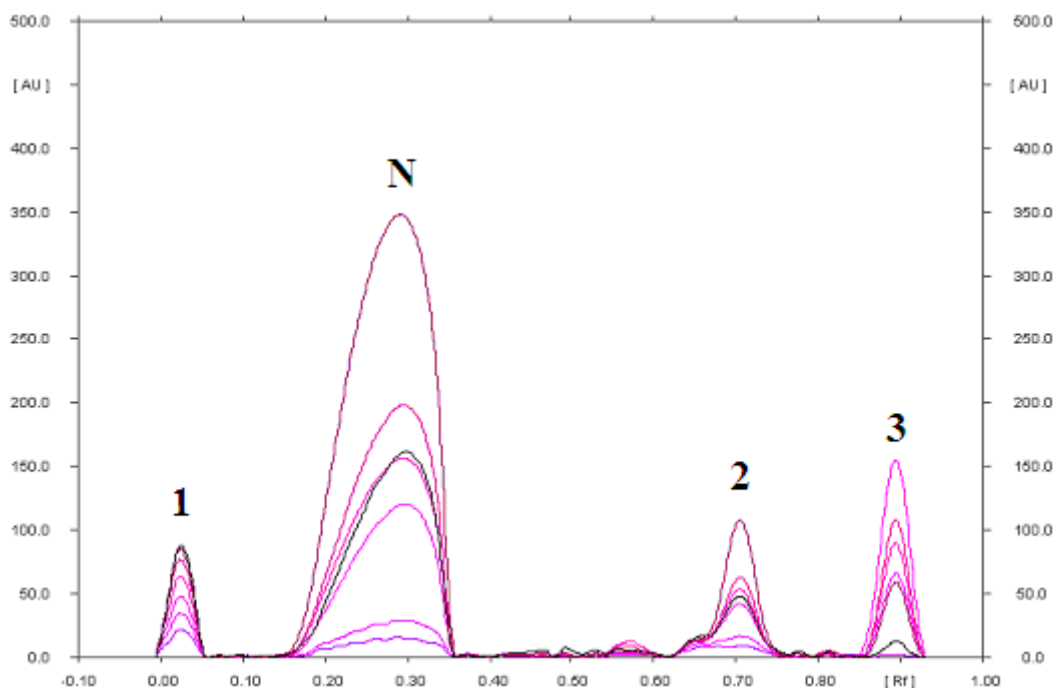
\* Correspondence: wparys@sum.edu.pl



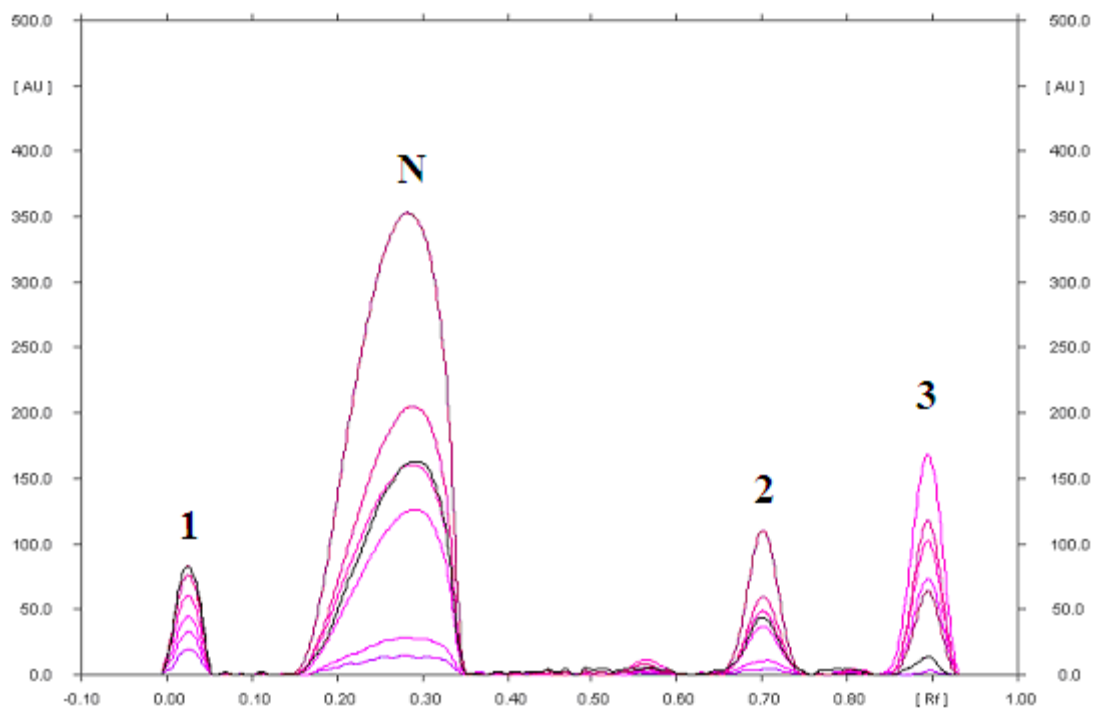
**Fig. S1.** Photograph of naproxen chromatogram that was irradiated with UV radiation at  $\lambda = 254$  nm on silica gel for a period of 1 h, 2 h, 3 h, 4 h, 5 h before developing the chromatographic plate (mobile phase A: TOL - ACE - CHL, 2:5:12 (v/v/v); photo taken at  $\lambda=254$  nm; where st – standard of naproxen (non-irradiated)



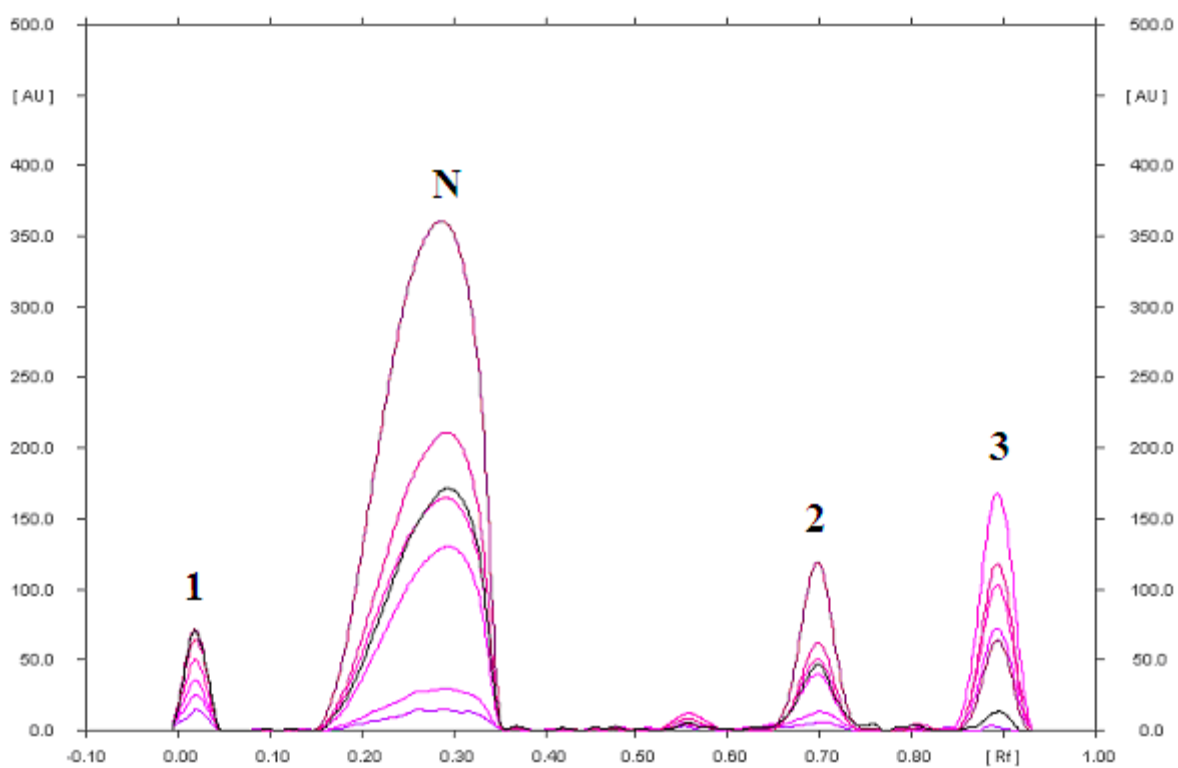
**Fig. S2.** Photograph of naproxen chromatogram that was irradiated with UV radiation at  $\lambda = 254$  nm on silica gel for a period of 1 h, 2 h, 3 h, 4 h, 5 h before developing the chromatographic plate (mobile phase A: TOL - ACE - CHL, 2:5:12 (v/v/v); photo taken under UV light at 366 nm); where st – standard of naproxen (non-irradiated)



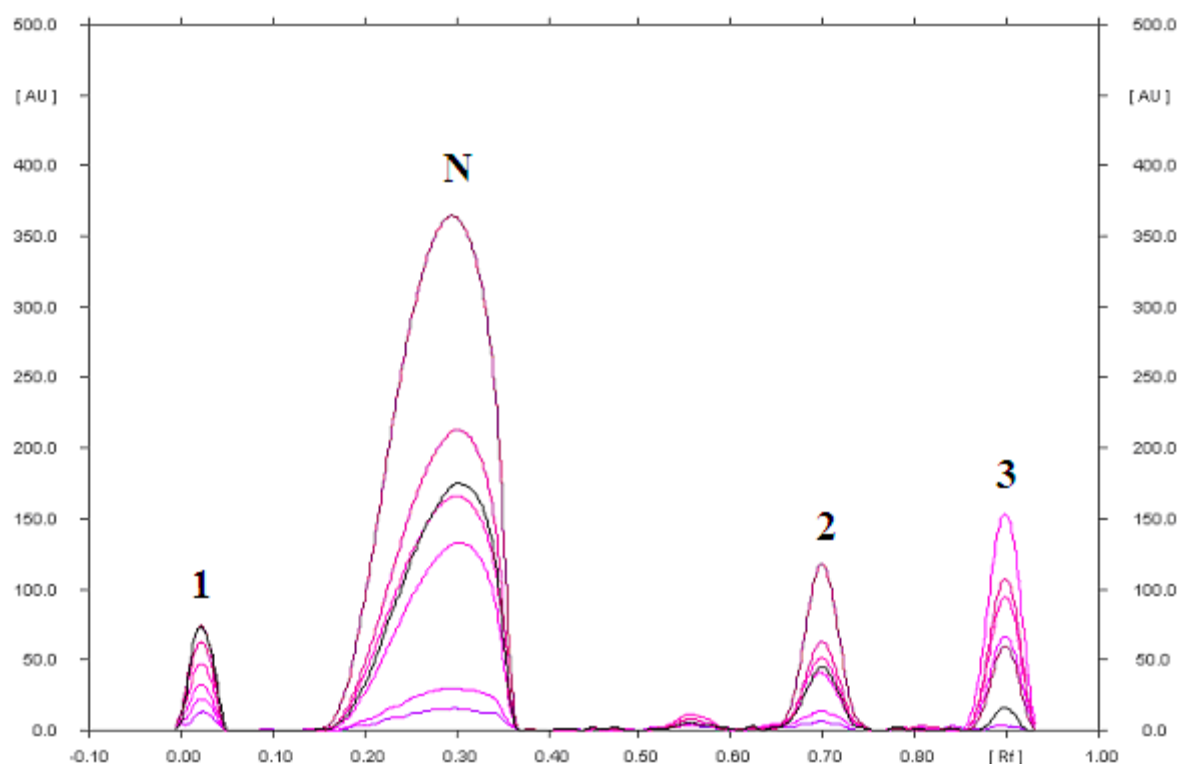
**Fig. S3.** Densitogram of naproxen irradiated on silica gel with UV radiation  $\lambda = 254$  nm for a period of 5 h (mobile phase A: TOL - ACE - CHL, 2:5:12 (v/v/v)).



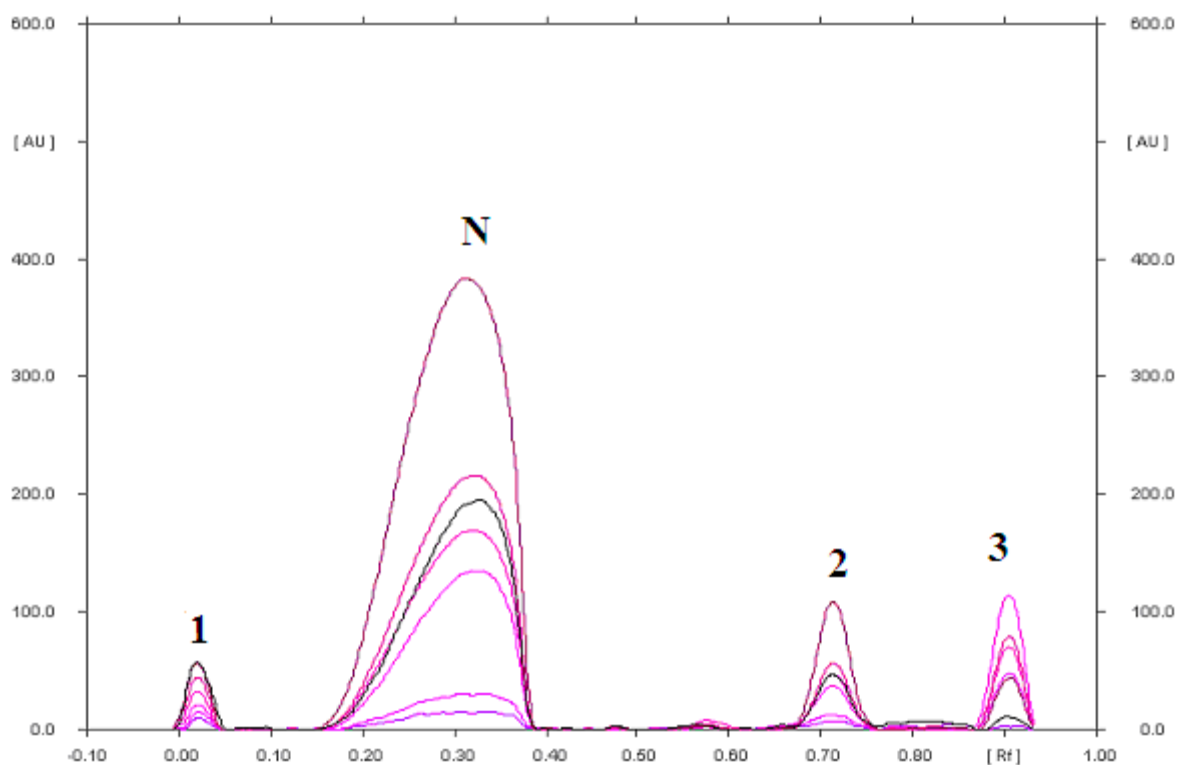
**Fig. S4.** Densitogram of naproxen irradiated on silica gel with UV radiation  $\lambda = 254$  nm for a period of 4 h (mobile phase A: TOL - ACE - CHL, 2:5:12 (v/v/v)).



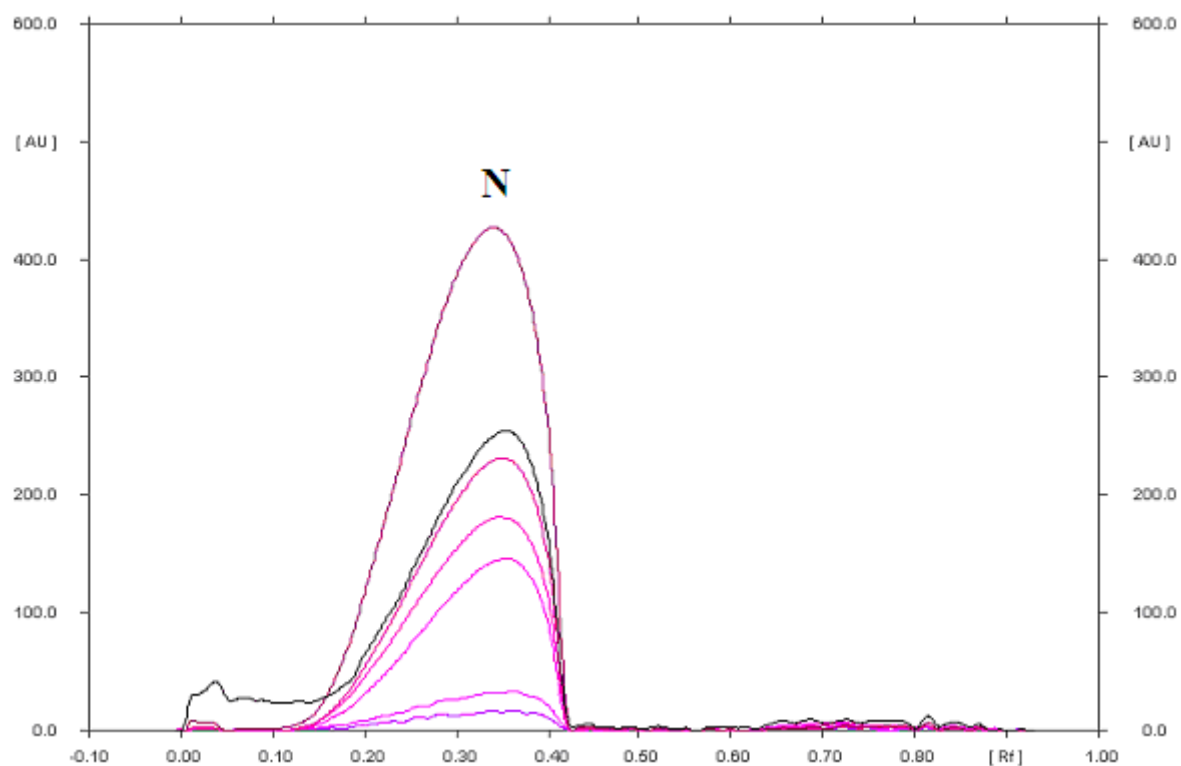
**Fig. S5.** Densitogram of naproxen irradiated on silica gel with UV radiation  $\lambda = 254$  nm for a period of 3 h (mobile phase A: TOL - ACE - CHL, 2:5:12 (v/v/v)).



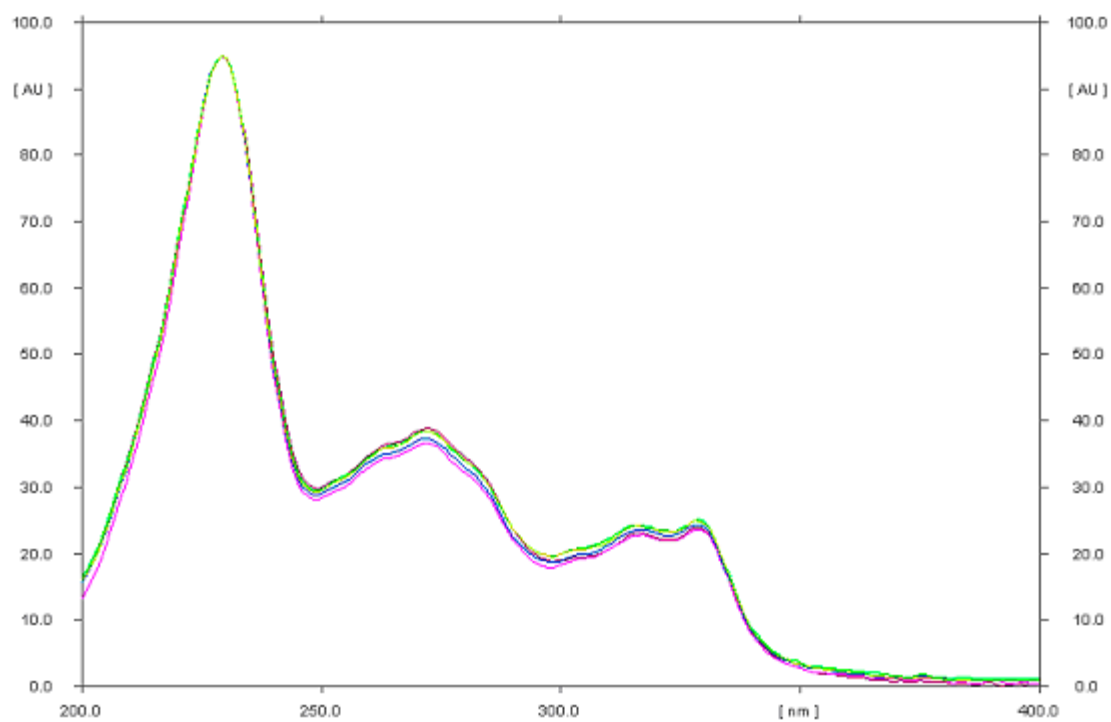
**Fig. S6.** Densitogram of naproxen irradiated on silica gel with UV radiation  $\lambda = 254$  nm for a period of 2 h (mobile phase A: TOL - ACE - CHL, 2:5:12 (v/v/v)).



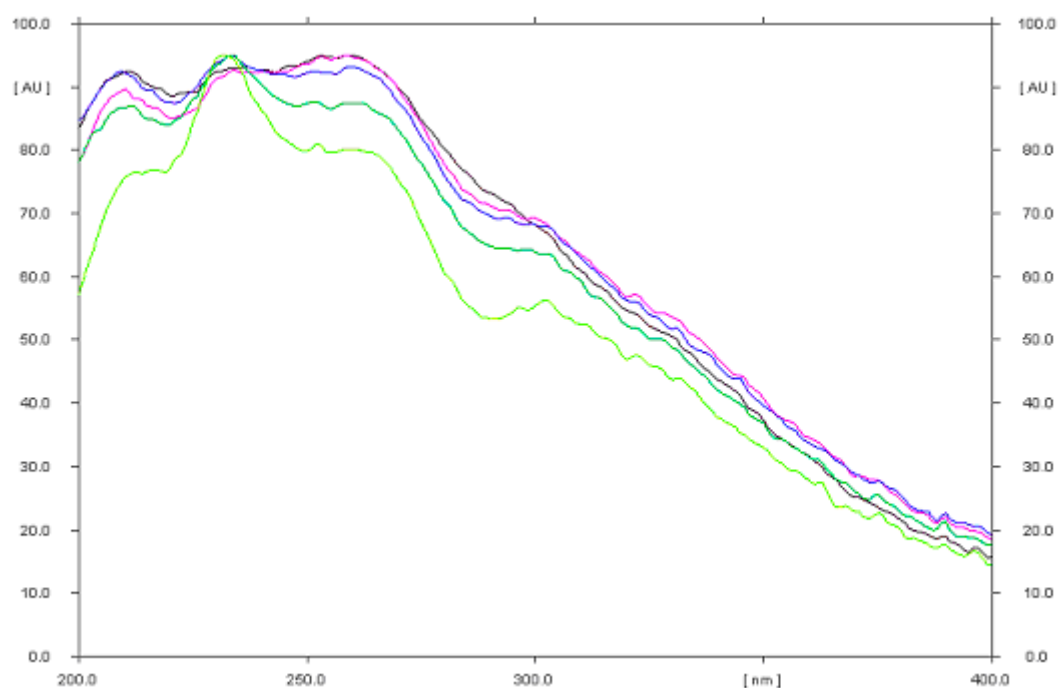
**Fig. S7.** Densitogram of naproxen irradiated on silica gel with UV radiation  $\lambda = 254$  nm for a period of 1 h (mobile phase A: TOL - ACE - CHL, 2:5:12 (v/v/v)).



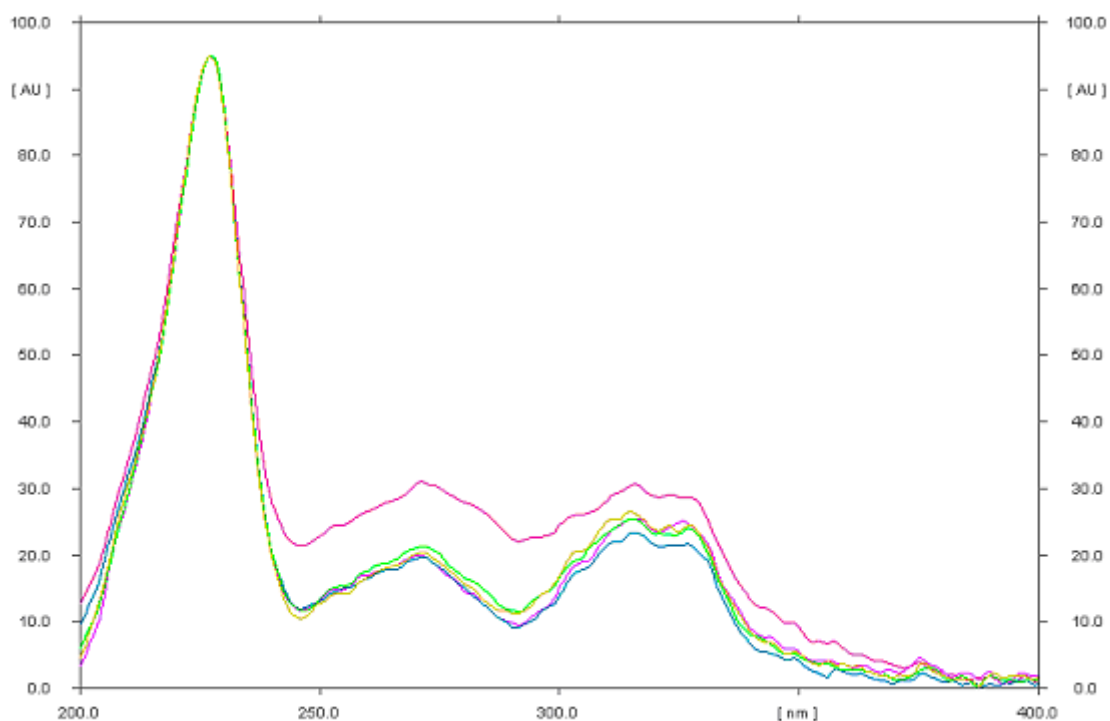
**Fig. S8.** Densitogram of naproxen (non-irradiated) standard (mobile phase A: TOL - ACE - CHL, 2:5:12 (v/v/v)).



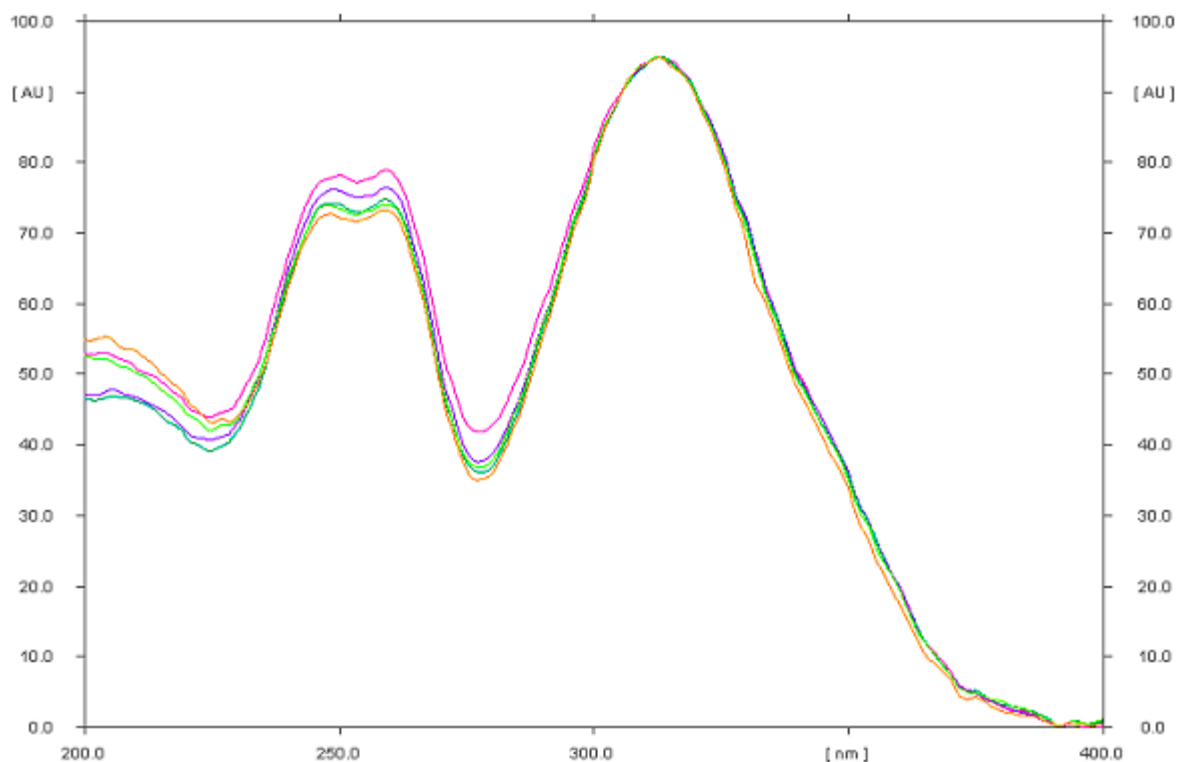
**Fig. S9.** Spectra of naproxen not exposed and irradiated with UV radiation at  $\lambda = 254$  nm for a period of 1 h to 5 h on silica gel (mobile phase A: TOL - ACE - CHL, 2:5:12 v/v/v)).



**Fig. S10.** Spectra of substance 1 with the value  $R_F = 0.02$  formed after irradiation with UV light at  $\lambda = 254$  nm naproxen on silica gel for 1 h, 2 h, 3 h, 4 h and 5 h (mobile phase A: TOL - ACE - CHL, 2:5:12 (v/v/v)).



**Fig. S11.** Spectra of substance 2 (naproxen ethyl ester) with the value  $R_F = 0.71$  formed after irradiation with UV light with  $\lambda = 254$  nm naproxen on silica gel for 1 h, 2 h, 3 h, 4 h and 5 h (mobile phase A: TOL - ACE - CHL, 2:5:12 (v/v/v)).



**Fig. S12.** Spectra of substance 3 with the value  $R_F = 0.89$  formed after irradiation with UV light with  $\lambda = 254$  nm naproxen on silica gel for 1 h, 2 h, 3 h, 4 h and 5 h (mobile phase A: TOL - ACE - CHL, 2:5:12 (v/v/v)).

**Table S1.**  $R_F$  values and chromatographic peak areas of naproxen and its chemical transformation products under the influence of UV light (254 nm) on silica gel, after separation using a mobile phase A: TOL - ACE - CHL (2:5:12, v/v/v).

Exposure time of naproxen on silica gel	Substance <sup>a)</sup>	$R_F$	Chromatographic peak area [AU] <sup>b)</sup>	% of band area
0 h	N	0.29	49298	100
1 h	N	0.29	36946	83.47
	S1	0.02	842	1.90
	S2	0.71	3290	7.43
	S3	0.89	3187	7.20
2 h	N	0.29	32965	77.18
	S1	0.02	1206	2.82
	S2	0.70	3814	8.93
	S3	0.89	4725	11.07
3 h	N	0.29	31668	75.92
	S1	0.02	907	2.17
	S2	0.70	3765	9.03
	S3	0.89	5373	12.88

4 h	N	0.29	30892	75.39
	S1	0.02	1278	3.12
	S2	0.71	3533	8.62
	S3	0.90	5274	12.87
5 h	N	0.29	31257	76.36
	S1	0.02	1160	2.82
	S2	0.71	3855	9.42
	S3	0.90	4666	11.39

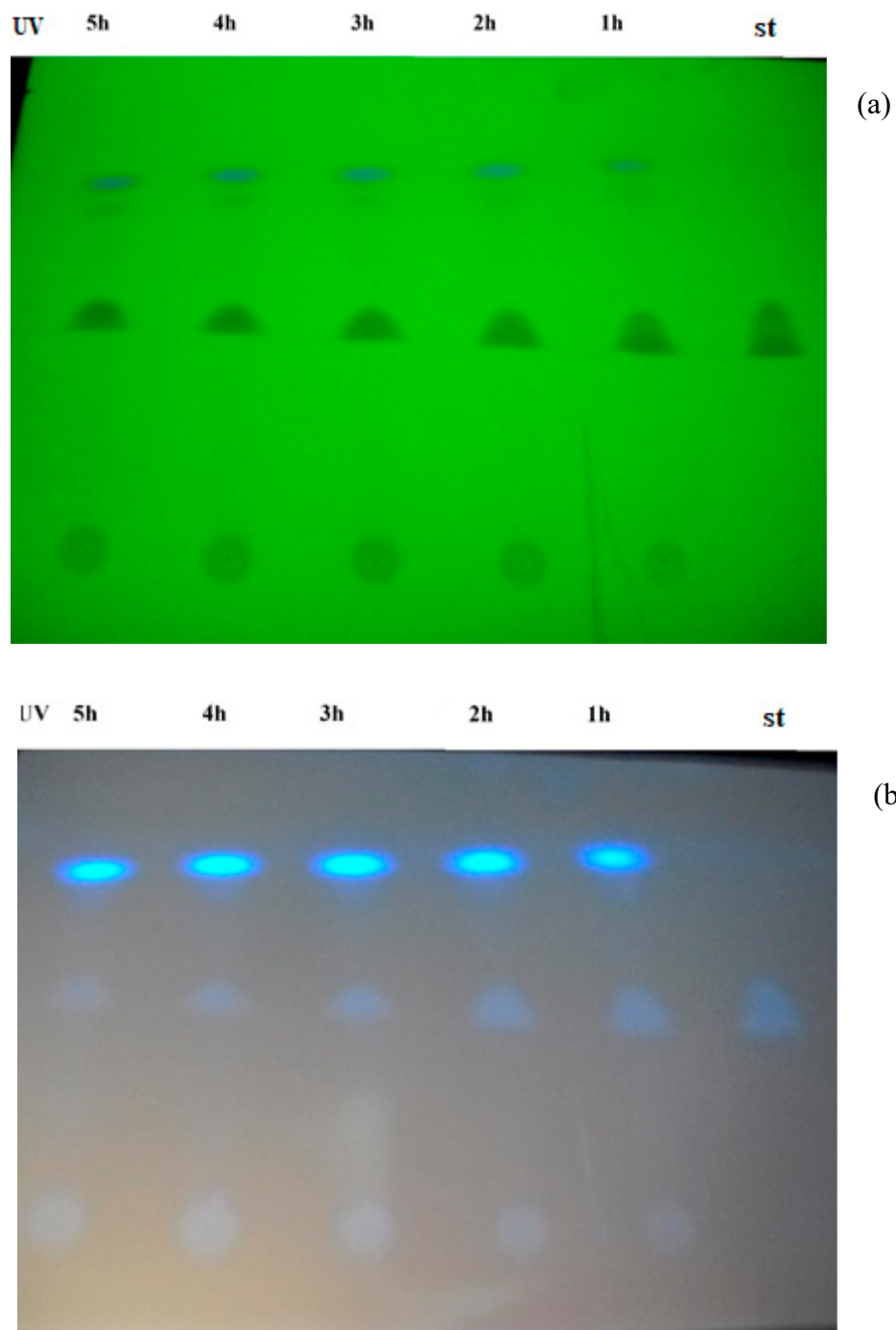
where:

<sup>a)</sup> N - naproxen

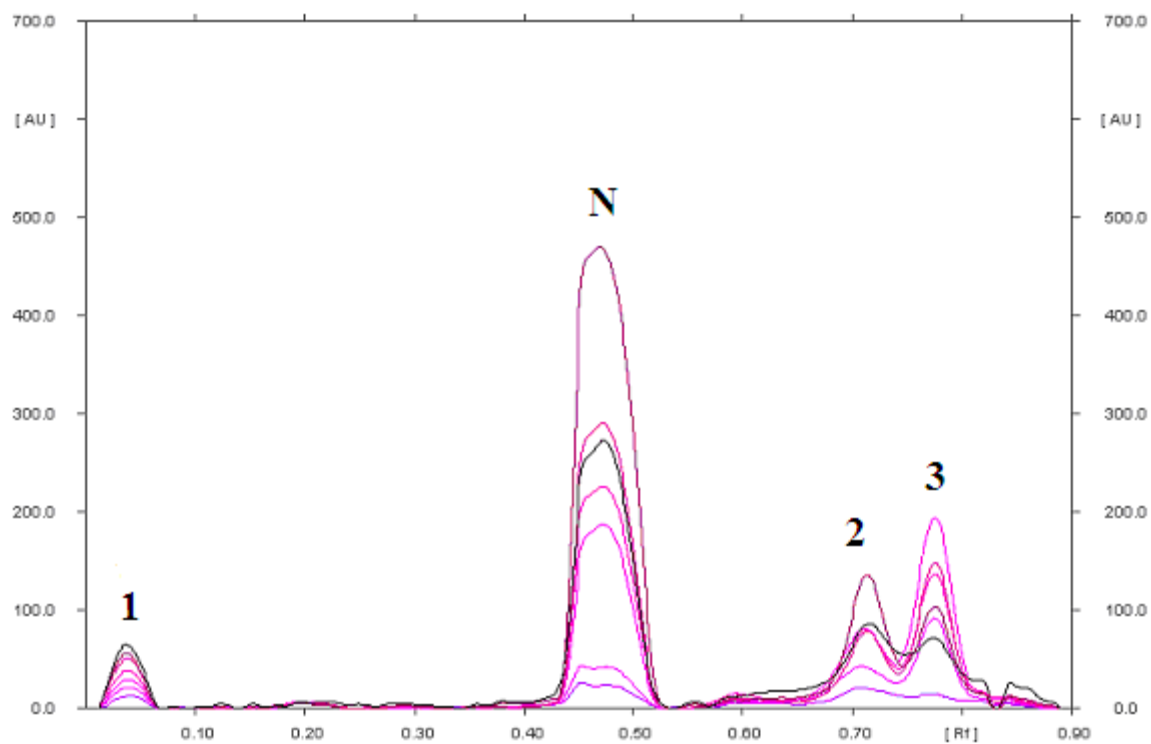
S1, S2, S3 - products of chemical transformation of naproxen; and S2 was identified as naproxen ethyl ester

<sup>b)</sup> Area of the chromatographic band at  $\lambda_{\max}$

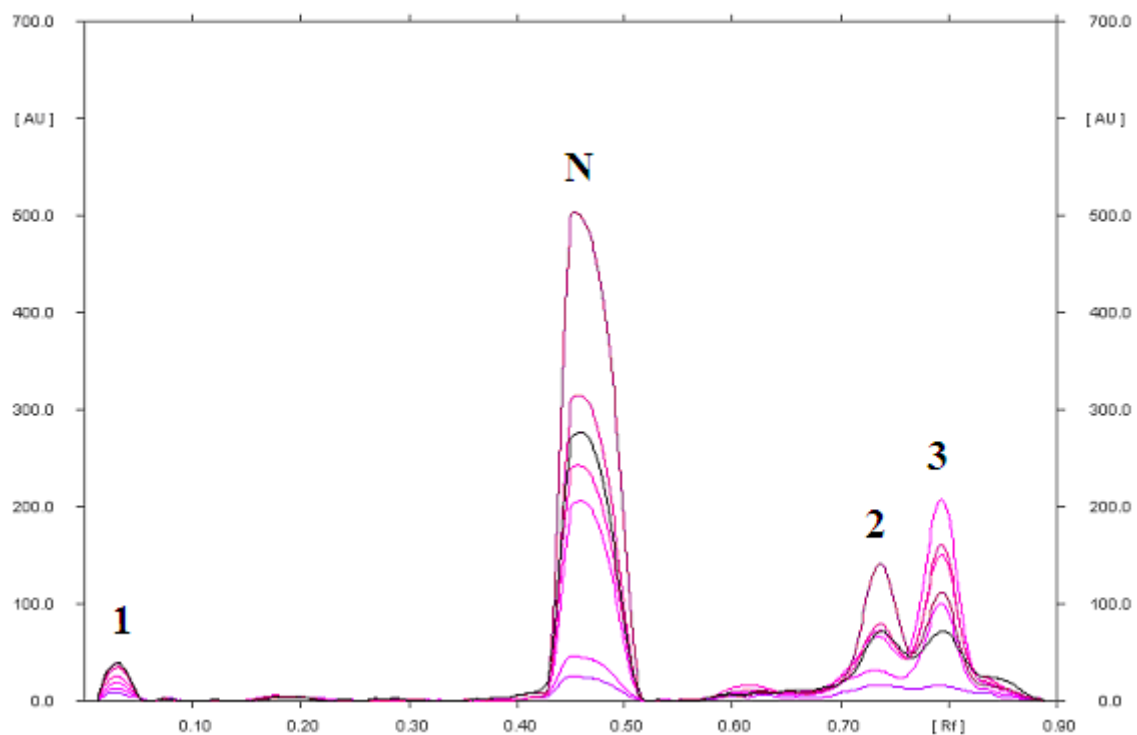




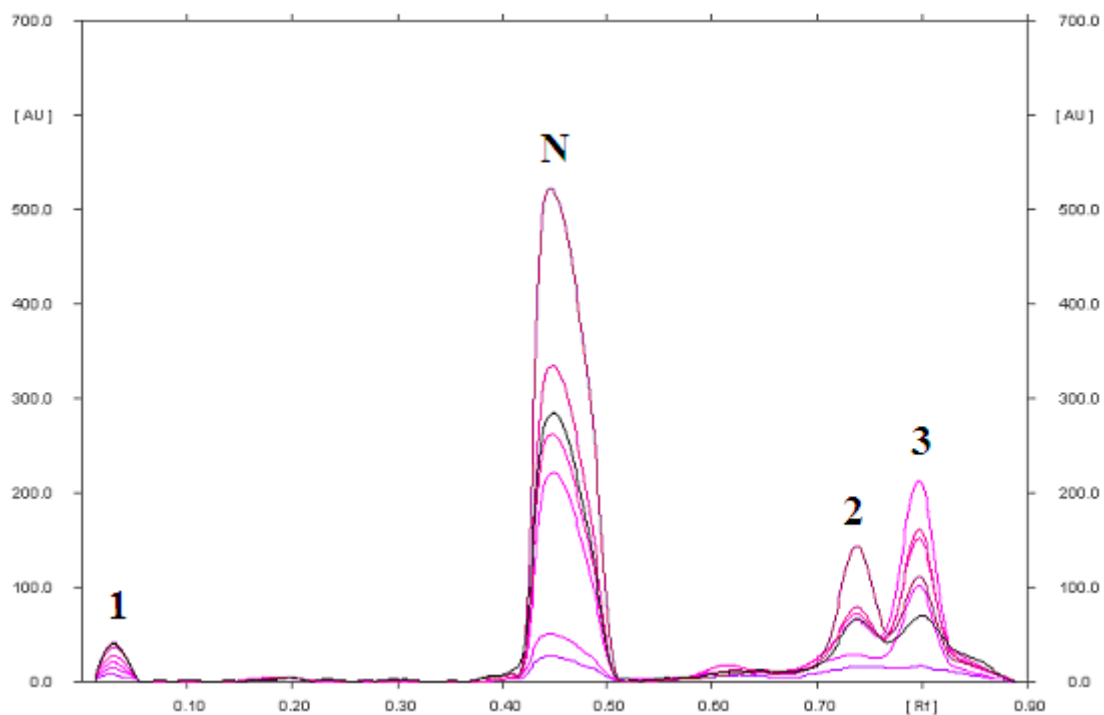
**Fig S13.** Photographs of chromatograms of naproxen that was irradiated with UV light ( 254 nm) on silica gel for 1 h, 2 h, 3 h, 4 h, 5 h before developing the chromatographic plate (mobile phase B: AcOH - Hex - ACE, 0.10:10:10, (v/v/v); photos taken under UV light at (a) 254 nm and (b) 366 nm); where st – standard of naproxen (non-irradiated)



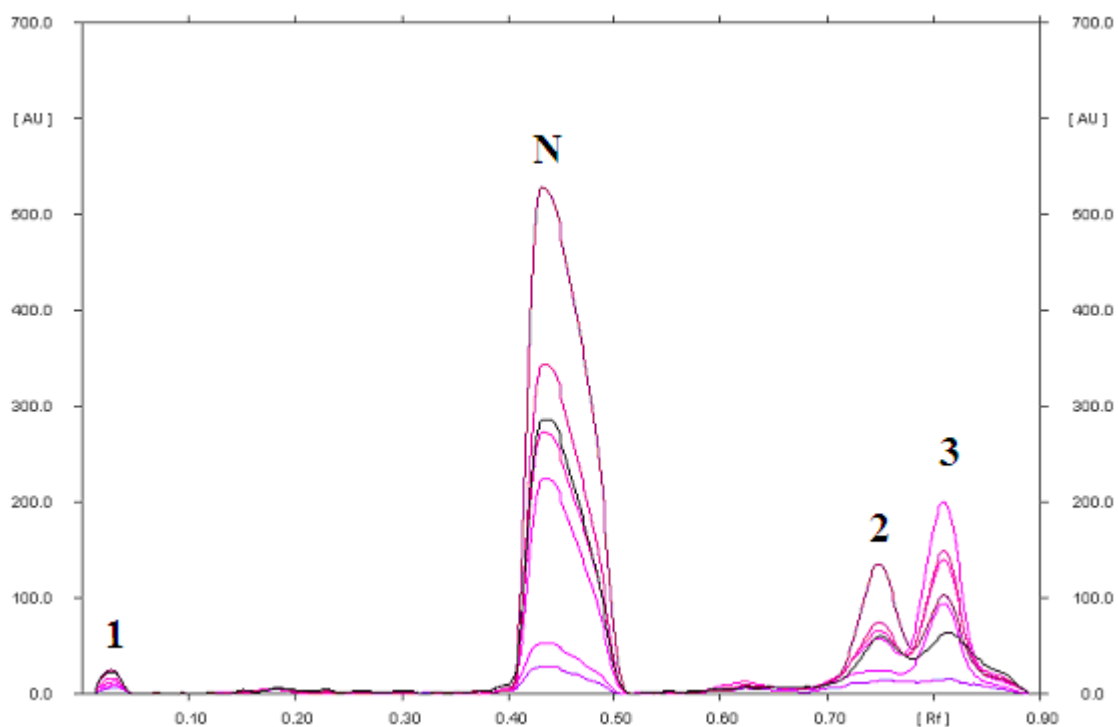
**Fig. S14.** Densitogram of naproxen irradiated on silica gel with UV light (254 nm) for a period of 5 h (mobile phase B: AcOH - Hex - ACE, 0.10:10:10 (v/v/v)).



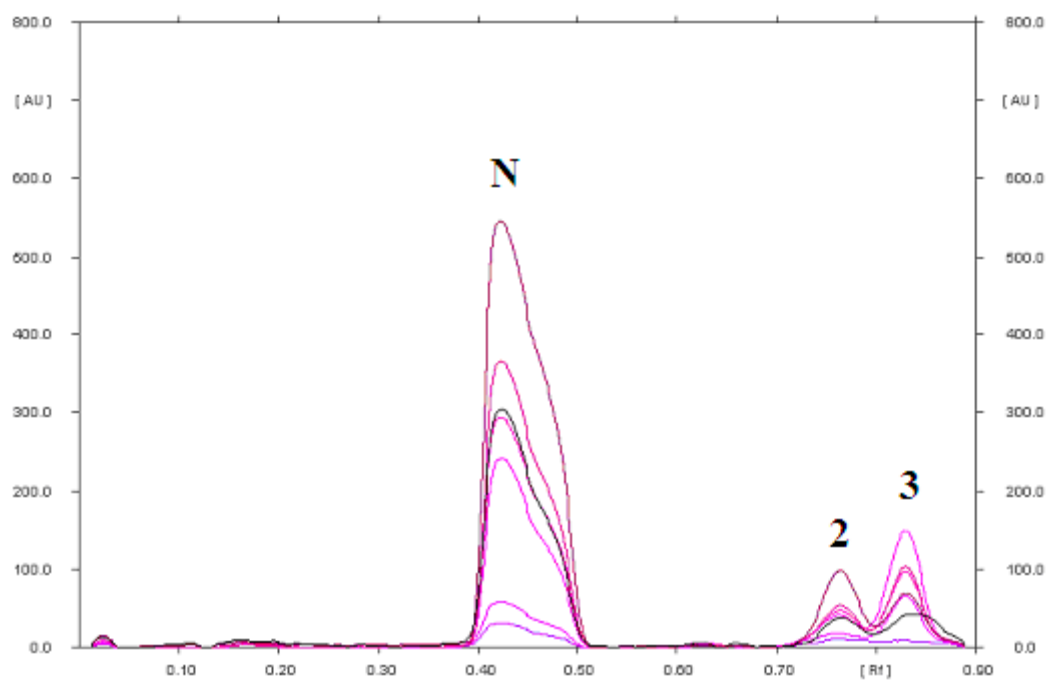
**Fig. S15.** Densitogram of naproxen irradiated on silica gel with UV light ( $\lambda = 254$  nm) for a period of 4 h (mobile phase B: AcOH - Hex - ACE, 0.10:10:10 (v/v/v)).



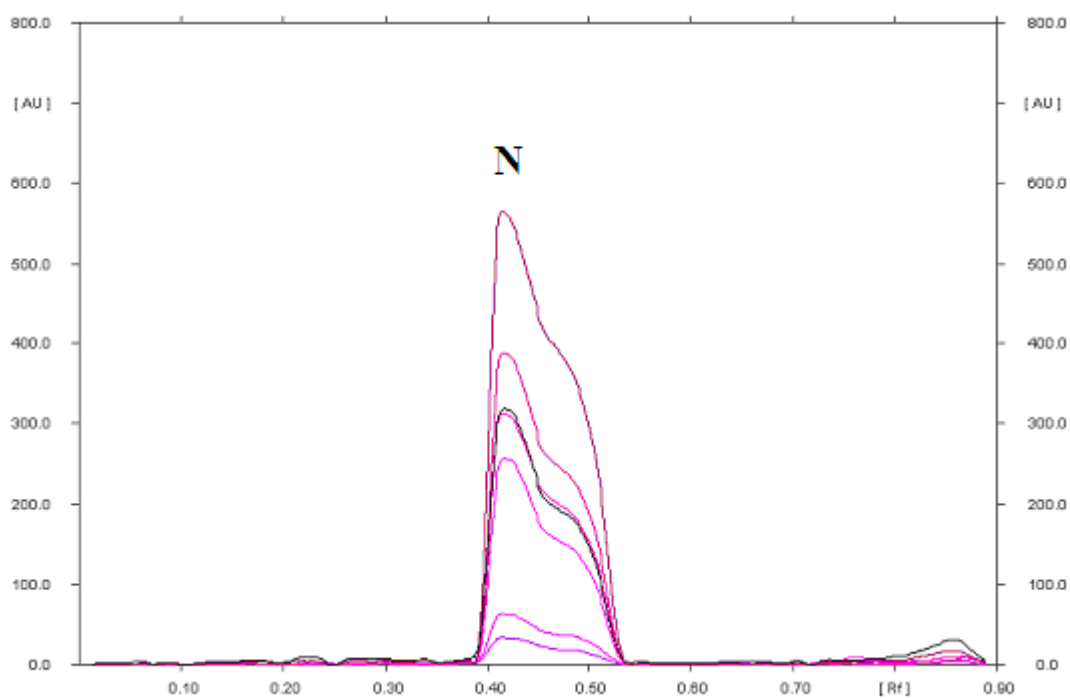
**Fig. S16.** Densitogram of naproxen irradiated on silica gel with UV light ( $\lambda = 254$  nm) for a period of 3 h (mobile phase B: AcOH - Hex - ACE, 0.10:10:10 (v/v/v)).



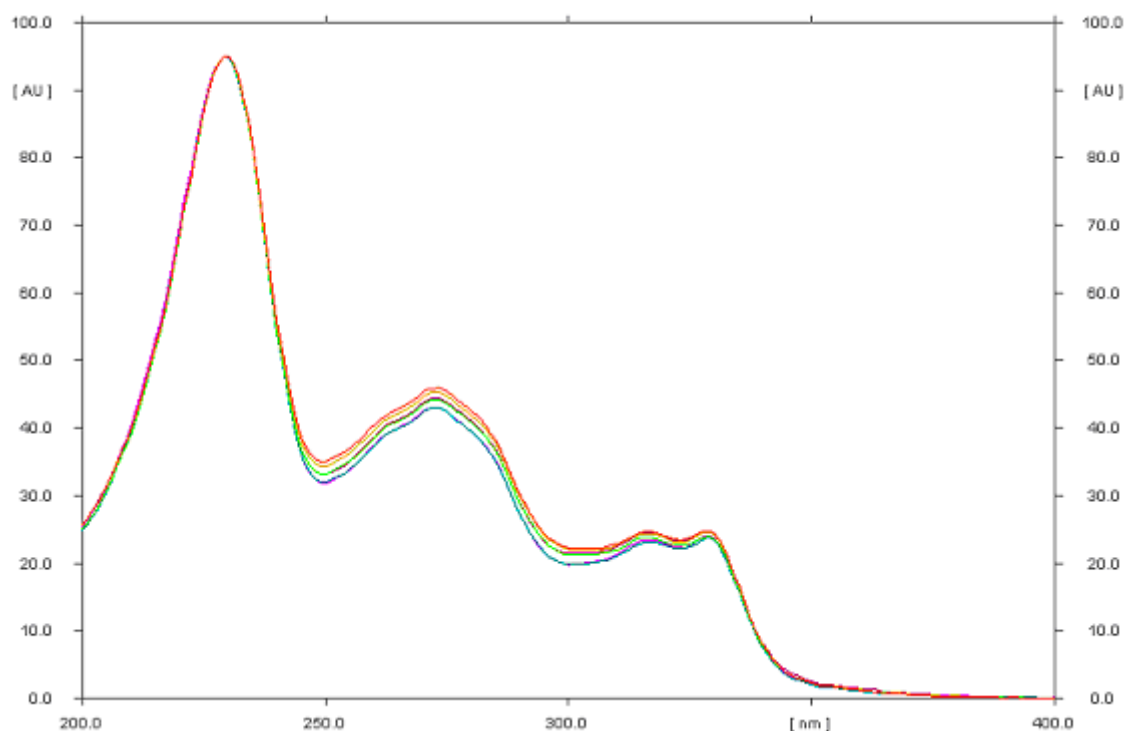
**Fig. S17.** Densitogram of naproxen irradiated on silica gel with UV light ( $\lambda = 254$  nm) for a period of 2 h (mobile phase B: AcOH - Hex - ACE, 0.10:10:10 (v/v/v)).



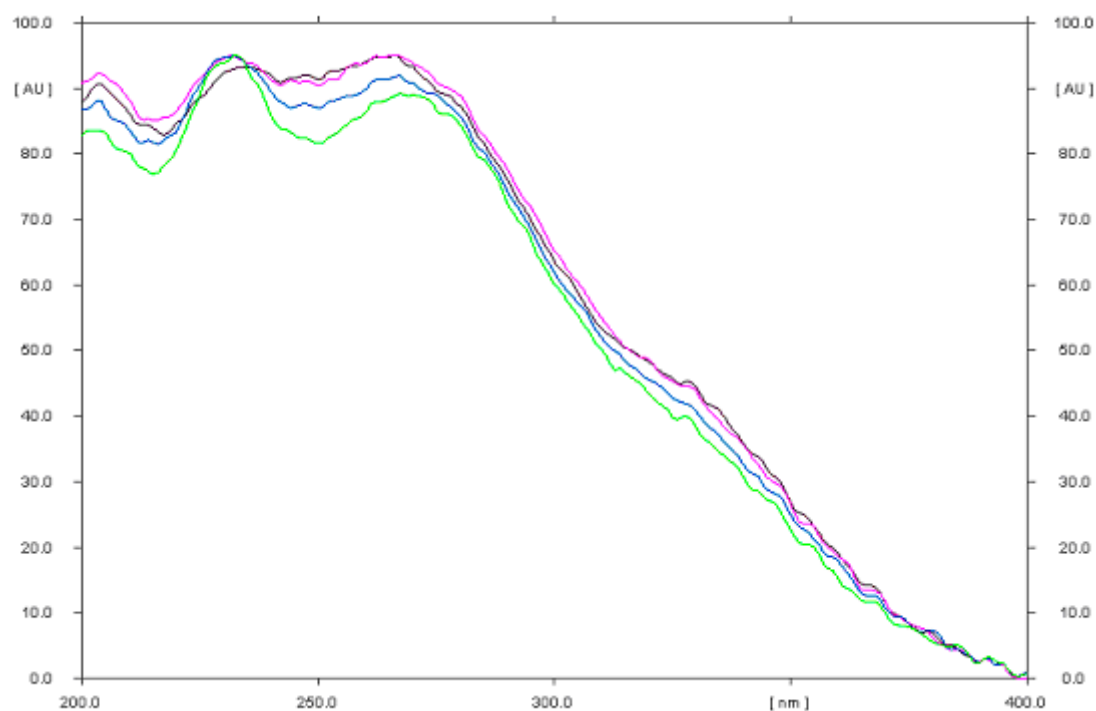
**Fig. S18.** Densitogram of naproxen irradiated on silica gel with UV light ( $\lambda = 254$  nm) for a period of 1 h (mobile phase B: AcOH - Hex - ACE, 0.10:10:10 (v/v/v)).



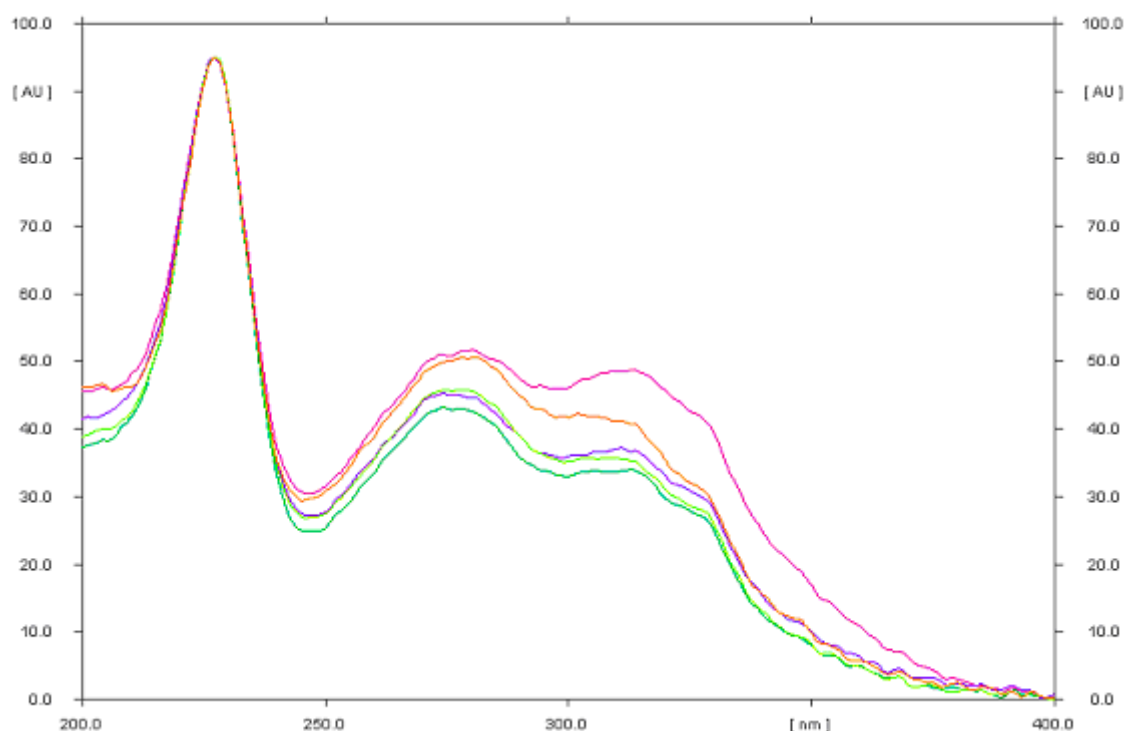
**Fig. S19.** Densitogram of naproxen standard (non-irradiated) (mobile phase B: AcOH - Hex - ACE, 0.10:10:10 (v/v/v)).



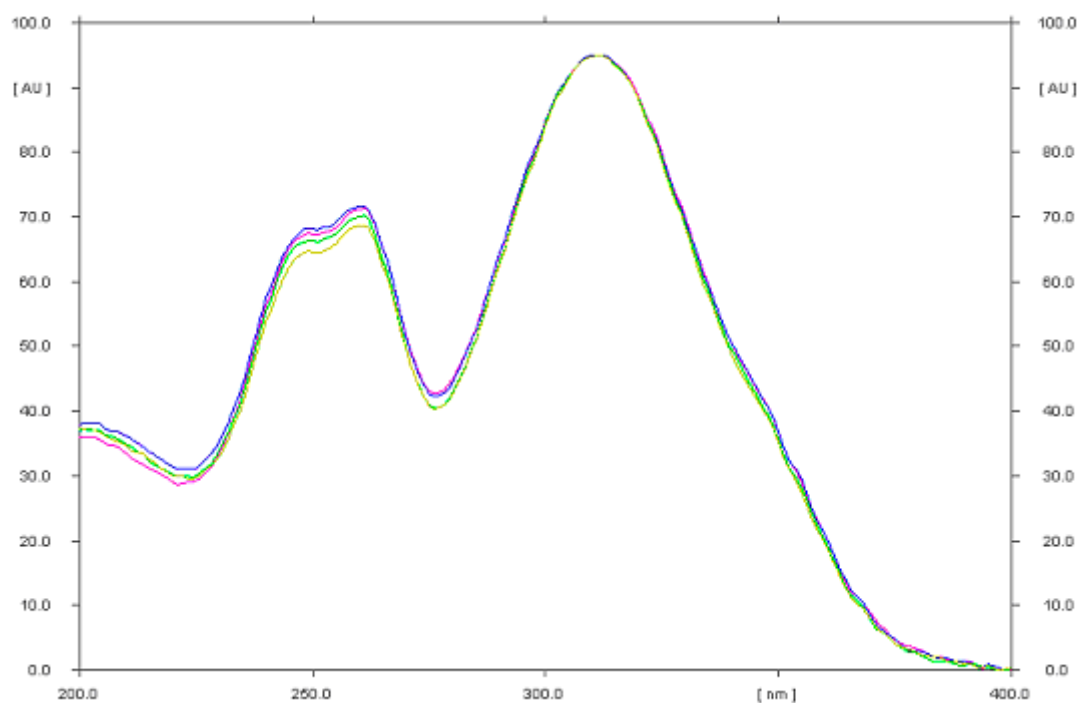
**Fig. S20.** The spectra of naproxen not exposed and irradiated with UV radiation at  $\lambda = 254$  nm for a period of 1 h to 5 h on silica gel (mobile phase B: AcOH - Hex - ACE, 0.10:10:10 (v/v/v)).



**Fig. S21.** The spectra of substance 1 with  $R_F = 0.03$  formed after UV irradiation with  $\lambda = 254$  nm naproxen on silica gel for 2 h, 3 h, 4 h and 5 h (mobile phase B: AcOH - Hex - ACE, 0.10:10:10 (v/v/v)).



**Fig. S22.** Spectra of substance 2 with  $R_F = 0.74$  formed after UV irradiation with  $\lambda = 254$  nm naproxen on silica gel for 2 h, 3 h, 4 h and 5 h (mobile phase B: AcOH - Hex - ACE, 0.10:10:10 (v/v/v)).



**Fig. S23.** Spectra of substance 3 with  $R_F = 0.79$  formed after UV irradiation with  $\lambda = 254$  nm naproxen on silica gel for 2 h, 3 h, 4 h and 5 h (mobile phase B: AcOH - Hex - ACE, 0.10:10:10 (v/v/v)).

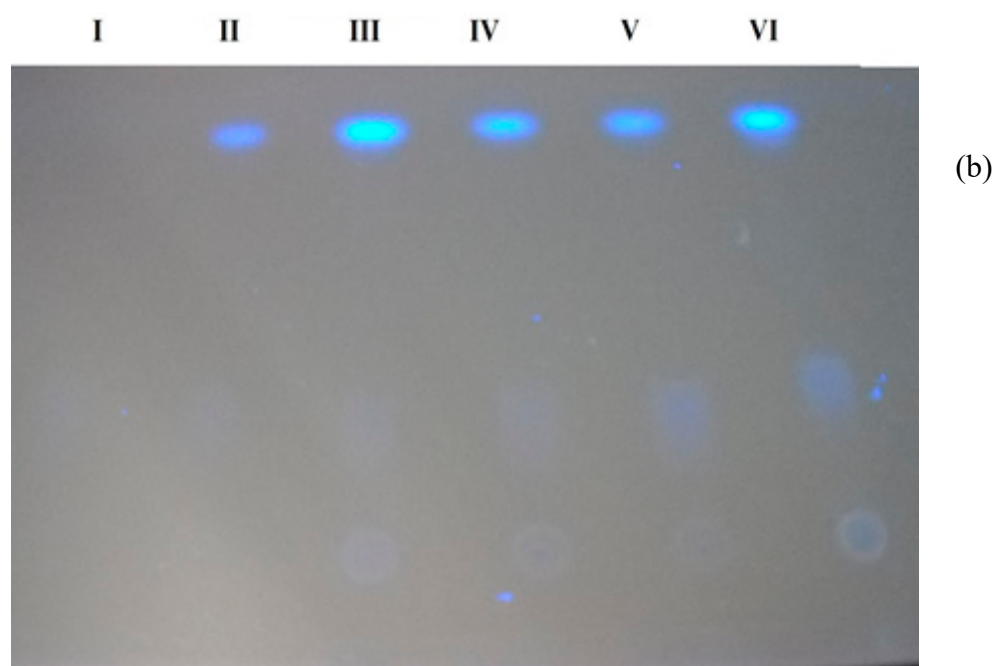
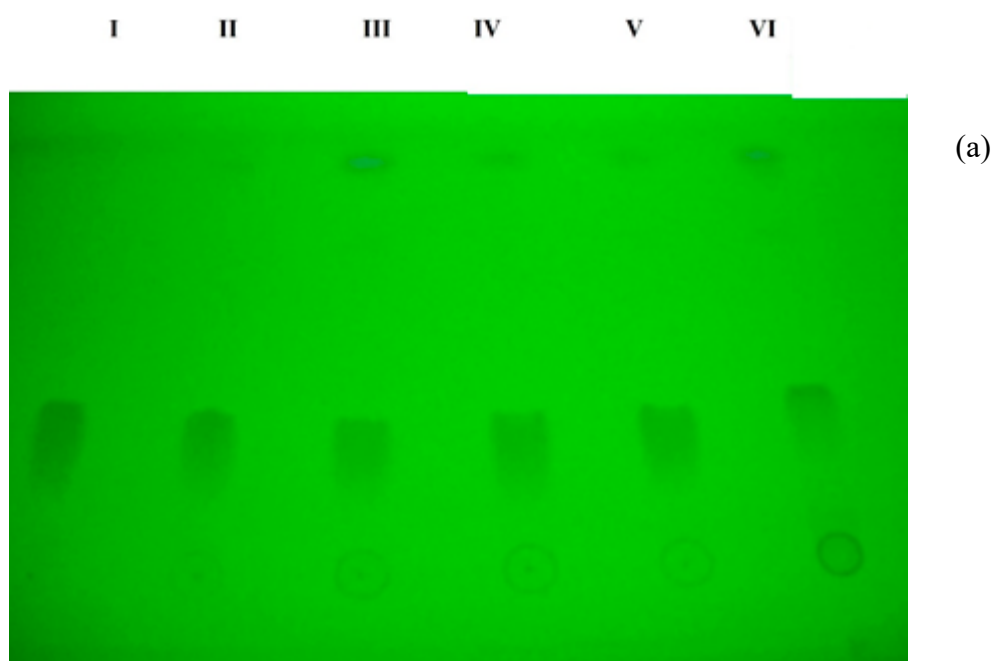
**Table S2.**  $R_F$  values and of chromatographic peak areas of naproxen and its chemical transformation products under the influence of UV light with (254 nm) on silica gel, after separation using a mobile phase B: AcOH - Hex - ACE, 0.10:10:10 (v/v/v).

Exposure time of naproxen on silica gel	Substance <sup>a)</sup>	$R_F$	Chromatographic peak area [AU] <sup>b)</sup>	% of band area
0 h	N	0.44	37896	100
1 h	N	0.45	28703	90.52
	S1	—	—	—
	S2	0.75	2337	7.37
	S3	0.78	670	2.11
2 h	N	0.45	25327	83.60
	S1	0.03	354	1.17
	S2	0.74	2774	9.16
	S3	0.81	1839	6.07
3 h	N	0.46	22429	71.78
	S1	0.03	748	2.40
	S2	0.74	3660	11.71
	S3	0.80	4409	14.11
4 h	N	0.46	20843	69.65
	S1	0.03	615	2.05
	S2	0.74	3662	12.24
	S3	0.79	4806	16.06
5 h	N	0.47	20640	65.53
	S1	0.04	1223	3.88
	S2	0.71	4216	13.39
	S3	0.78	5416	17.20

<sup>a)</sup> N - naproxen

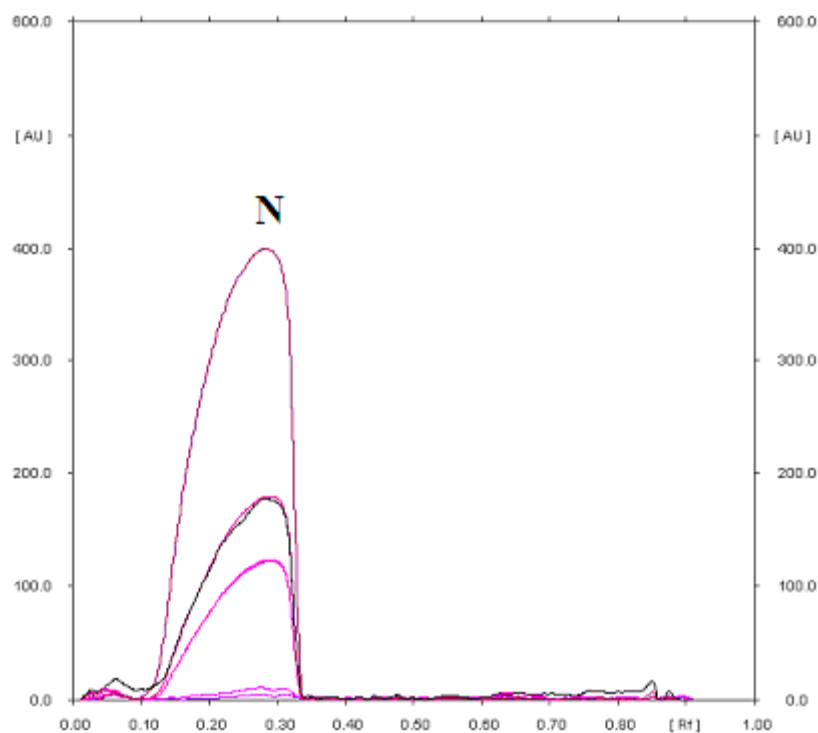
S1, S2, S3 - products of chemical transformation of naproxen; and S2 was identified as naproxen ethyl ester

<sup>b)</sup> Area of the chromatographic band at  $\lambda_{\max}$

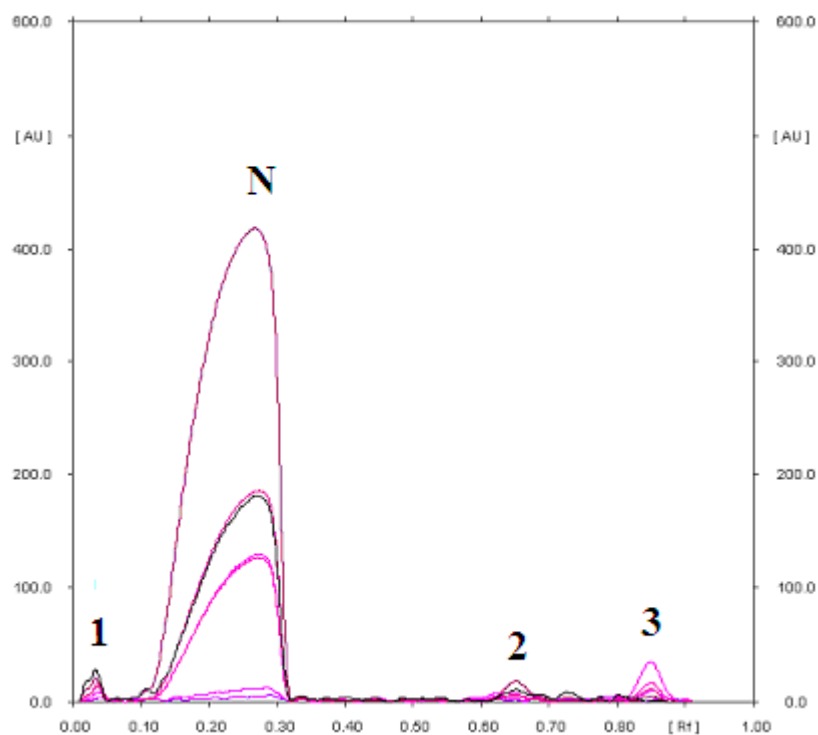


**Fig. S24.** Photographs of chromatograms, naproxen not exposed (I) and naproxen in solutions II, III, IV, V and VI irradiated for 5 h with UV radiation at  $\lambda = 254$  nm taken in UV light at 254 nm (a) and 366 nm (b), after separation using a mobile phase A : TOL - ACE - CHL, 2:5:12 (v/v/v).

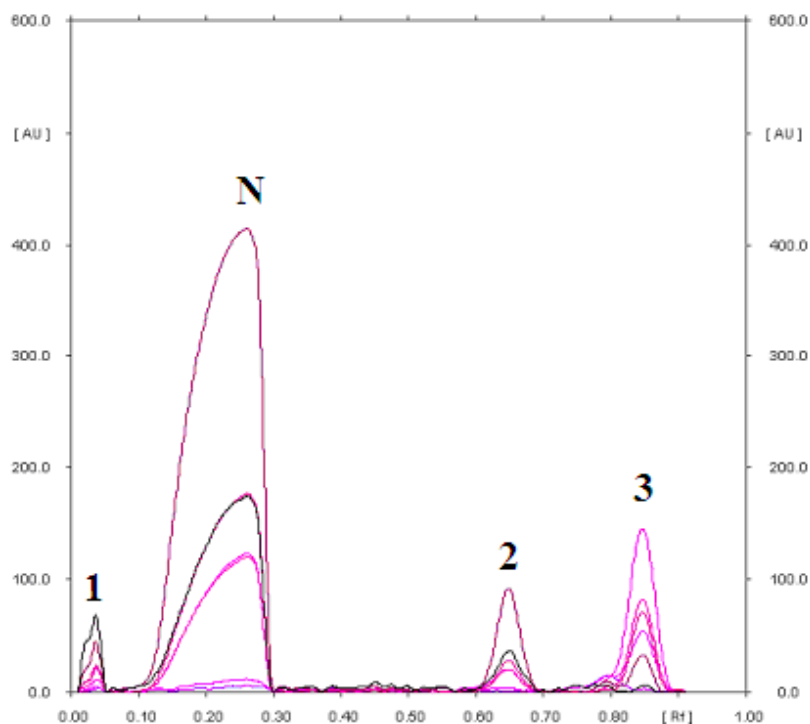




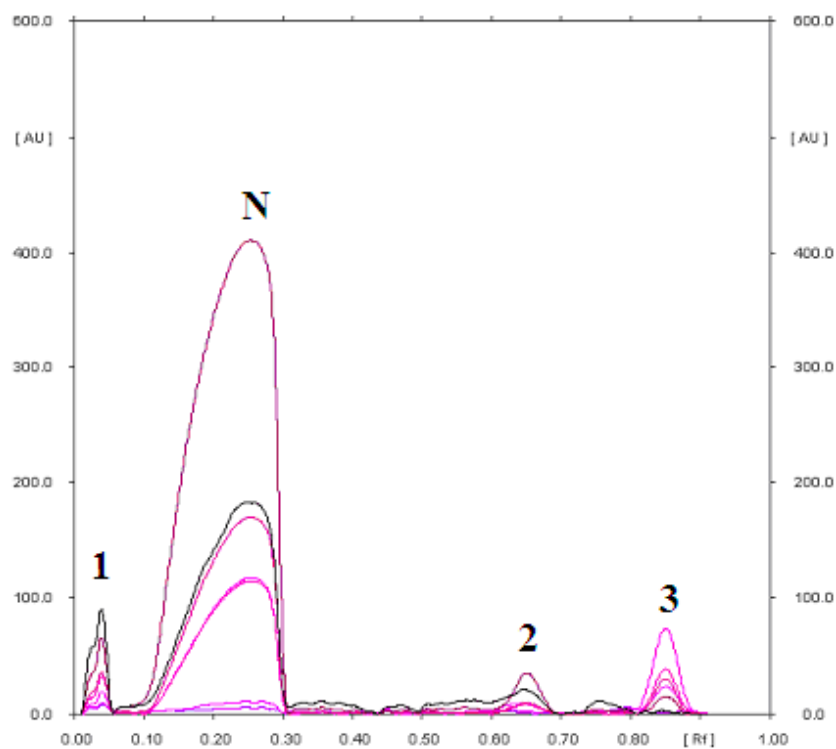
**Fig. S25.** Densitogram of naproxen standard (not exposed to UV) developed using mobile phase A: TOL - ACE - CHL (2:5:12, v/v/v).



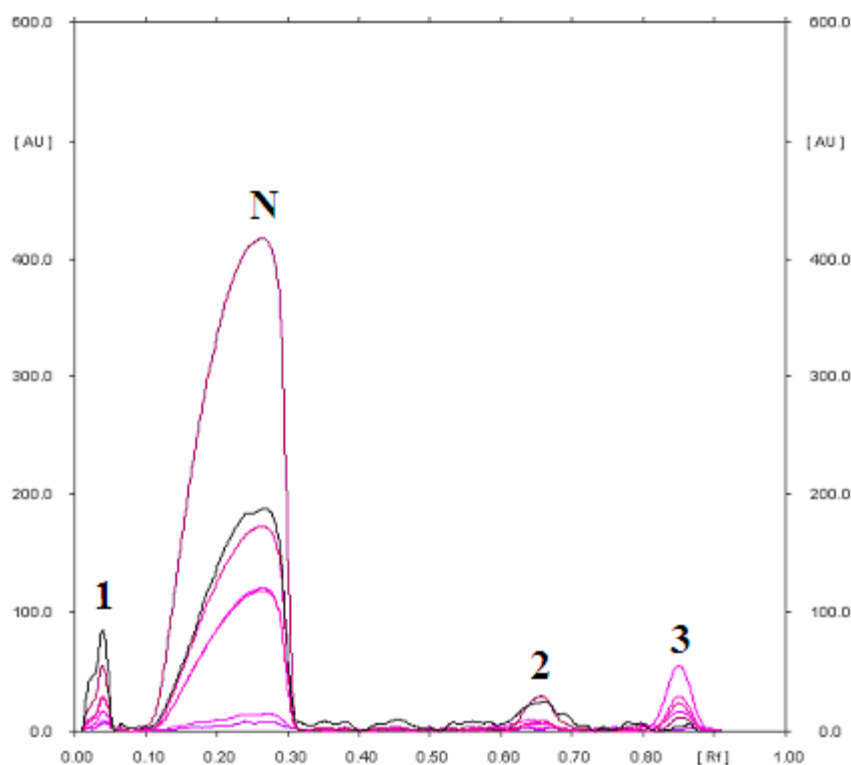
**Fig. S26.** Densitogram of naproxen (N) in solution of physiological salt (II), which was irradiated to UV light (254 nm) for 5h (mobile phase A: TOL-ACE-CHL; 2:5:12, v/v/v); 1, 2, 3 – degradation products of naproxen; and 2 was identified as naproxen ethyl ester.



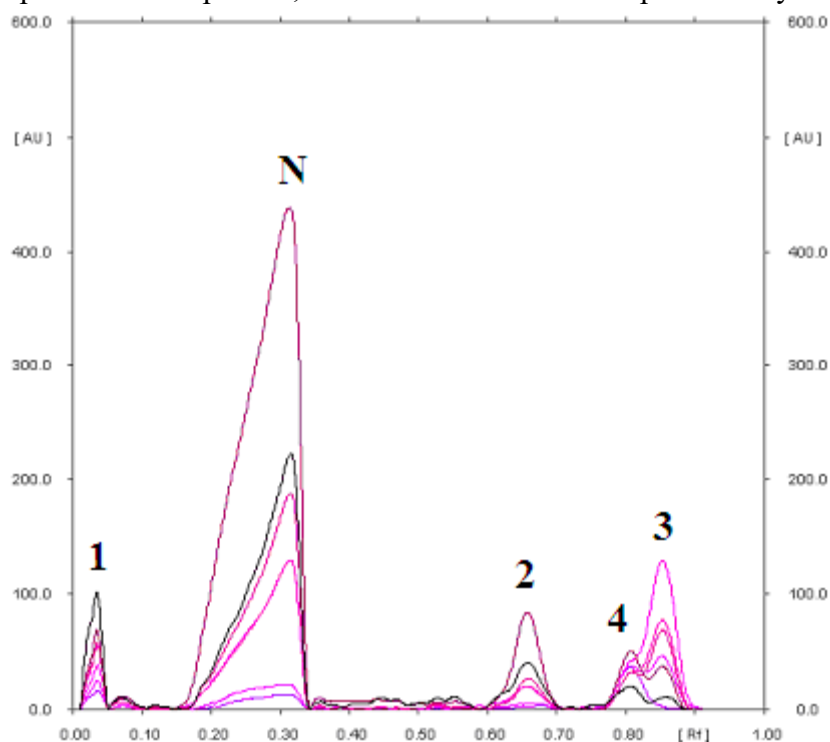
**Fig. S27.** Densitogram of naproxen (N) in solution of water at pH≈2.60 (III), which was irradiated to UV light (254 nm) for 5h (mobile phase A: TOL-ACE-CHL; 2:5:12, v/v/v); 1, 2, 3 – degradation products of naproxen; and 2 was identified as naproxen ethyl ester.



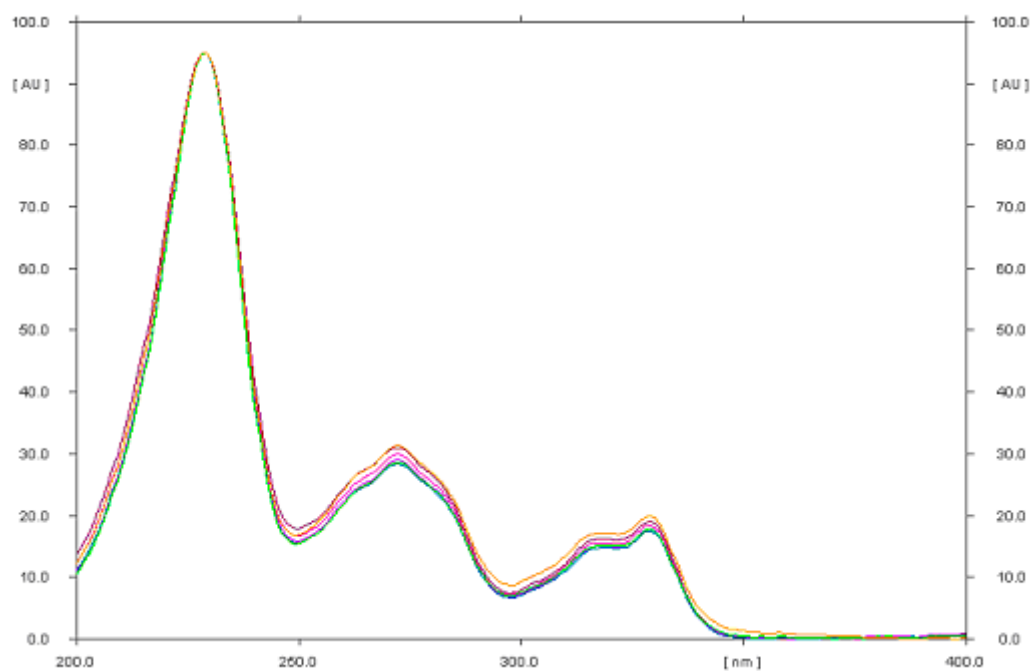
**Fig. S28.** Densitogram of naproxen (N) in solution of water at pH≈5.70 (IV), which was irradiated to UV light (254 nm) for 5h (mobile phase A: TOL-ACE-CHL; 2:5:12, v/v/v); 1, 2, 3 – degradation products of naproxen; and 2 was identified as naproxen ethyl ester.



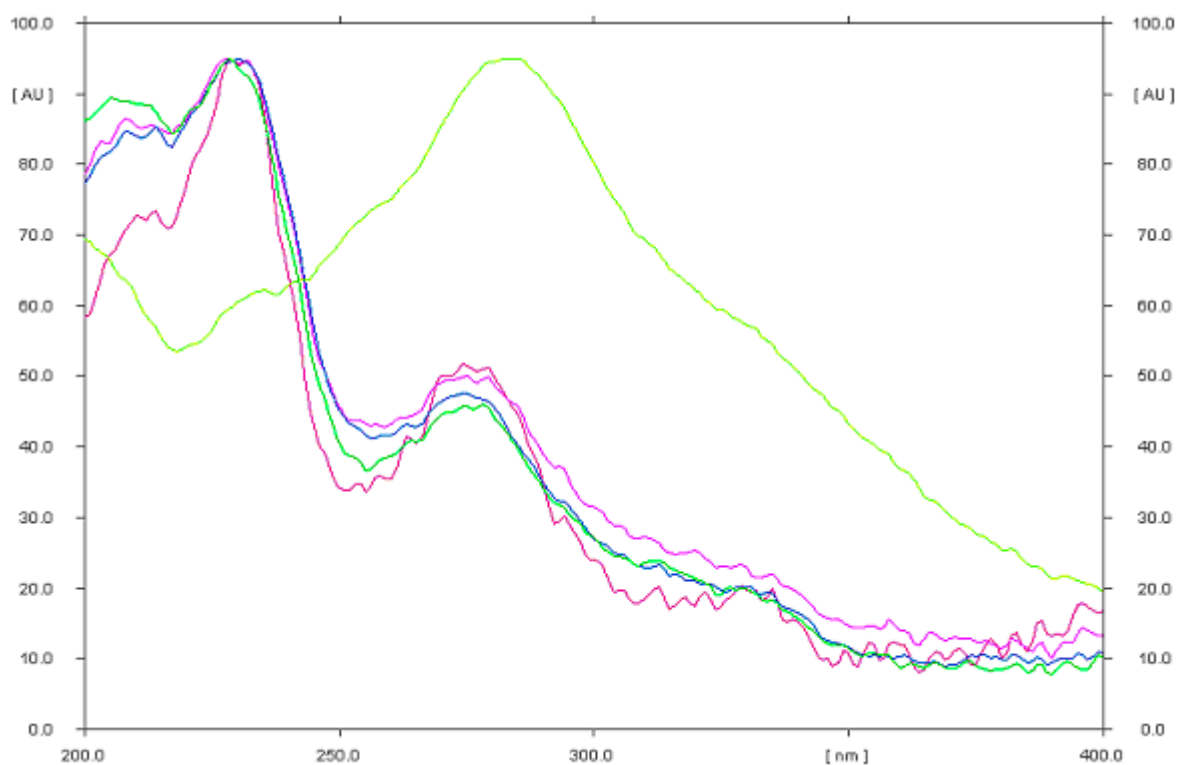
**Fig. S29.** Densitogram of naproxen (N) in solution of water at pH≈8.50 (V) which was irradiated to UV light (254 nm) for 5h (mobile phase A: TOL-ACE-CHL; 2:5:12, v/v/v); 1, 2, 3 – degradation products of naproxen; and 2 was identified as naproxen ethyl ester.



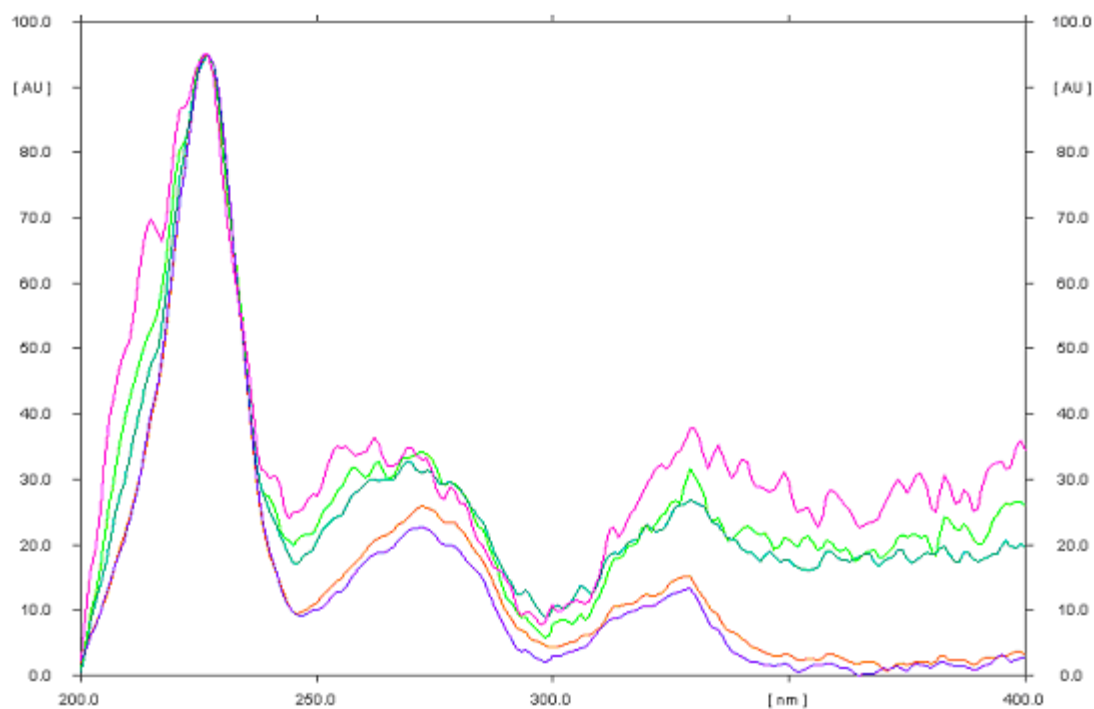
**Fig. S30.** Densitogram of naproxen (N) in hydrogen peroxide (VI), which was exposed to UV radiation ( $\lambda=254$  nm) irradiated to UV light (254 nm) for 5h (mobile phase A: TOL-ACE-CHL; 2:5:12, v/v/v); 1, 2, 3 – degradation products of naproxen; and 2 was identified as naproxen ethyl ester.



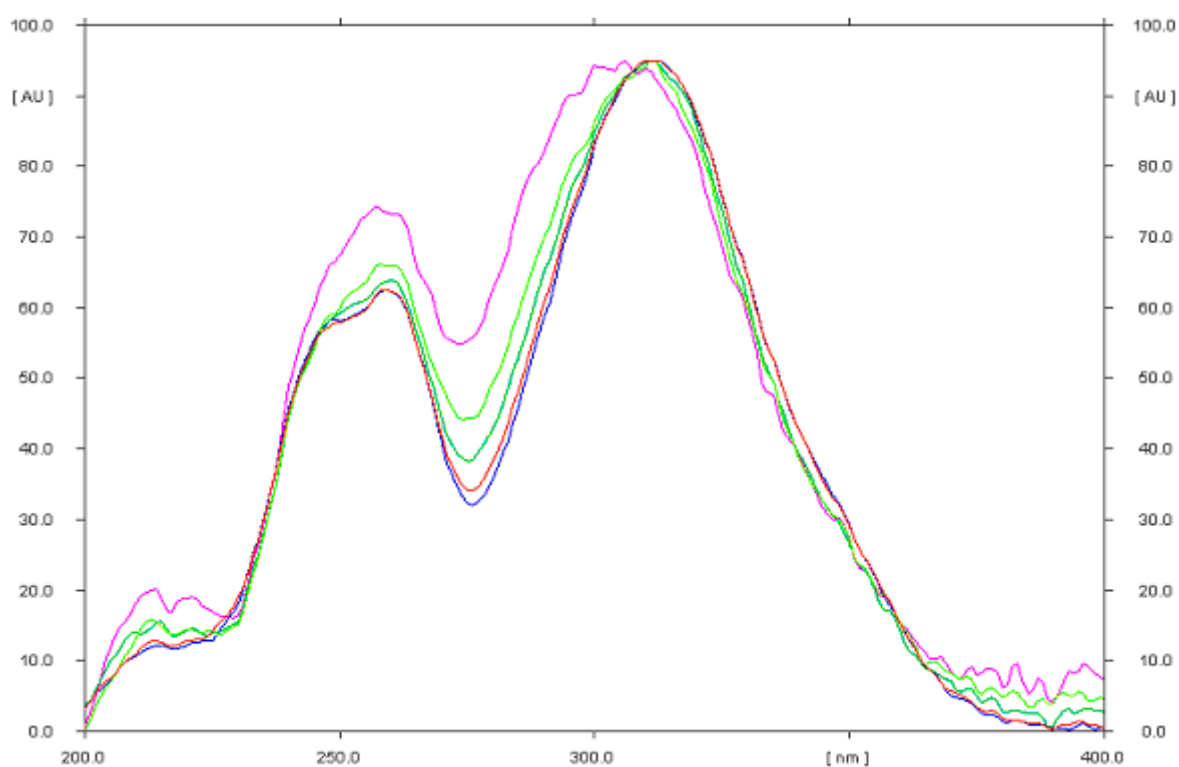
**Fig. S31.** Comparison of naproxen spectra ( $R_F = 0.29$ ), which in solutions II, III, IV, V, VI was irradiated from above for 5 h and naproxen standard (mobile phase A: TOL - ACE - CHL, 2:5:12 (v/v/v)).



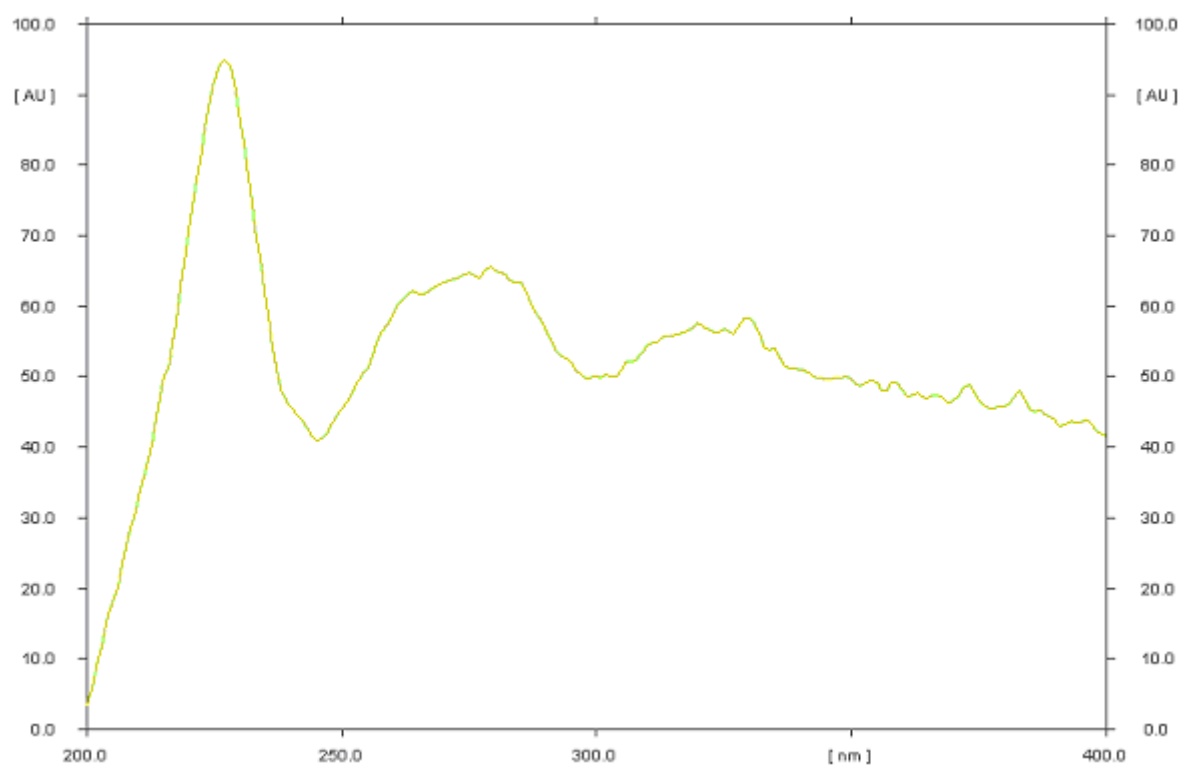
**Fig. S32.** Spectra of substance 1 with  $R_F = 0.03$  formed after irradiation of naproxen in solutions II, III, IV, V, VI for 5 h (mobile phase A: TOL - ACE - CHL, 2:5:12 (v/v/v)).



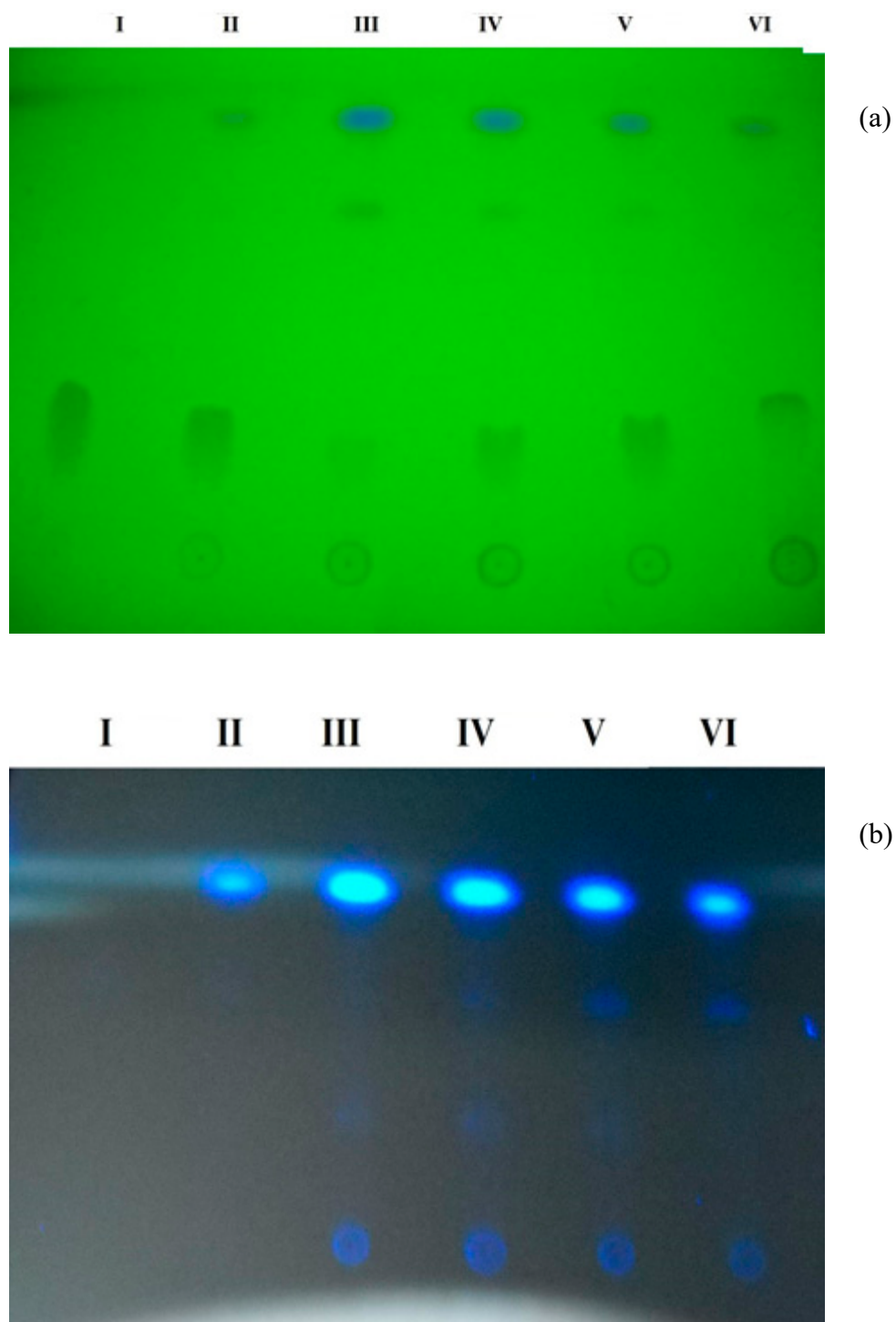
**Fig. S33.** Spectra of substance 2 (naproxen ethyl ester) with  $R_F = 0.65$  formed after irradiation of naproxen in solutions II, III, IV, V, VI for 5 h (mobile phase A: TOL - ACE - CHL, 2:5:12 (v/v/v)).



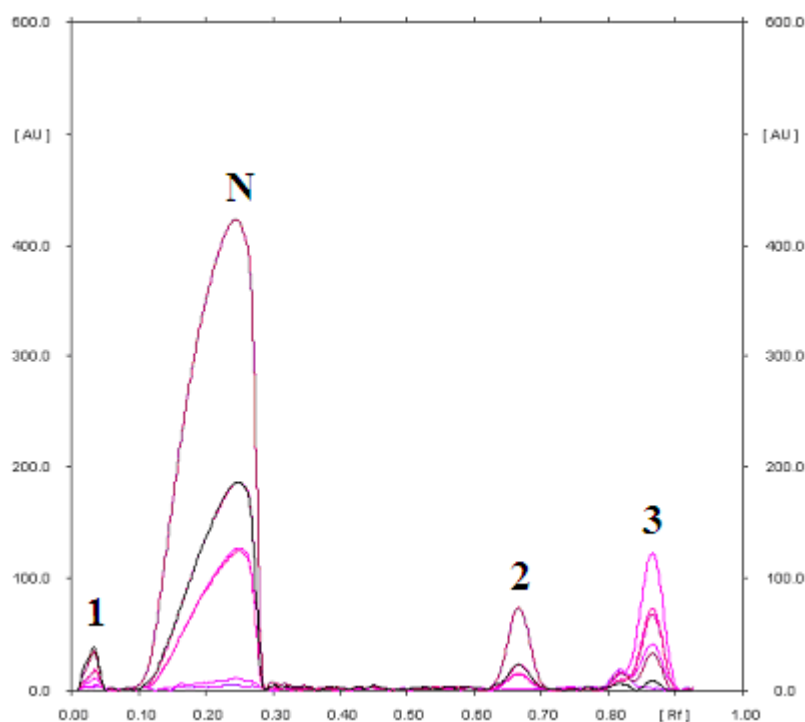
**Fig. S34.** Spectra of substance 3 with  $R_F = 0.85$  formed after irradiation of naproxen in solutions II, III, IV, V, VI for 5 h (mobile phase A: TOL - ACE - CHL, 2:5:12 (v/v/v)).



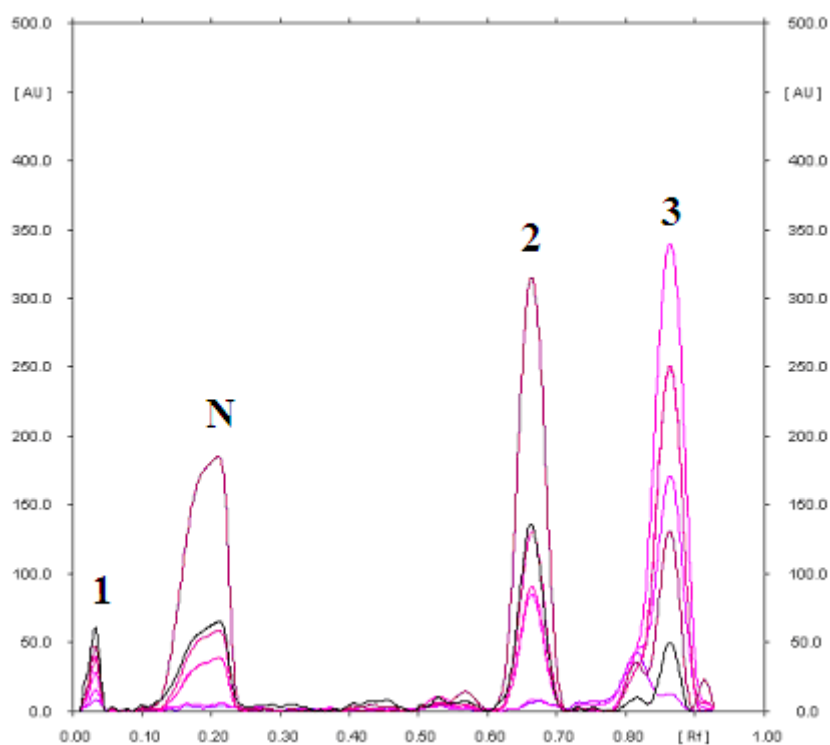
**Fig. S35.** Spectra of substance 4 with  $R_F = 0.81$  formed after irradiation of naproxen in solutions II, III, IV, V, VI for 5 h (mobile phase A: TOL - ACE - CHL, 2:5:12 (v/v/v)).



**Fig. S36.** Photographs of chromatograms, naproxen not exposed (I) and naproxen in solutions II, III, IV, V and VI irradiated for 10 h with UV radiation ( $\lambda = 254$  nm) taken at 254 nm (a) and 366 nm (b), after separation using a mobile phase A: TOL - ACE - CHL, 2:5:12 (v/v/v).

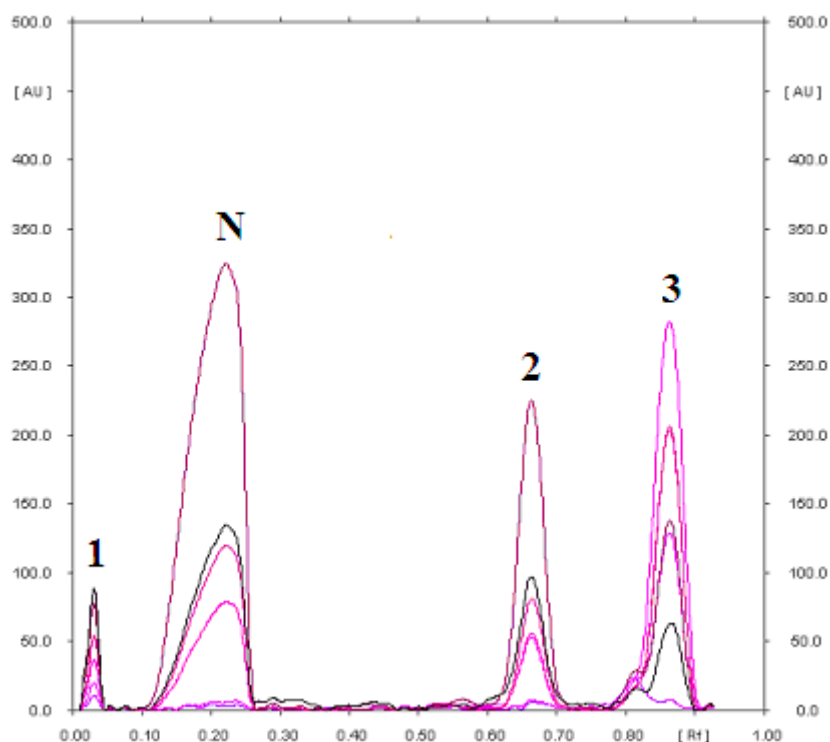


**Fig. S37.** Densitogram of naproxen (N) in solution of physiological salt (II), which was irradiated to UV light (254 nm) for 10 h (mobile phase A: TOL - ACE - CHL; 2:5:12, v/v/v); 1, 2, 3 – degradation products of naproxen; and 2 was identified as naproxen ethyl ester.

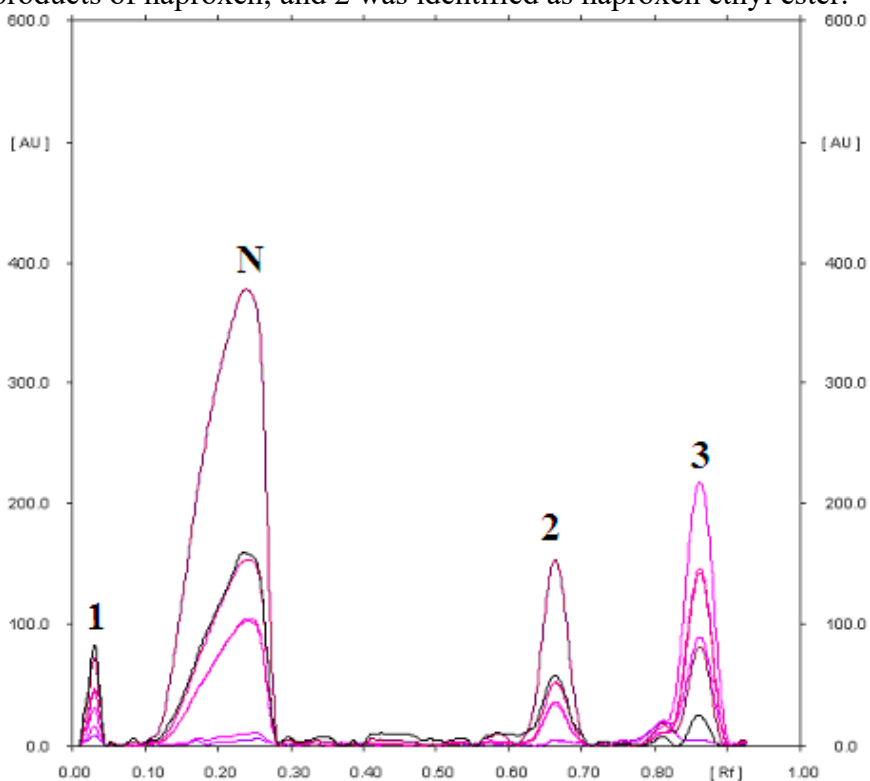


**Fig. S38.** Densitogram of naproxen (N) in water at pH≈2.60 (III), which was irradiated to UV light (254 nm) for 10 h (mobile phase A: TOL - ACE - CHL; 2:5:12, v/v/v); 1, 2, 3 – degradation products of naproxen; and 2 was identified as naproxen ethyl ester.

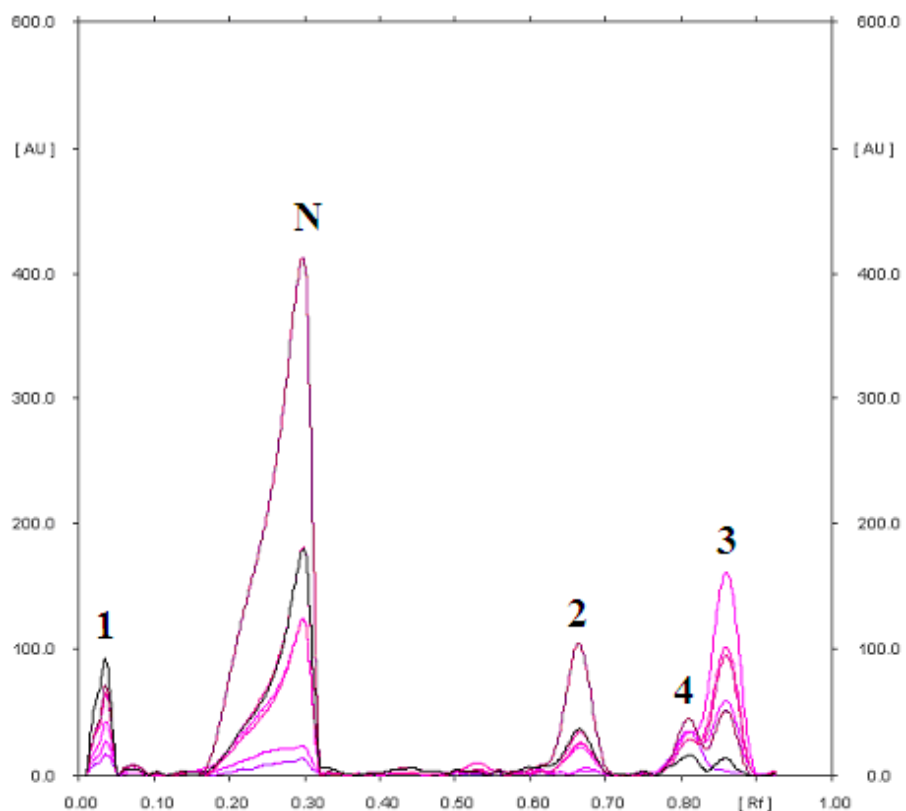




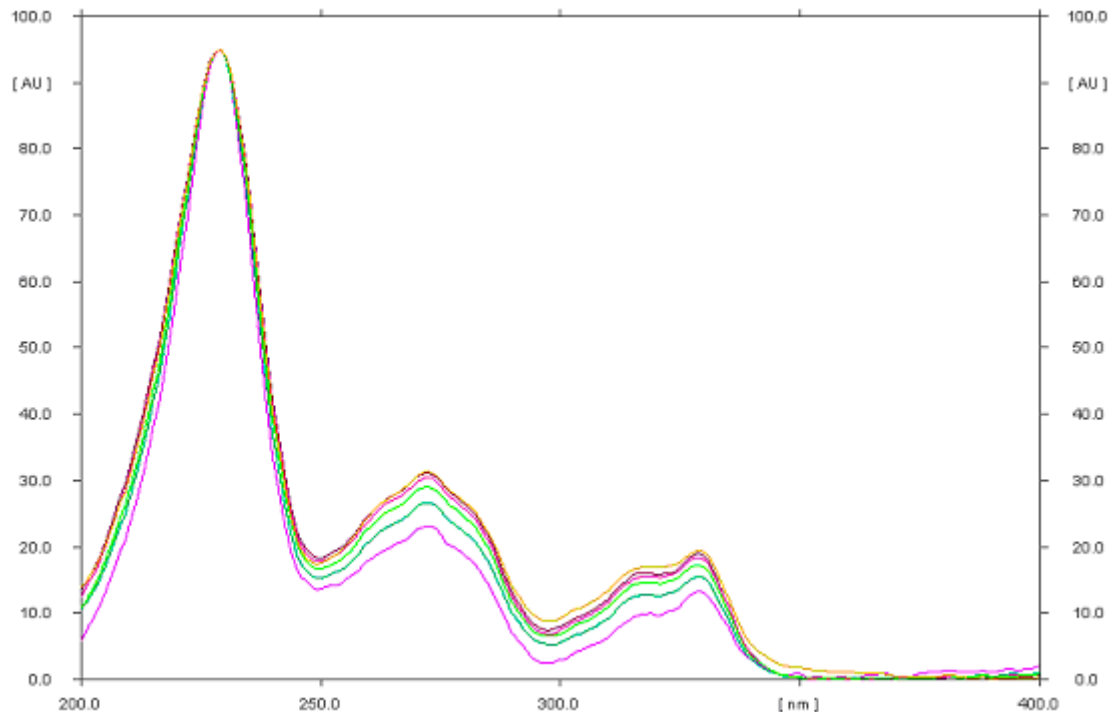
**Fig. S39.** Densitogram of naproxen (N) in water at pH $\approx$ 5.70 (IV), which was irradiated to UV light (254 nm) for 10 h (mobile phase A: TOL - ACE - CHL; 2:5:12, v/v/v); 1, 2, 3 – degradation products of naproxen; and 2 was identified as naproxen ethyl ester.



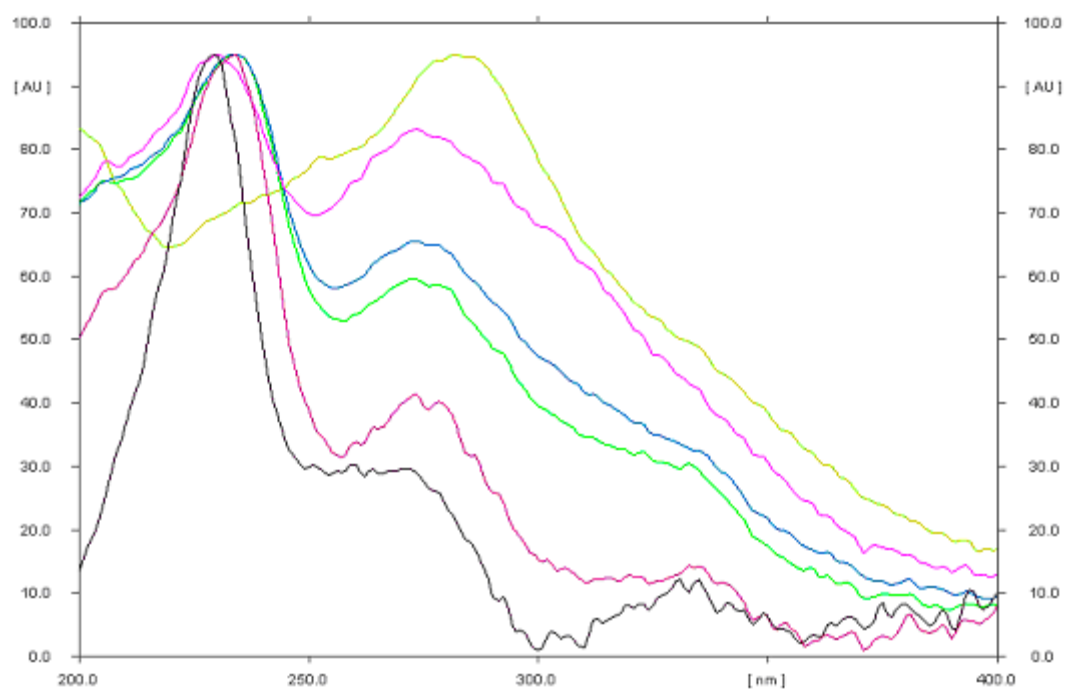
**Fig. S40.** Densitogram of naproxen (N) in water at pH $\approx$ 8.50 (V), which was irradiated to UV light (254 nm) for 10 h (mobile phase A: TOL - ACE - CHL; 2:5:12, v/v/v); 1, 2, 3 – degradation products of naproxen; and 2 was identified as naproxen ethyl ester.



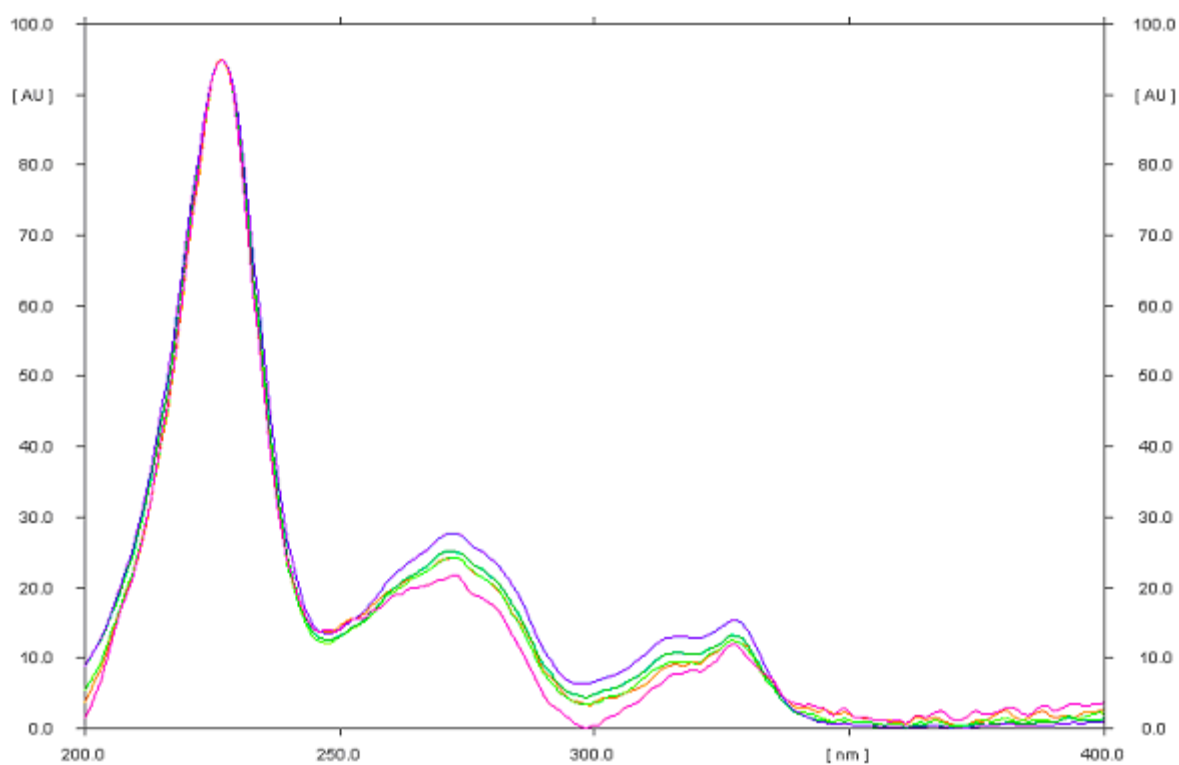
**Fig. S41.** Densitogram of naproxen (N) in hydrogen peroxide (VI), which was irradiated to UV light (254 nm) for 10 h (mobile phase A: TOL - ACE - CHL; 2:5:12, v/v/v); 1, 2, 3,4 – degradation products of naproxen; and 2 was identified as naproxen ethyl ester.



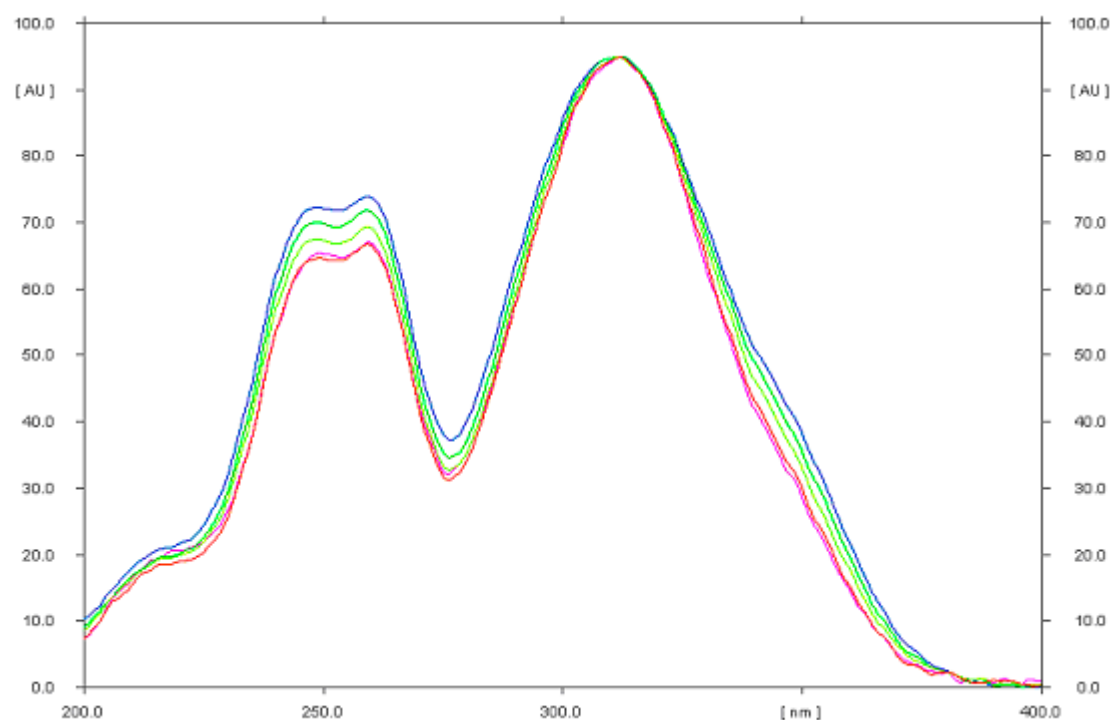
**Fig. S42.** Comparison of naproxen spectra ( $R_F = 0.26$ ), which in solutions II, III, IV, V, VI was irradiated from above for 10 h and naproxen standard (mobile phase A: TOL - ACE - CHL, 2:5:12, v/v/v).



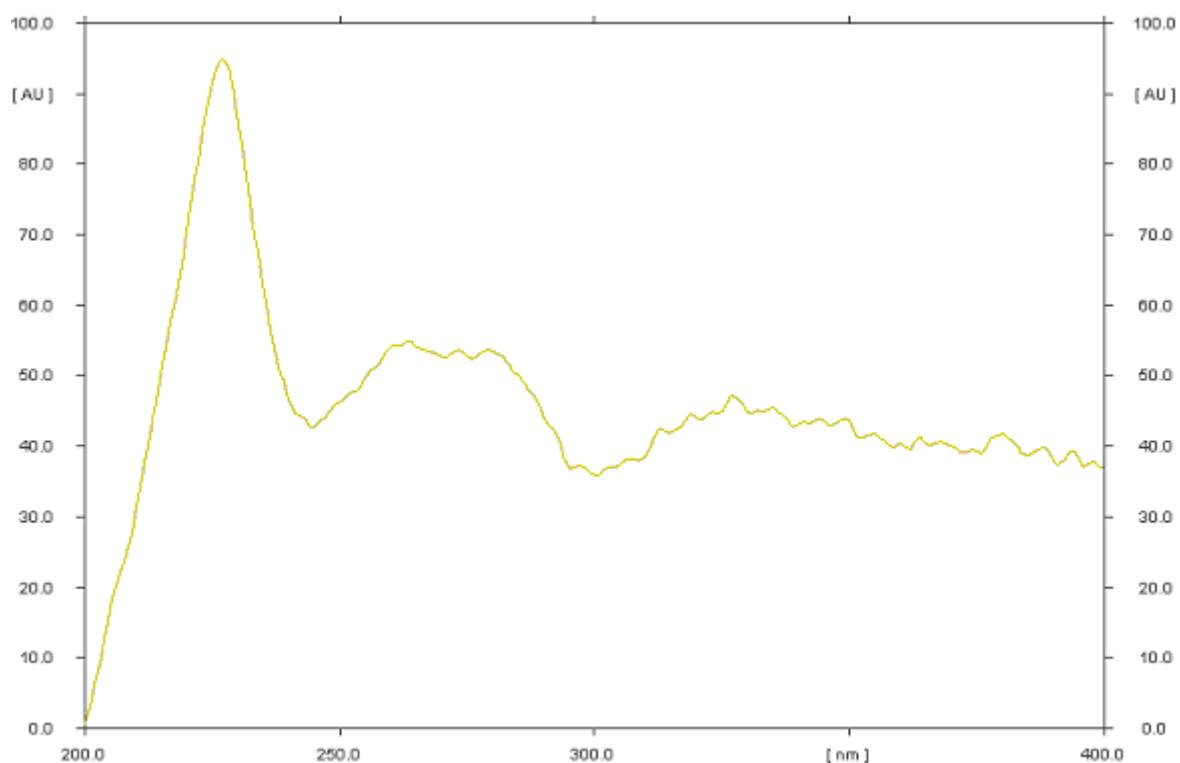
**Fig. S43.** Spectra of substance 1 with  $R_F = 0.03$  formed after irradiation of naproxen in solutions II, III, IV, V, VI for 10 h (mobile phase A: TOL - ACE - CHL, 2:5:12, v/v/v).



**Fig. S44.** Spectra of substance 2 (naproxen ethyl ester) with  $R_F = 0.67$  formed after irradiation of naproxen in solutions II, III, IV, V, VI for 10 h (mobile phase A: TOL - ACE - CHL, 2:5:12, v/v/v).



**Fig. S45.** Spectra of substance 3 with  $R_F = 0.86$  formed after irradiation of naproxen in solutions II, III, IV, V, VI for 10 h (mobile phase A: TOL - ACE - CHL, 2:5:12, v/v/v).



**Fig. S46.** Spectra of substance 4 with  $R_F = 0.81$  formed after irradiation of naproxen in solution VI for 10 h (mobile phase A: TOL - ACE - CHL, 2:5:12, v/v/v).

**Table S3.**  $R_F$  values and chromatographic peak areas of naproxen and its chemical transformation products formed in individual solutions irradiated from the top by UV light (254 nm), after separation using a mobile phase A: TOL - ACE - CHL 2:5:12 (v/v/v).

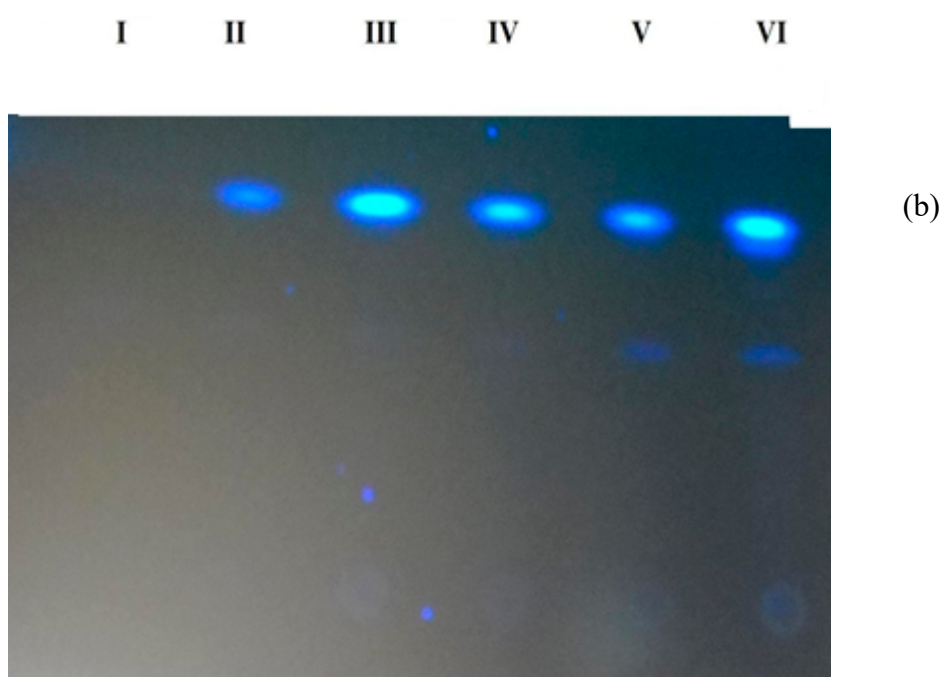
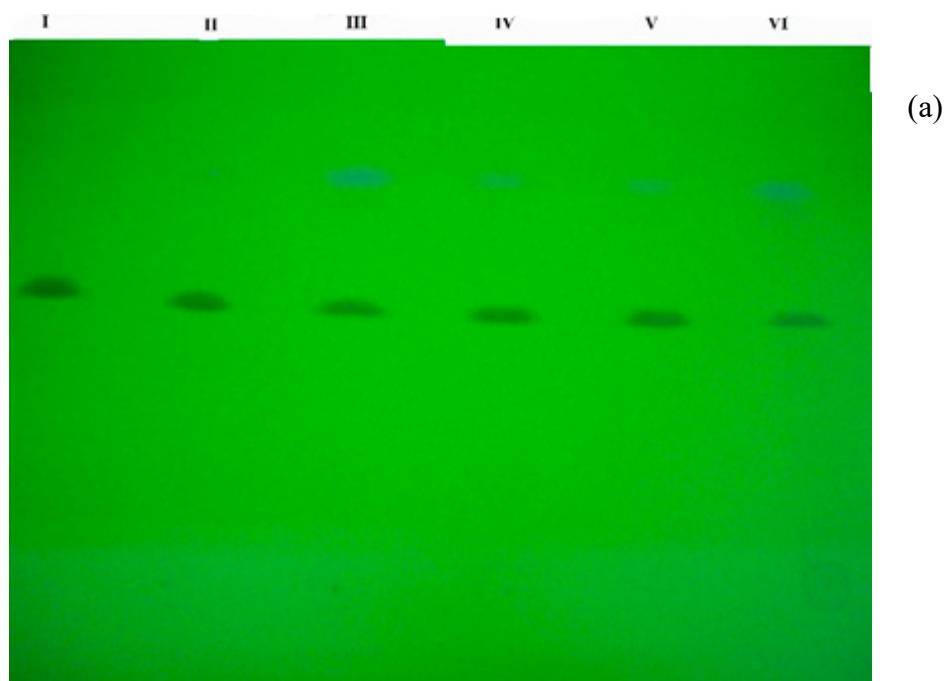
Solution	Exposure time	Substance <sup>a)</sup>	$R_F$	Chromatographic peak area [AU] <sup>b)</sup>	% of band area
I	0 h	N	0.28	42457	100
		N	0.27	41896	95.72
		S1	0.03	271	0.62
		S2	0.65	598	1.37
II	5 h	S3	0.85	1005	2.29
		N	0.25	34277	83.05
		S1	0.02	840	2.03
		S2	0.67	2150	5.21
	10 h	S3	0.87	4008	9.71
		N	0.26	37306	81.13
		S1	0.04	596	1.30
		S2	0.65	2889	6.28
III	5 h	S3	0.85	5194	11.29
		N	0.24	9513	27.64
		S1	0.03	1376	4.00
		S2	0.66	10538	30.61
	10 h	S3	0.86	12993	37.75
		N	0.25	41363	89.72
		S1	0.04	1123	2.44
		S2	0.65	1204	2.61
IV	5 h	S3	0.85	2410	5.23
		N	0.24	20603	51.39
		S1	0.03	1827	4.56
		S2	0.66	7174	17.90
	10 h	S3	0.86	10485	26.15
		N	0.26	40976	91.73
		S1	0.04	782	1.75
		S2	0.66	1079	2.41
V	5 h	S3	0.85	1834	4.11
		N	0.27	27115	66.26
		S1	0.03	1561	3.81
		S2	0.66	4637	11.33
	10 h	S3	0.86	7609	18.60
		N	0.31	30519	73.68
		S1	0.03	887	2.14
		S2	0.66	2832	6.84
VI	5 h	S3	0.85	5682	13.72
		S4	0.81	1502	3.62
		N	0.29	20844	62.57
		S1	0.03	1885	5.66
	10 h	S2	0.67	3297	9.90
		S3	0.86	6061	18.19
		S4	0.81	1226	3.68

where:

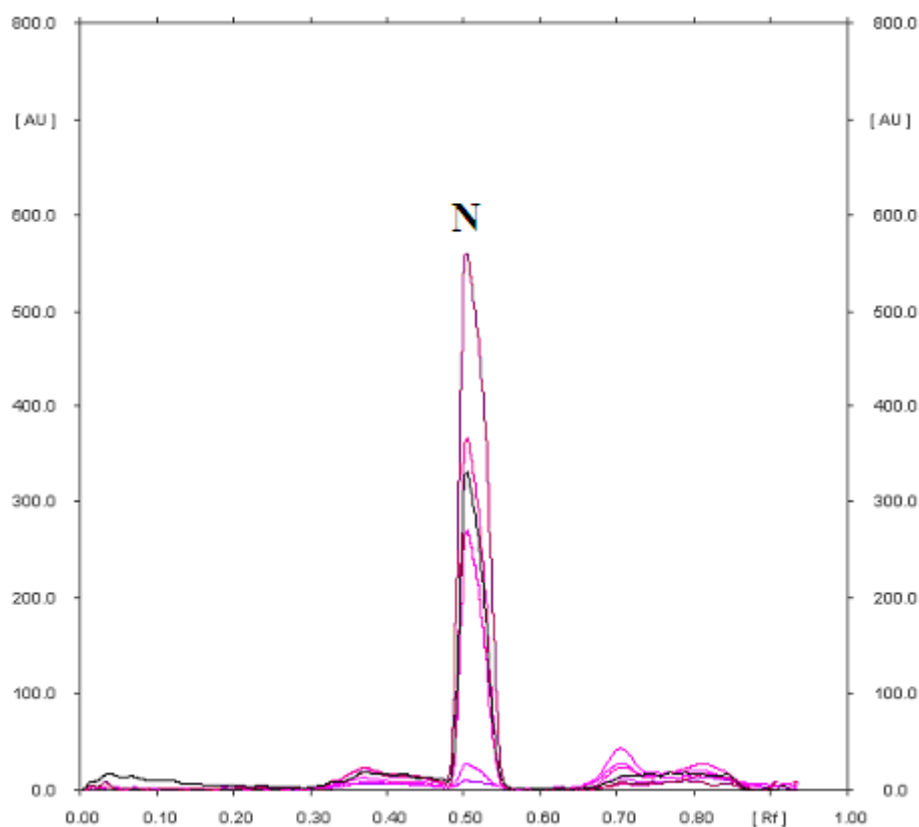
<sup>a)</sup> N – naproxen

S1, S2, S3, S4 - products of chemical transformation of naproxen; and S2 was identified as naproxen ethyl ester

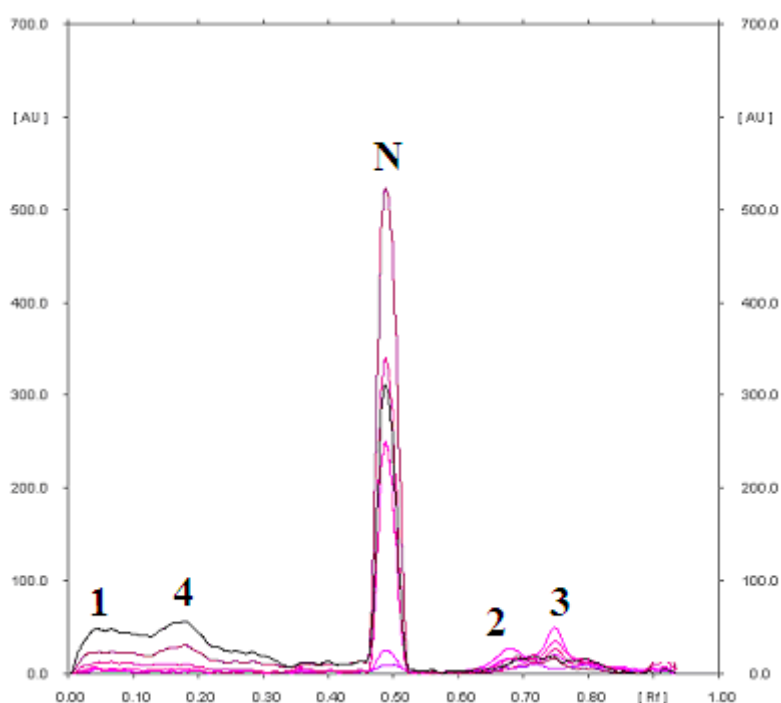
<sup>b)</sup> Area of the chromatographic band at  $\lambda_{\max}$



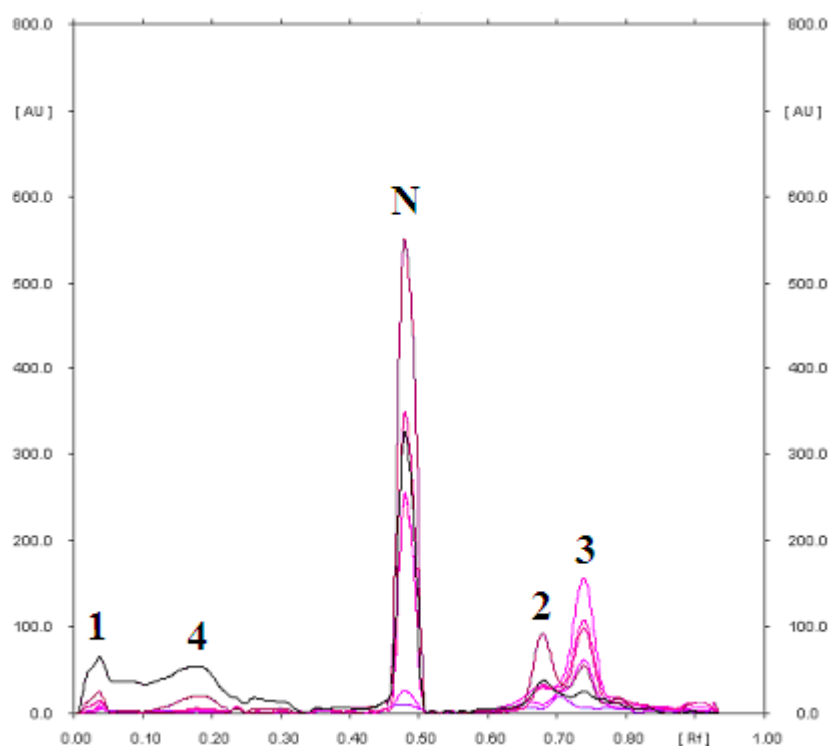
**Fig. S47.** Photographs of chromatograms, naproxen not exposed (I) and naproxen in solutions II, III, IV, V and VI irradiated for 5 h with UV radiation  $\lambda = 254\text{nm}$  taken at 254 nm (a) and 366 nm (b), after separation using a mobile phase B: AcOH - Hex - ACE, 0.10:10:10 (v/v/v).



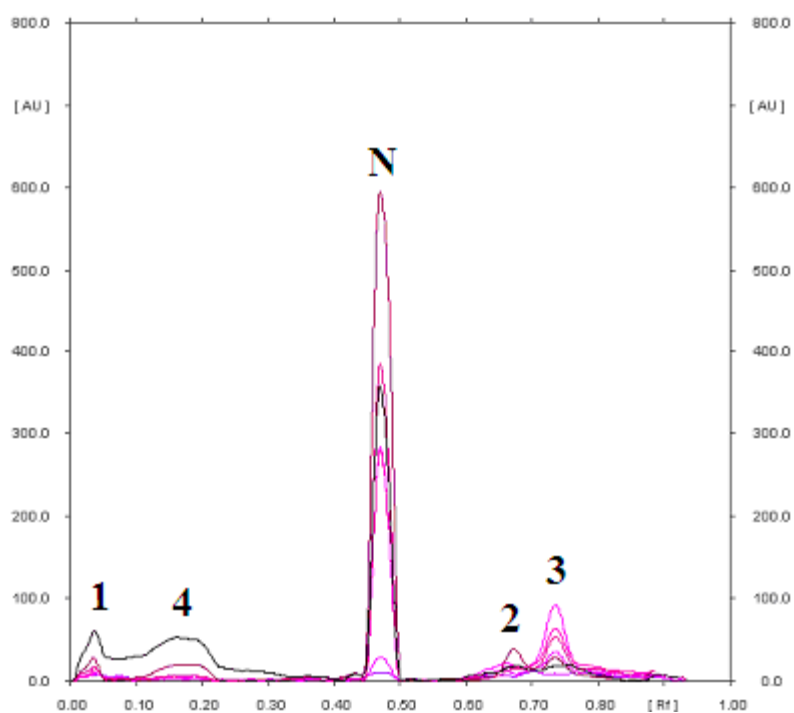
**Fig. S48.** Densitogram of naproxen standard (not exposed to UV) developed using mobile phase B: AcOH - Hex - ACE (0.10:10:10 ,v/v/v).



**Fig. S49.** Densitogram of naproxen (N) in solution of physiological salt (II), which was irradiated to UV light (254 nm) for 5h (mobile phase B: AcOH - Hex - ACE, 0.10:10:10, v/v/v); 1, 2, 3,4 – degradation products of naproxen; and 2 was identified as naproxen ethyl ester.

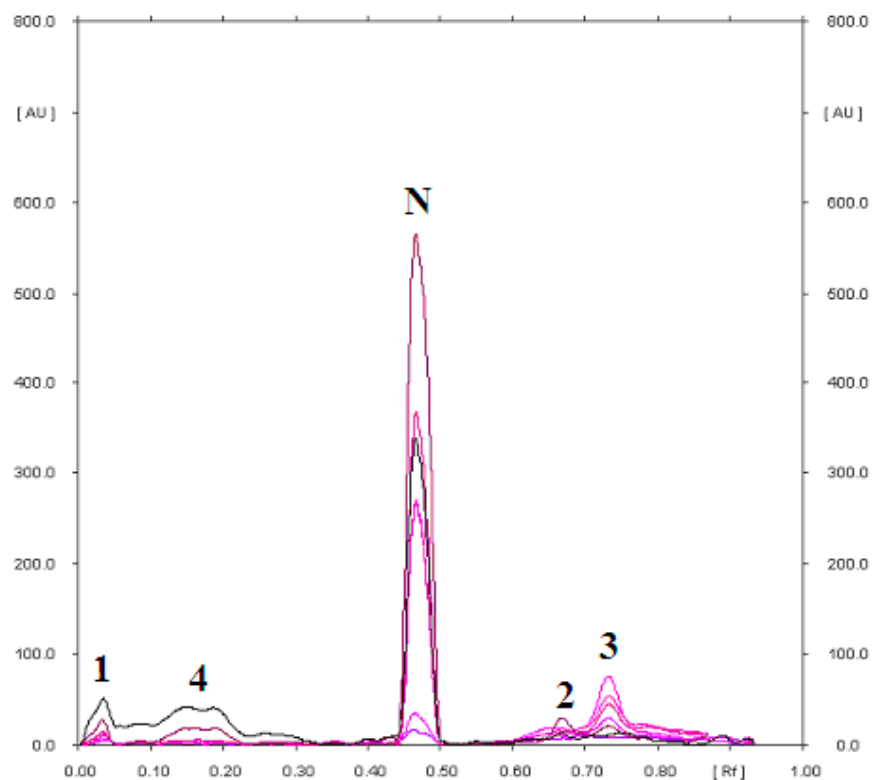


**Fig. S50.** Densitogram of naproxen (N) in solution of water at pH≈2.60 (III), which was irradiated to UV light (254 nm) for 5h (mobile phase B: AcOH - Hex - ACE, 0.10:10:10, v/v/v); 1, 2, 3,4 – degradation products of naproxen; and 2 was identified as naproxen ethyl ester.

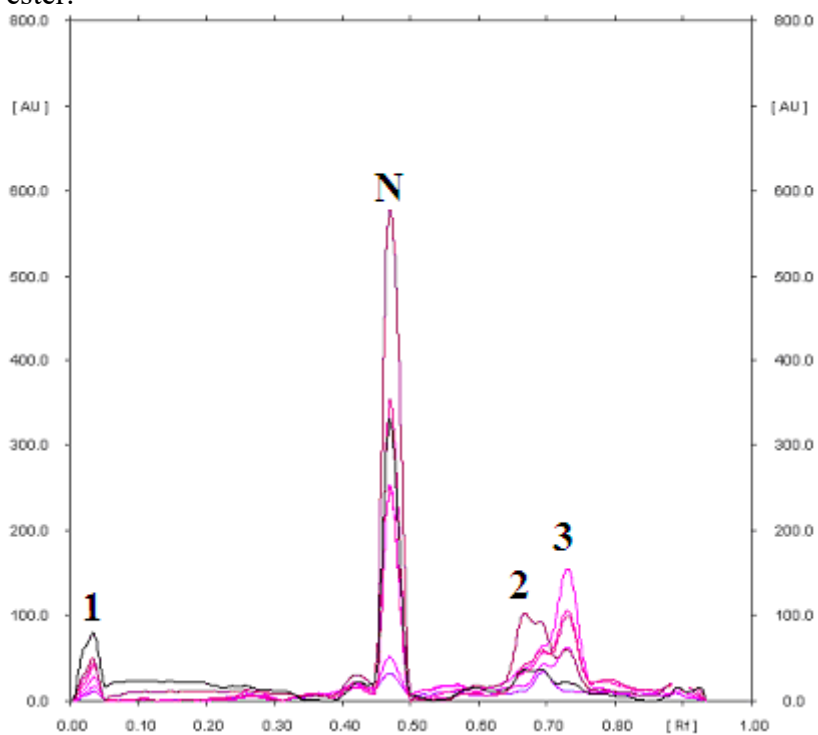


**Fig. S51.** Densitogram of naproxen (N) in solution of water at pH≈5.70 (IV), which was irradiated to UV light (254 nm) for 5h (mobile phase B: AcOH - Hex - ACE, 0.10:10:10,v/v/v); 1, 2, 3,4 – degradation products of naproxen; and 2 was identified as naproxen ethyl ester.

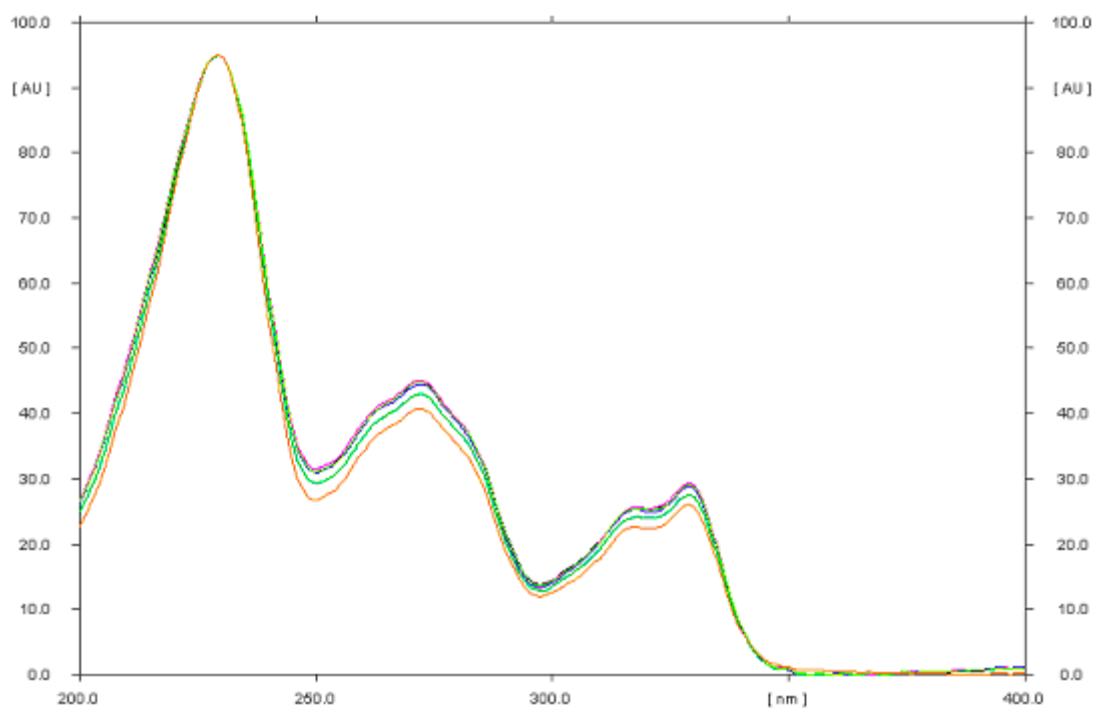




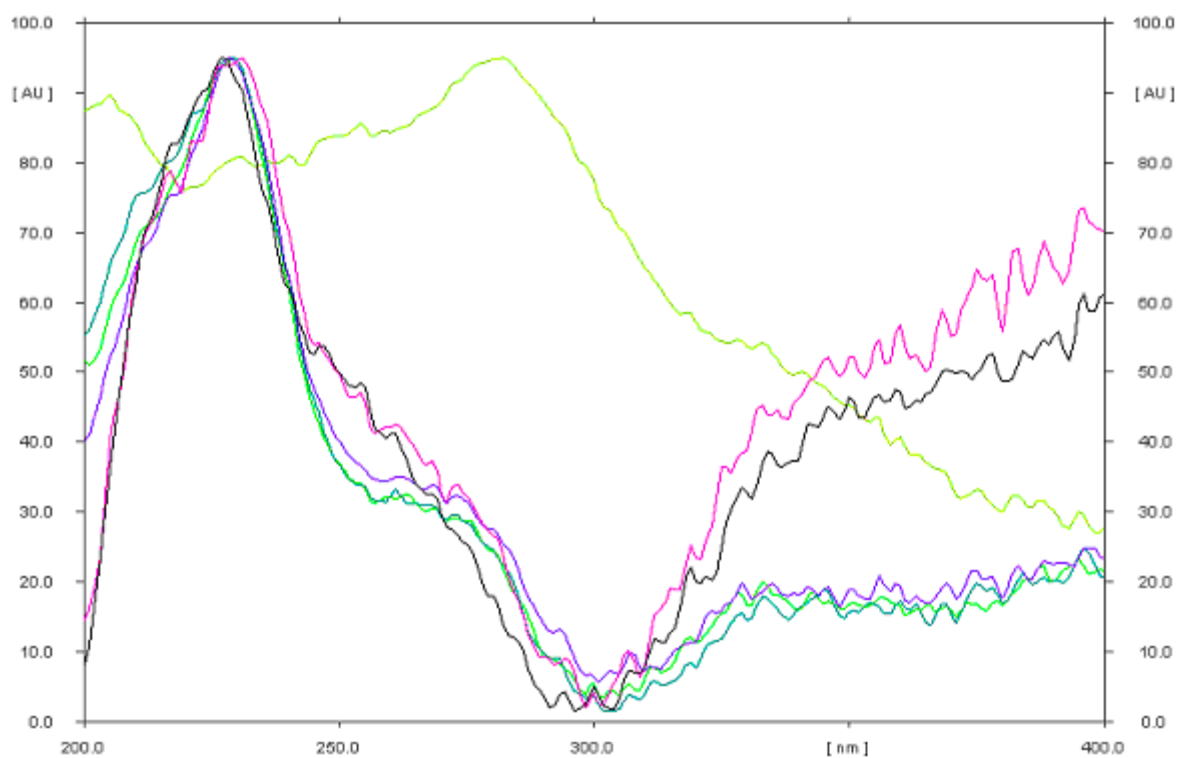
**Fig. S52.** Densitogram of naproxen (N) in solution of water at pH≈8.50 (V), which was irradiated to UV light (254 nm) for 5h (mobile phase B: AcOH - Hex - ACE, 0.10:10:10,v/v/v); 1, 2, 3,4 – degradation products of naproxen; and 2 was identified as naproxen ethyl ester.



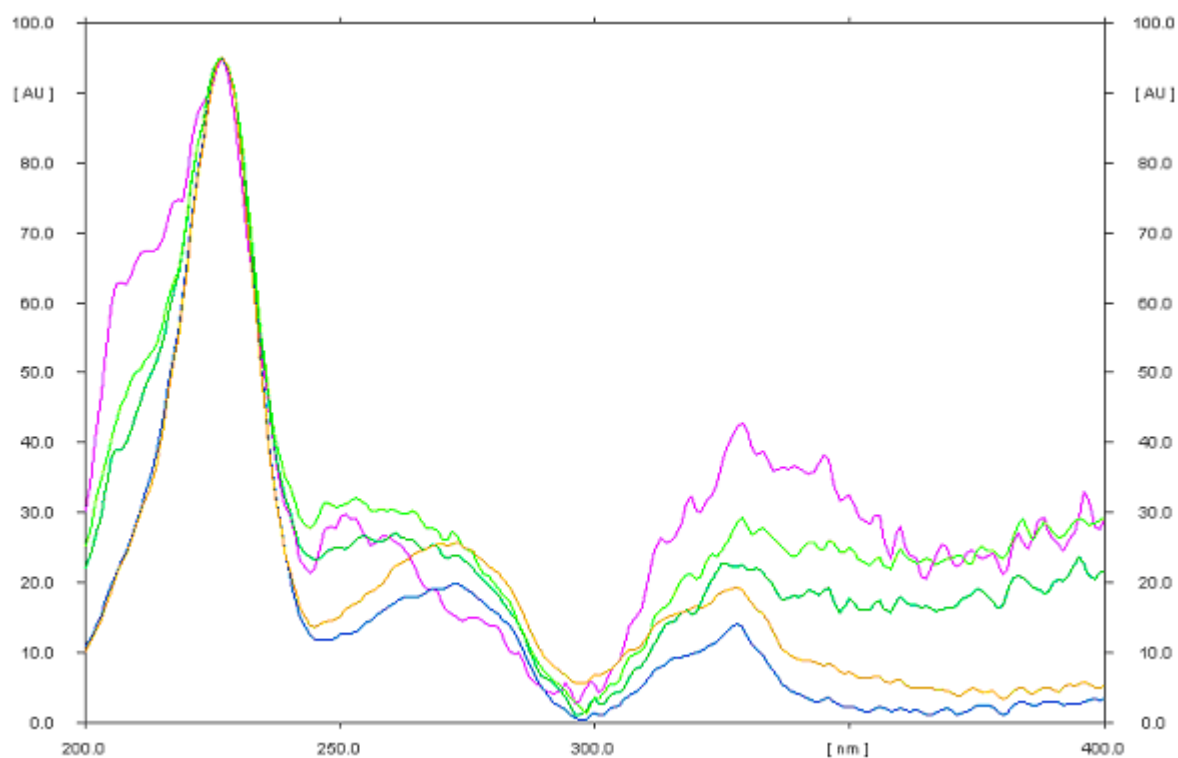
**Fig. S53.** Densitogram of naproxen (N) in hydrogen peroxide (VI), which was irradiated to UV light (254 nm) for 5h (mobile phase B: AcOH - Hex - ACE, 0.10:10:10,v/v/v); 1, 2, 3 – degradation products of naproxen; and 2 was identified as naproxen ethyl ester.



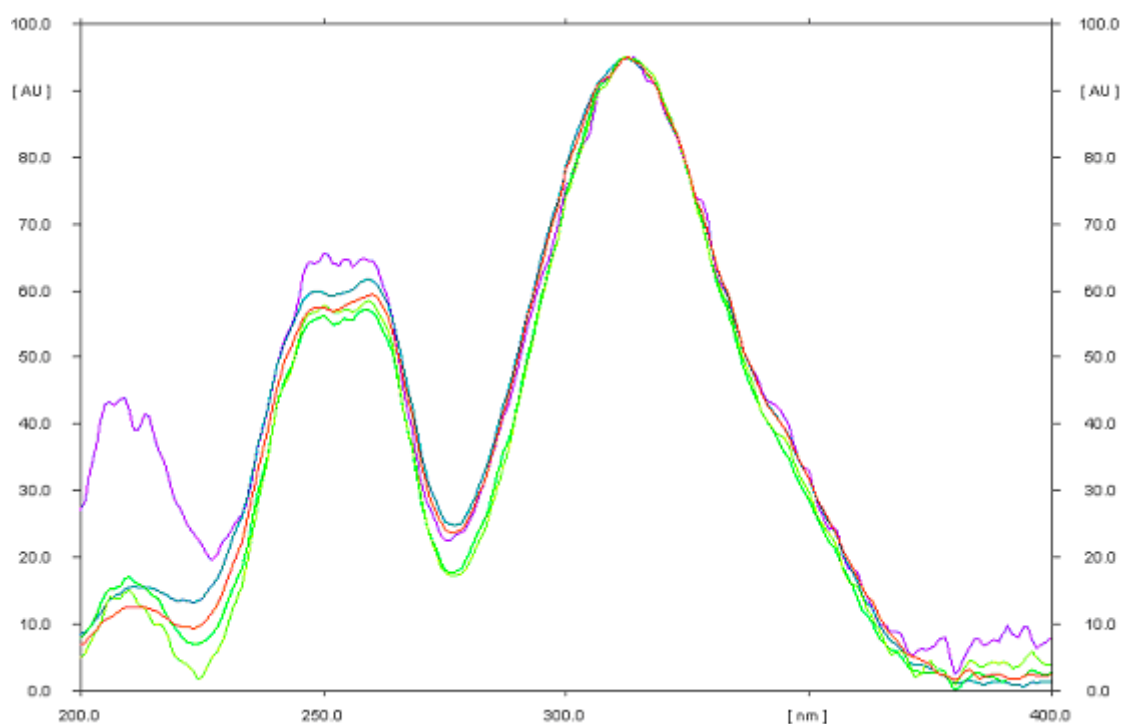
**Fig. S54.** Comparison of naproxen spectra ( $R_F = 0.50$ ), which in solutions II, III, IV, V, VI was irradiated from above for 5 hours and naproxen standard (mobile phase B: AcOH - Hex - ACE, 0.10:10:10, v/v/v).



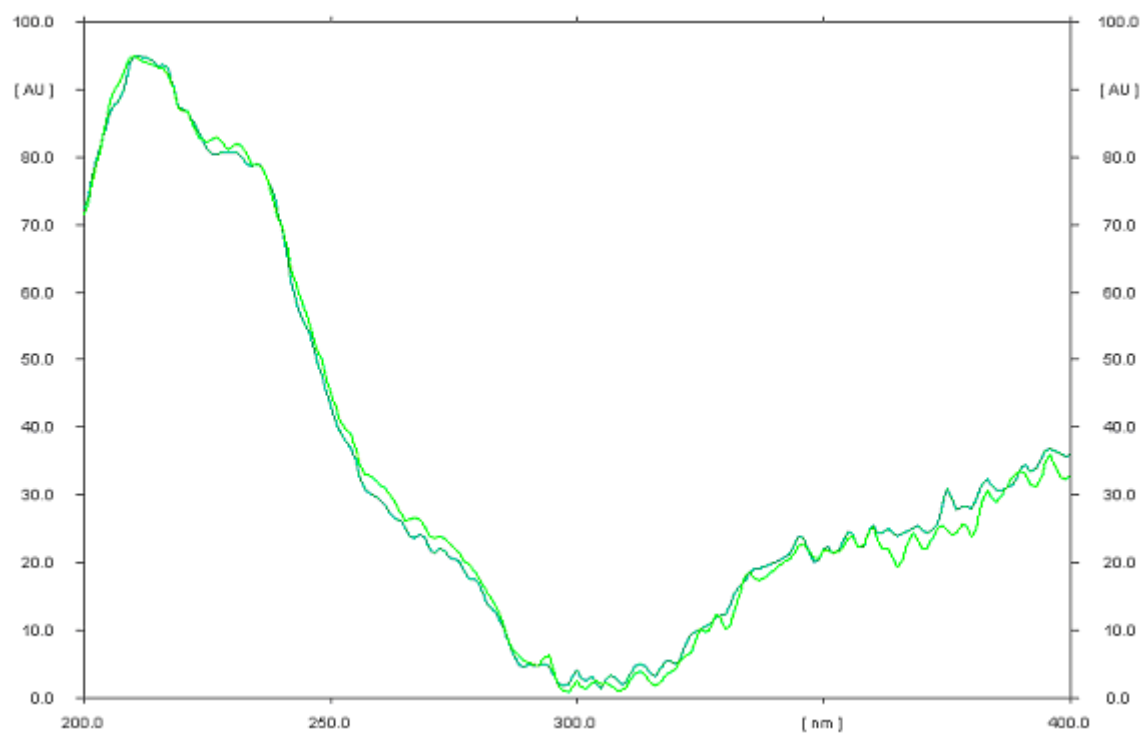
**Fig. S55.** Spectra of substance 1 with  $R_F = 0.04$  formed after irradiation of naproxen in solutions II, III, IV, V, VI for 5 h (mobile phase B: AcOH - Hex - ACE, 0.10:10:10, v/v/v).



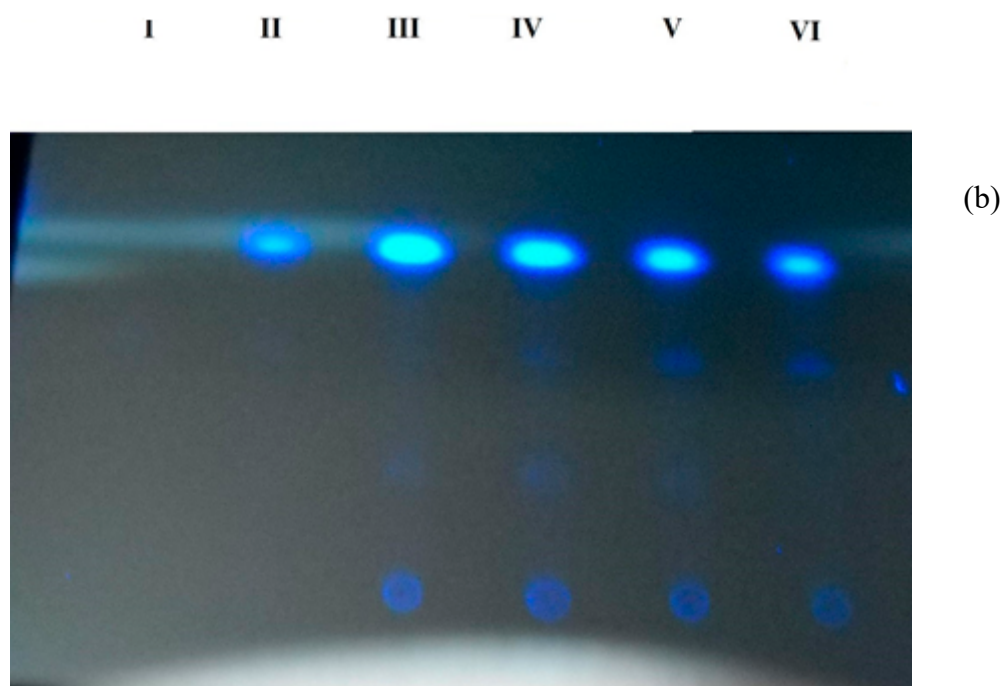
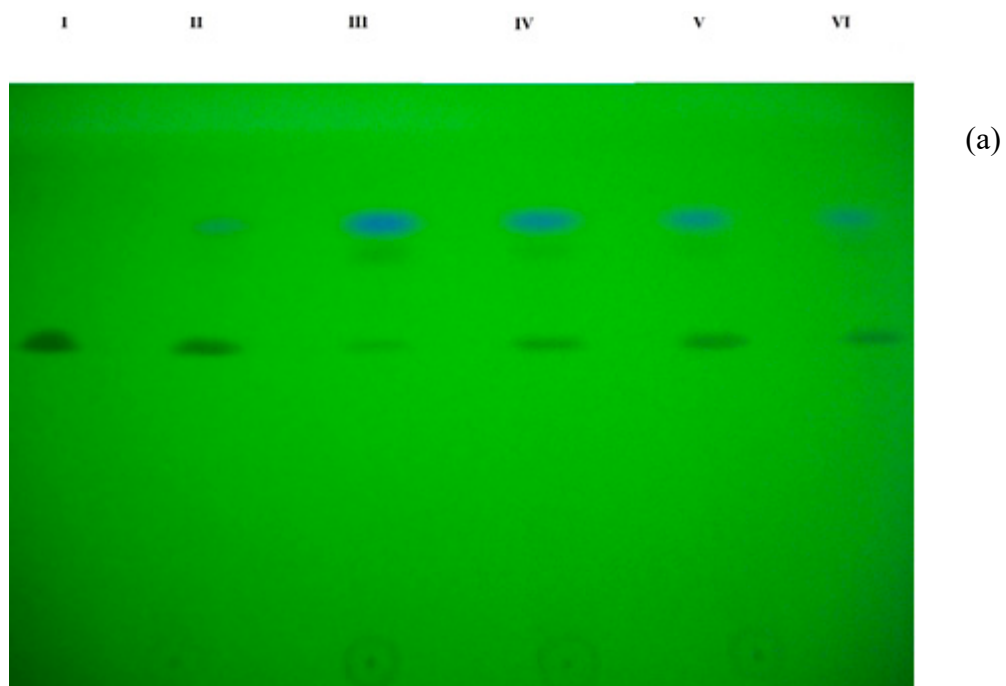
**Fig. S56.** Spectra of substance 2 (naproxen ethyl ester) with  $R_F = 0.67$  formed after irradiation of naproxen in solutions II, III, IV, V, VI for 5 h (mobile phase B: AcOH - Hex - ACE, 0.10:10:10, v/v/v).



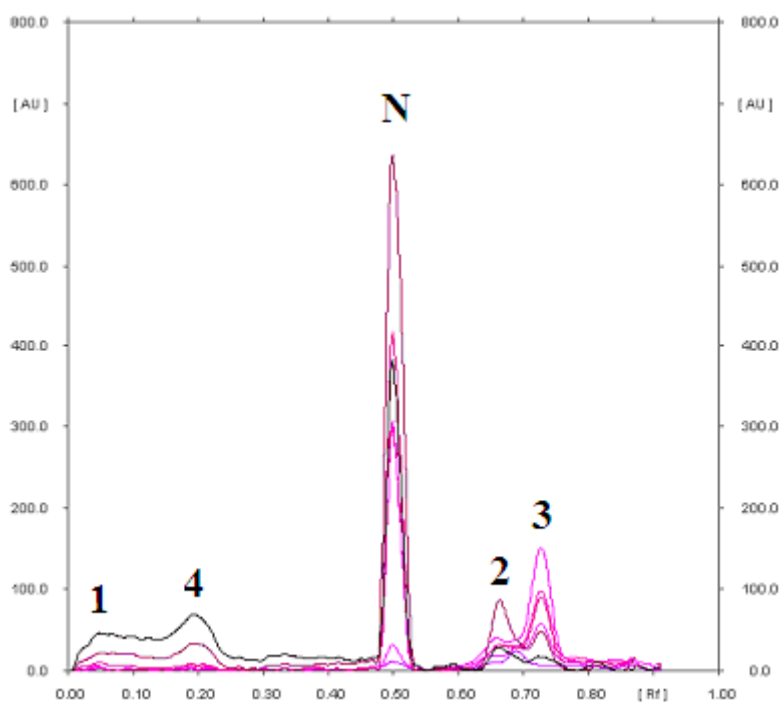
**Fig. S57.** Spectra of substance 3 with  $R_F = 0.74$  formed after irradiation of naproxen in solutions II, III, IV, V, VI for 5 h (mobile phase B: AcOH - Hex - ACE, 0.10:10:10, v/v/v).



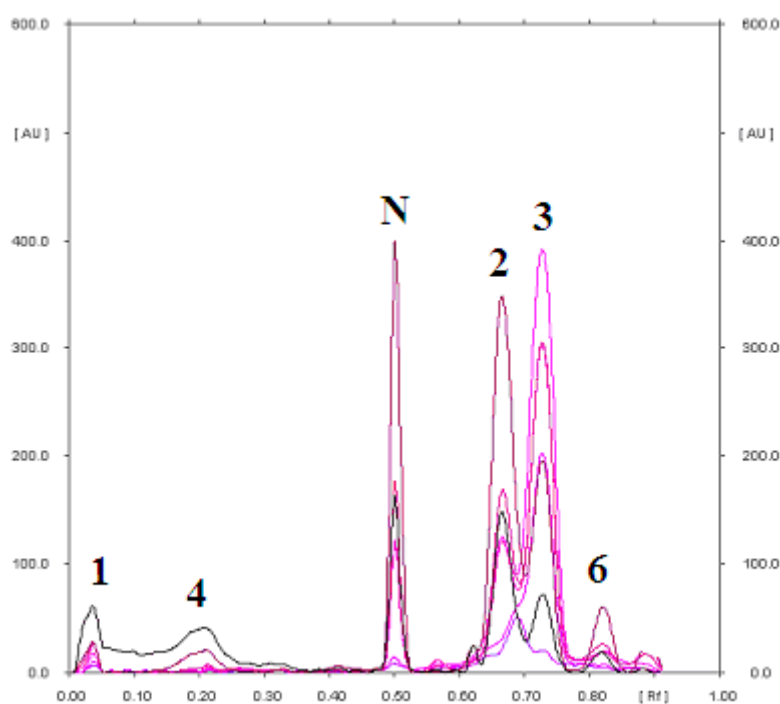
**Fig. S58.** Spectra of substance 4 with  $R_F = 0.19$  formed after irradiation of naproxen in solutions II, III, IV, V, VI for 5 h (mobile phase B: AcOH - Hex - ACE, 0.10:10:10, v/v/v).



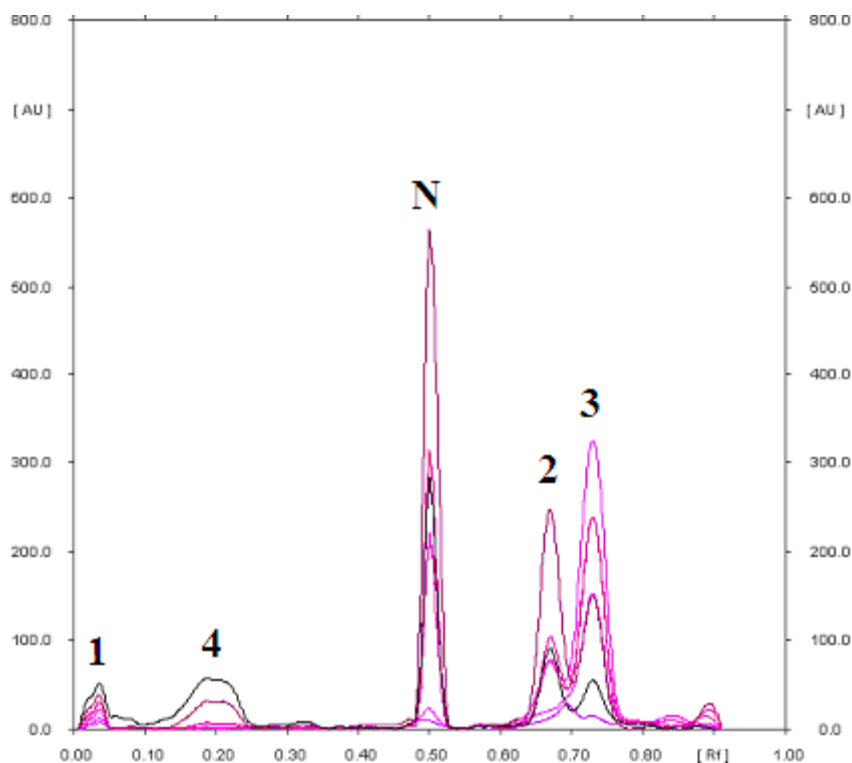
**Fig. S59.** Photographs of chromatograms, naproxen not exposed (I) and naproxen in solutions II, III, IV, V and VI irradiated for 10 h with UV radiation  $\lambda = 254\text{nm}$  taken at 254 nm (a) and 366 nm (b), after separation using a mobile phase B: AcOH - Hex - ACE, 0.10:10:10 (v/v/v).



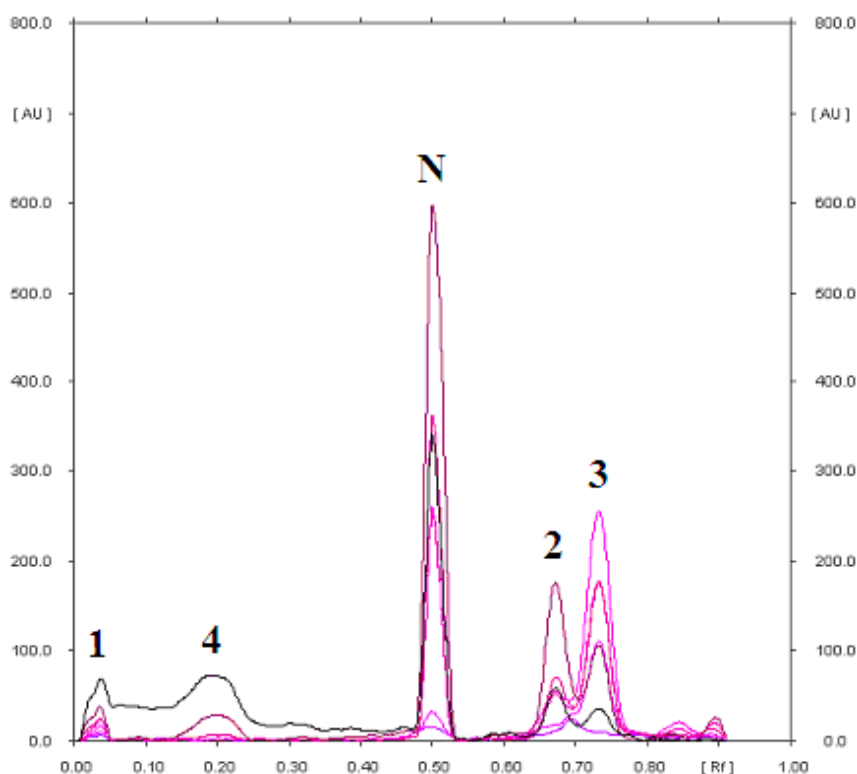
**Fig. S60.** Densitogram of naproxen (N) in solution of physiological salt (II), which was irradiated to UV light (254 nm) for 10h (mobile phase B: AcOH - Hex - ACE, 0.10:10:10, v/v/v); 1, 2, 3,4 – degradation products of naproxen; and 2 was identified as naproxen ethyl ester.



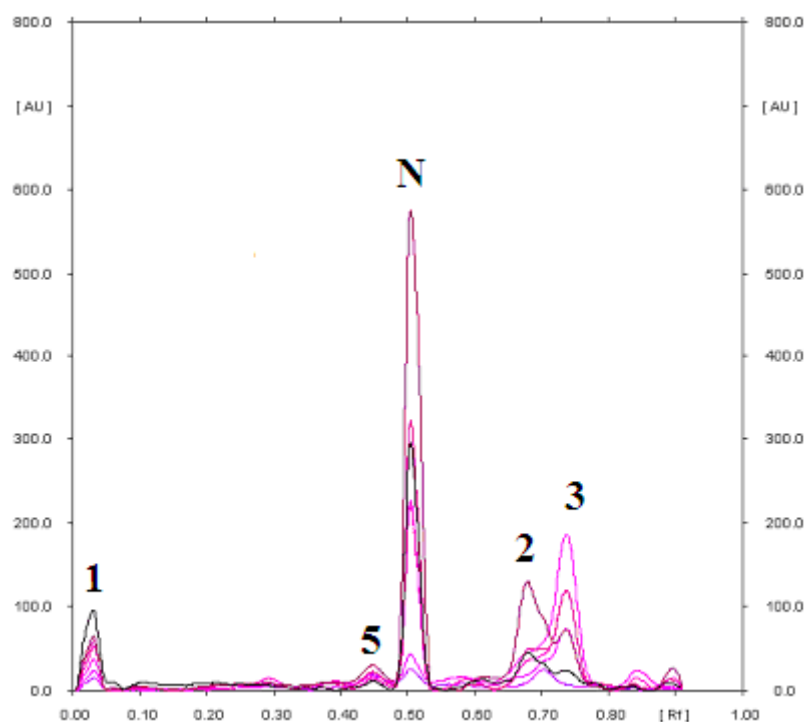
**Fig. S61.** Densitogram of naproxen (N) in solution of water at pH≈2.60 (III), which was irradiated to UV light (254 nm) for 10h (mobile phase B: AcOH - Hex - ACE, 0.10:10:10, v/v/v); 1, 2, 3,4,6 – degradation products of naproxen; and 2 was identified as naproxen ethyl ester.



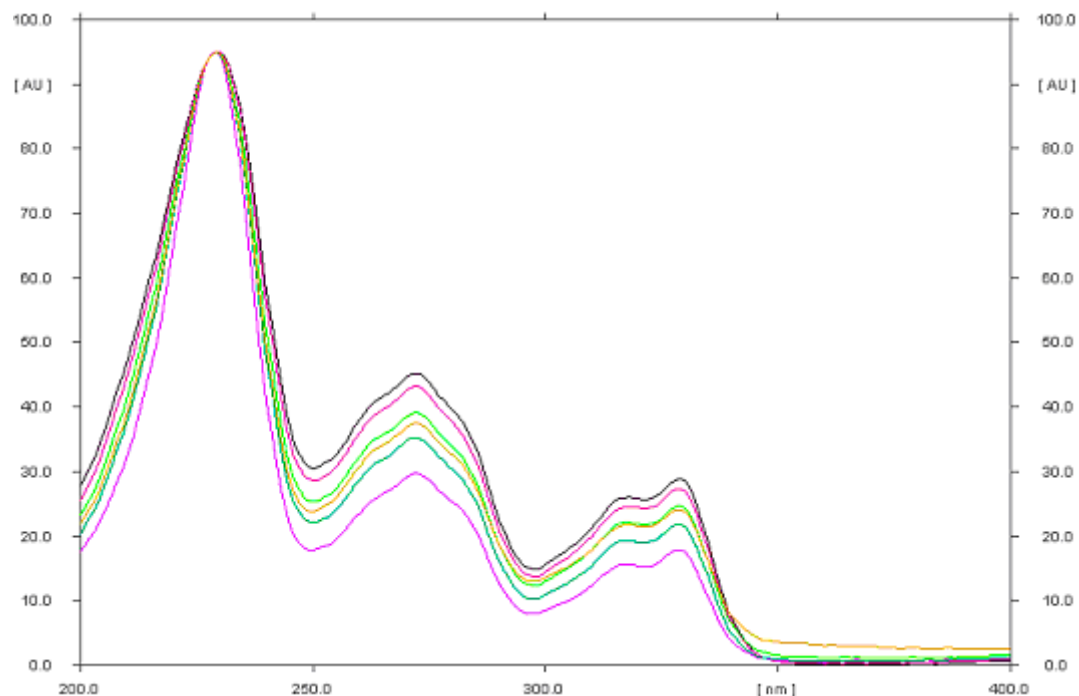
**Fig. S62.** Densitogram of naproxen (N) in solution of water at pH $\approx$ 5.70 (IV), which was irradiated to UV light (254 nm) for 10h (mobile phase B: AcOH - Hex - ACE, 0.10:10:10, v/v/v); 1, 2, 3,4 – degradation products of naproxen; and 2 was identified as naproxen ethyl ester.



**Fig. S63.** Densitogram of naproxen (N) in solution of water at pH $\approx$ 8.50 (V), which was irradiated to UV light (254 nm) for 10h (mobile phase B: AcOH - Hex - ACE, 0.10:10:10, v/v/v); 1, 2, 3,4 – degradation products of naproxen; and 2 was identified as naproxen ethyl ester.

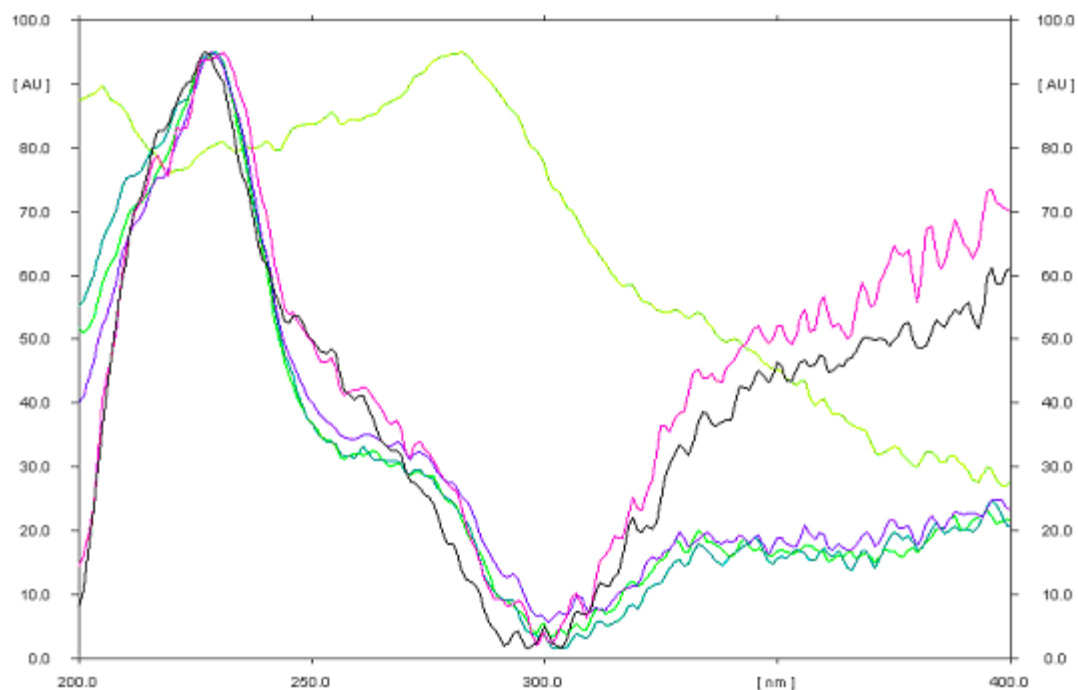


**Fig. S64.** Densitogram of naproxen (N) in hydrogen peroxide (VI), which was irradiated to UV light (254 nm) for 10h (mobile phase B: AcOH - Hex - ACE, 0.10:10:10, v/v/v); 1, 2, 3,5 – degradation products of naproxen; and 2 was identified as naproxen ethyl ester.

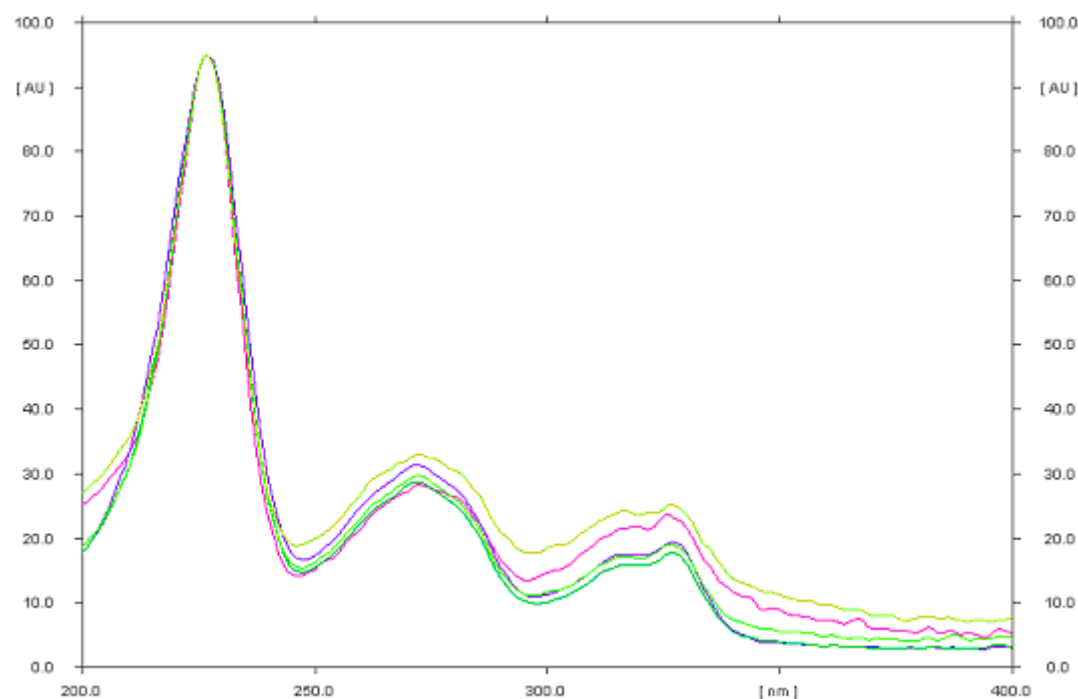


**Fig. S65.** Comparison of naproxen spectra ( $R_F = 0.50$ ), which in solutions II, III, IV, V, VI was irradiated from above for 10 h and naproxen standard (mobile phase B: AcOH - Hex - ACE, 0.10:10:10, v/v/v)).

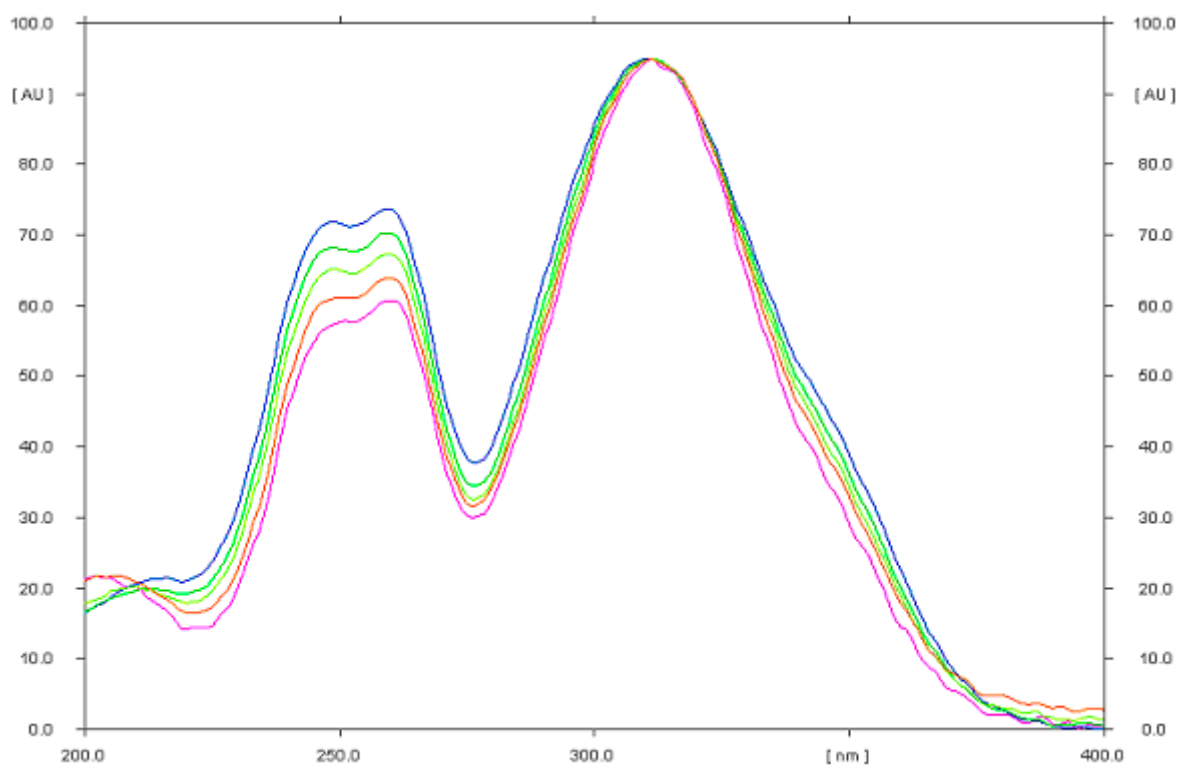




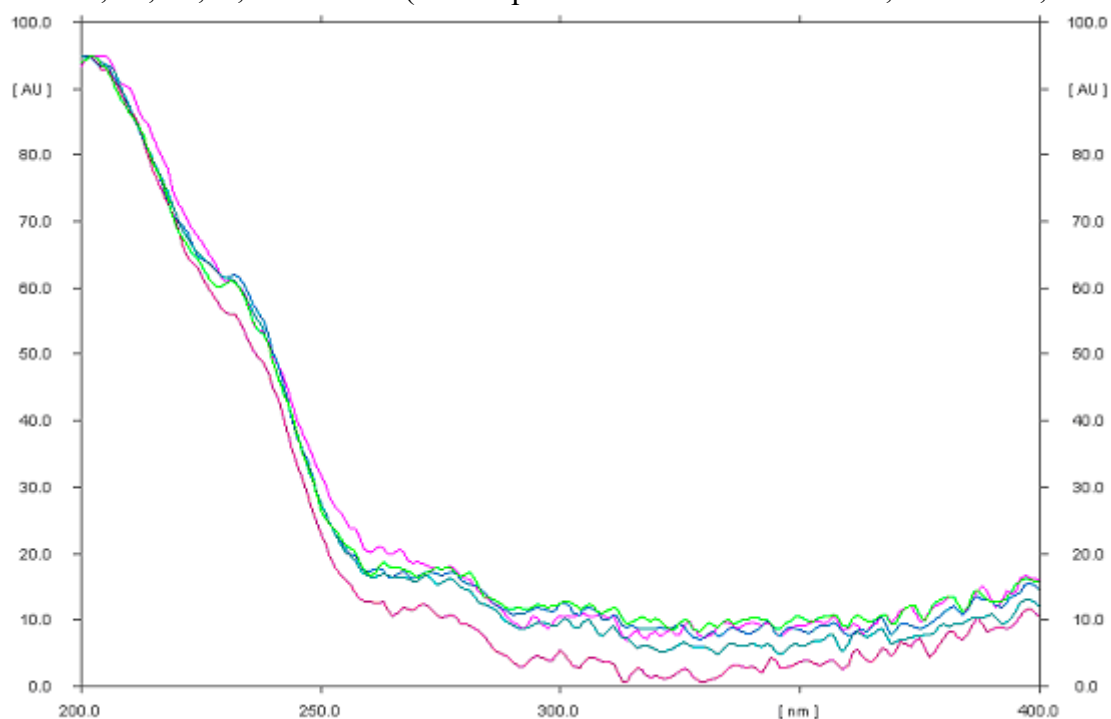
**Fig. S66.** Spectra of substance 1 with  $R_F = 0.04$  formed after irradiation of naproxen in solutions II, III, IV, V, VI for 10 h (mobile phase B: AcOH - Hex - ACE, 0.10:10:10, v/v/v)).



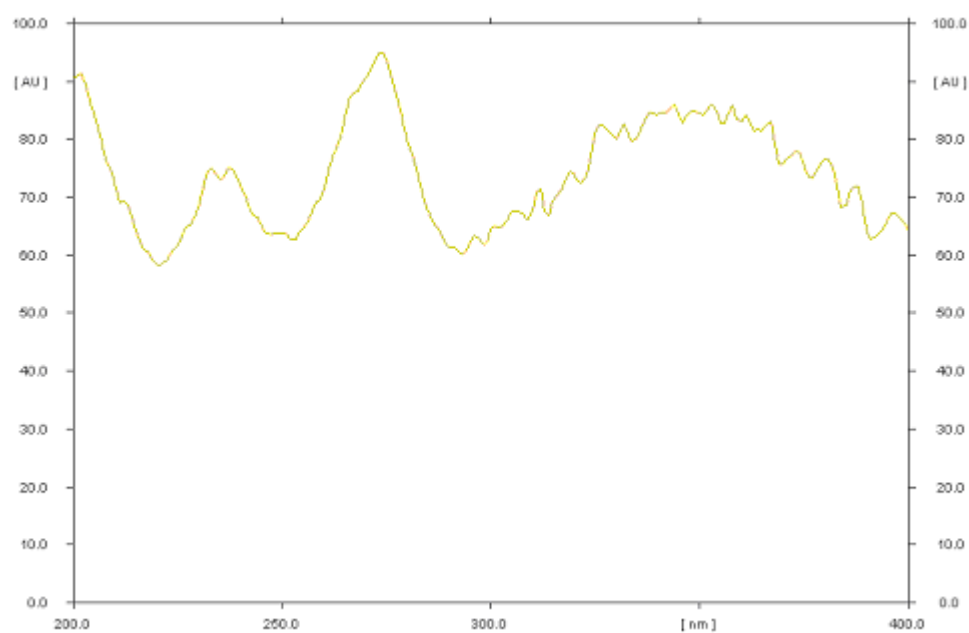
**Fig. S67.** Spectra of substance 2 (naproxen ethyl ester) with  $R_F = 0.67$  formed after irradiation of naproxen in solutions II, III, IV, V, VI for 10 h (mobile phase B: AcOH - Hex - ACE, 0.10:10:10, v/v/v)).



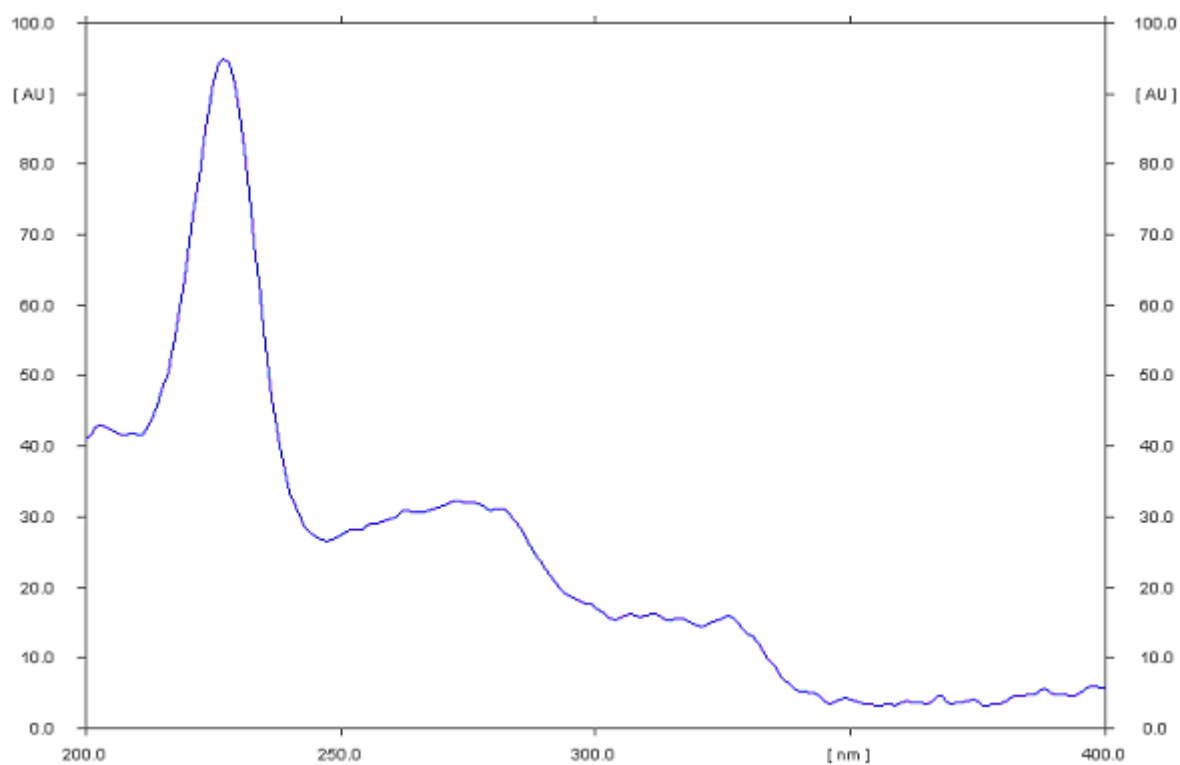
**Fig. S68.** Spectra of substance 3 with  $R_F = 0.73$  formed after irradiation of naproxen in solutions II, III, IV, V, VI for 10 h (mobile phase B: AcOH - Hex - ACE, 0.10:10:10, v/v/v).



**Fig. S69.** Spectra of substance 4 with  $R_F = 0.20$  formed after irradiation of naproxen in solutions II, III, IV, V, VI for 10 h (mobile phase B: AcOH - Hex - ACE, 0.10:10:10, v/v/v).



**Fig. S70.** Spectra of substance 5 with  $R_F = 0.45$  formed after irradiation of naproxen in solution VI for 10 h (mobile phase B: AcOH - Hex - ACE, 0.10:10:10, v/v/v).



**Fig. S71.** Spectra of substance 6 with  $R_F = 0.82$  formed after irradiation of naproxen in solution III for 10 h (mobile phase B: AcOH - Hex - ACE, 0.10:10:10, v/v/v).

**Table S4.** R<sub>F</sub> values and chromatographic peak area of naproxen and its chemical transformation products formed in individual solutions irradiated from the top by UV light (254 nm), after separation using a mobile phase B: AcOH - Hex - ACE, 0.10:10:10 (v/v/v).

Solution	Exposure time	Substance <sup>a)</sup>	R <sub>F</sub>	Chromatographic band area [AU] <sup>b)</sup>	% of band area
I	0 h	N	0.50	17935	100
		N	0.49	14622	67.59
II	5 h	S1	0.04	707	3.27
		S2	0.69	975	4.51
		S3	0.75	1551	7.17
		S4	0.19	3777	17.46
		N	0.50	14826	58.75
	10 h	S1	0.04	1102	4.37
		S2	0.66	2590	10.26
		S3	0.73	4812	19.07
		S4	0.19	1907	7.55
		S5	—	—	—
		S6	—	—	—
	5 h	N	0.48	12790	51.58
		S1	0.04	458	1.85
		S2	0.68	2739	11.05
		S3	0.74	4943	19.93
		S4	0.19	3865	15.59
III	10 h	N	0.50	5956	17.91
		S1	0.03	936	2.81
		S2	0.67	10379	31.20
		S3	0.73	12967	38.98
		S4	0.21	1505	4.52
		S5	—	—	—
		S6	0.82	1519	4.58
IV	5 h	N	0.47	14162	60.22
		S1	0.04	520	2.21
		S2	0.67	1216	5.17
		S3	0.74	3032	12.99
		S4	0.18	4586	19.50
	10 h	N	0.50	10621	35.36
		S1	0.04	880	2.93
		S2	0.67	6568	21.87
		S3	0.73	10132	33.73
		S4	0.20	1836	6.11
		S5	—	—	—
		S6	—	—	—
V	5 h	N	0.47	14496	74.08
		S1	0.03	468	2.39
		S2	0.67	795	4.06
		S3	0.73	2506	12.81
		S4	0.18	1304	6.66
	10 h	N	0.50	13412	46.06
		S1	0.04	407	1.40
		S2	0.67	4817	16.54
		S3	0.73	7778	26.71
		S4	0.20	2705	9.29
		S5	—	—	—
		S6	—	—	—

VI	5 h	N	0.47	12874	56.27
		S1	0.03	635	2.78
		S2	0.67	2829	12.37
		S3	0.73	6539	28.58
		S4	—	—	—
	10 h	N	0.51	11795	47.46
		S1	0.04	525	2.11
		S2	0.68	4720	19.00
		S3	0.74	7171	28.85
		S4	—	—	—
		S5	0.45	641	2.58
		S6	—	—	—

where:

<sup>a)</sup> N - naproxen

S1, S2, S3, S4, S5, S6 - products of chemical transformation of naproxen; and S2 was identified as naproxen ethyl ester

<sup>b)</sup> Area of the chromatographic band at  $\lambda_{\max}$