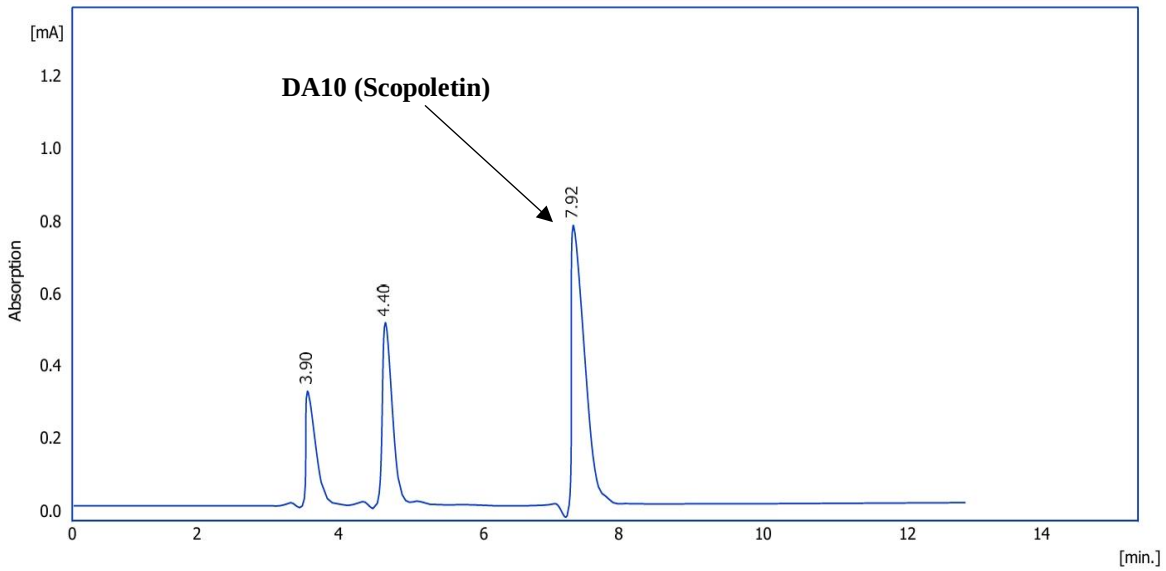
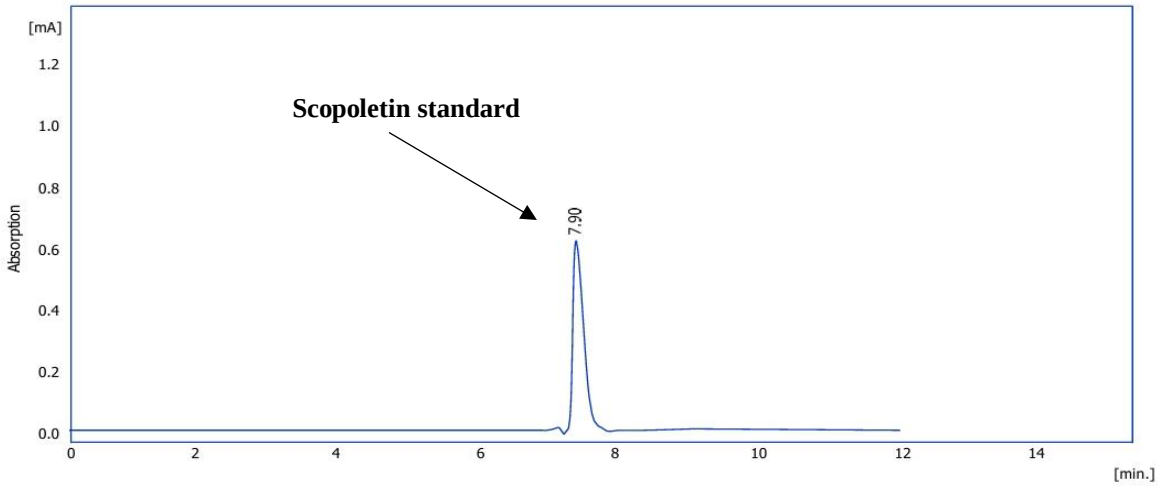
Supplementary data



Result chromatography Table (Uncal - F:\ chloroform)

No	Reten. Time [min]	Area [mAU.s]	Height [mAU]	Area [%]	Height [%]	W 05 [min]	Compound Name
1	3.90	2541.15	362.05	20.00	20.00	0.05	
2	4.40	4562.35	489.57	30.00	30.00	0.08	
3	7.92	11854.71	784.12	50.00	50.00	0.10	
	Total	18958.71	1635.24	100.00	100.00		

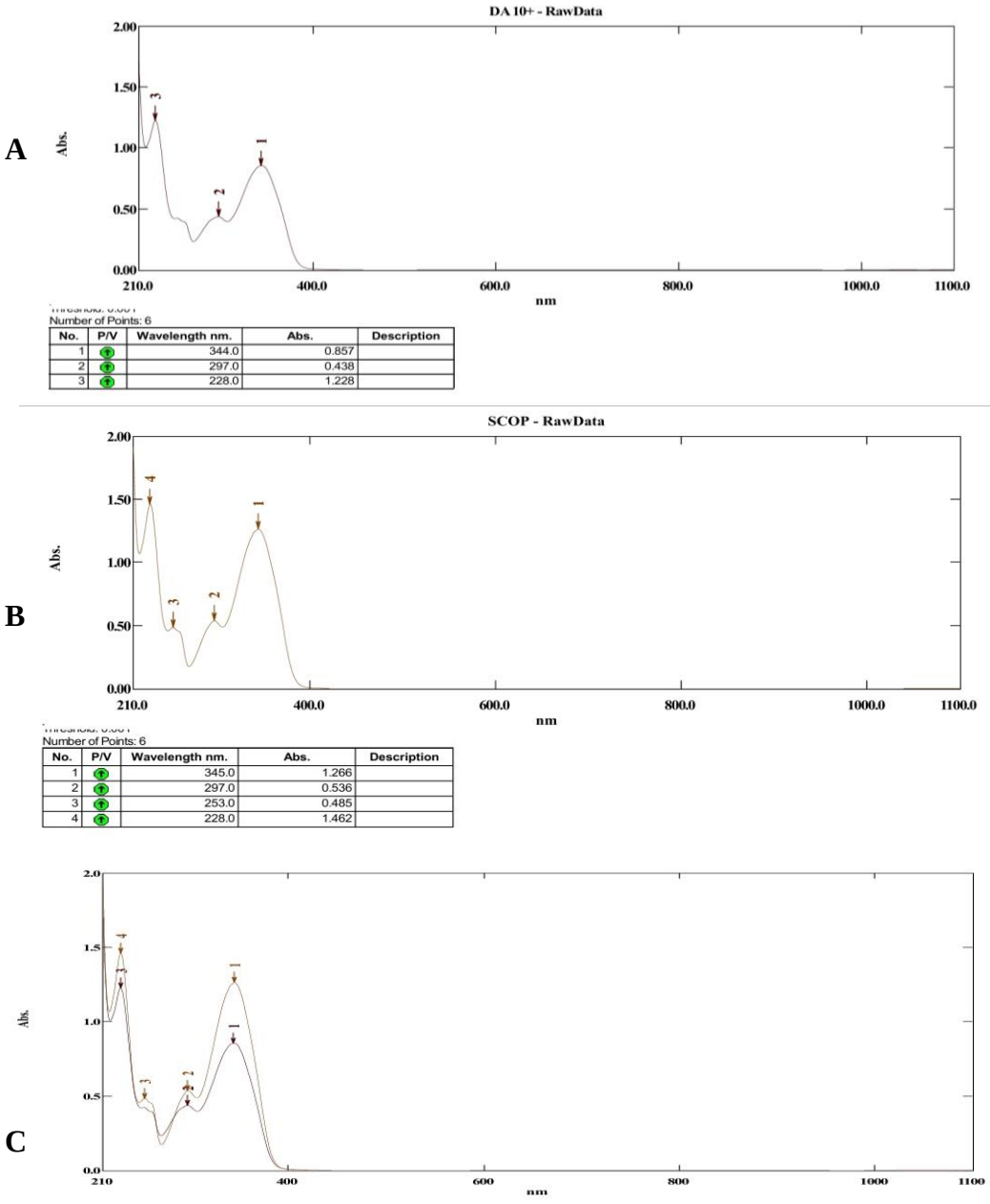
Supplementary Fig. 1. High-performance liquid chromatography chromatogram of the chloroform fraction of *Rhanterium epapposum*, showing the major chromatographic peaks. The main peak at a retention time of 7.92 min corresponds to scopoletin (DA10), indicating it as a major constituent of the fraction.



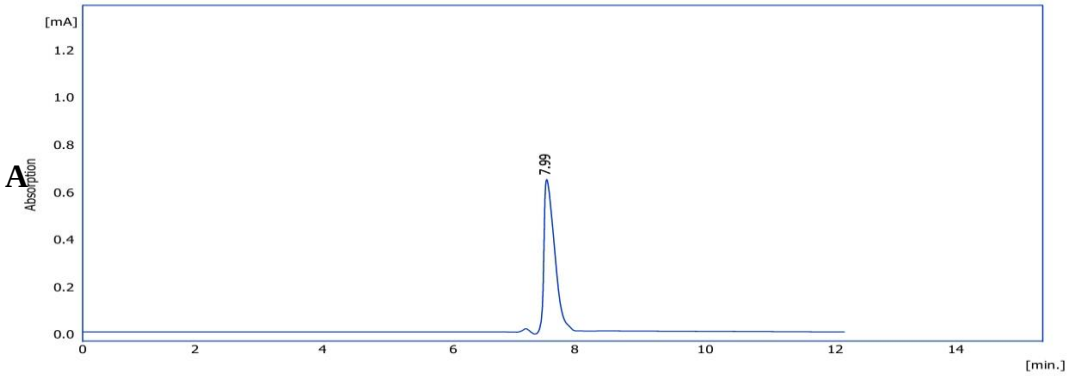
Result chromatography Table (Uncal - F:\ scopoletin 5 ppm)

No	Reten. Time [min]	Area [mAU.s]	Height [mAU]	Area [%]	Height [%]	W 05 [min]	Compound Name
1	7.90	466.21	590.11	100.00	100.00	0.25	
	Total	466.21	590.11	100.00	100.00		

Supplementary Fig. 2. High-performance liquid chromatography chromatogram of the scopoletin standard, showing a single sharp peak at a retention time of 7.90 min, confirming the purity of the standard and its suitability for compound identification.

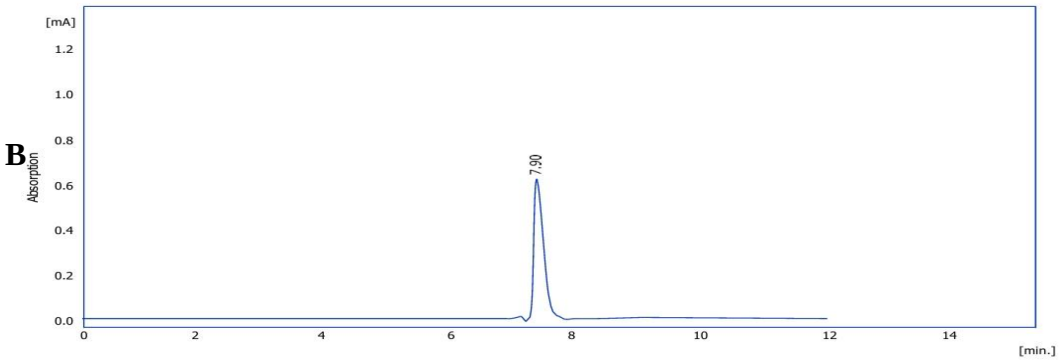


Supplementary Fig. 3. UV-Vis spectra of (A) isolated compound DA10; (B) scopoletin standard; (C) a mixture of DA10 with scopoletin standard. The spectra show similar absorption maxima at approximately 228, 297 and 345 nm, confirming the identity of DA10 as scopoletin.



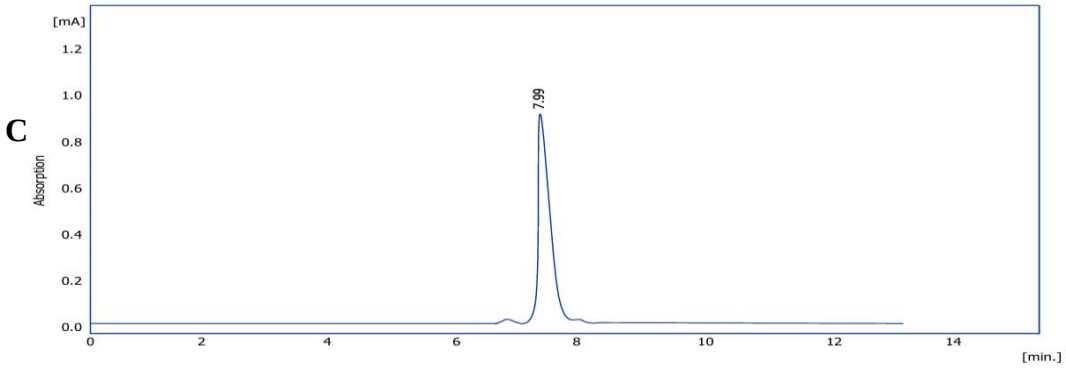
Result chromatography Table (Uncal - F:\ scopalatine isolation)

No	Reten. Time [min]	Area [mAU.s]	Height [mAU]	Area [%]	Height [%]	W 05 [min]	Compound Name
1	7.99	1587.09	620.14	100.00	100.00	0.25	
	Total	1587.09	620.14	100.00	100.00		



Result chromatography Table (Uncal - F:\ scopoletin 5 ppm)

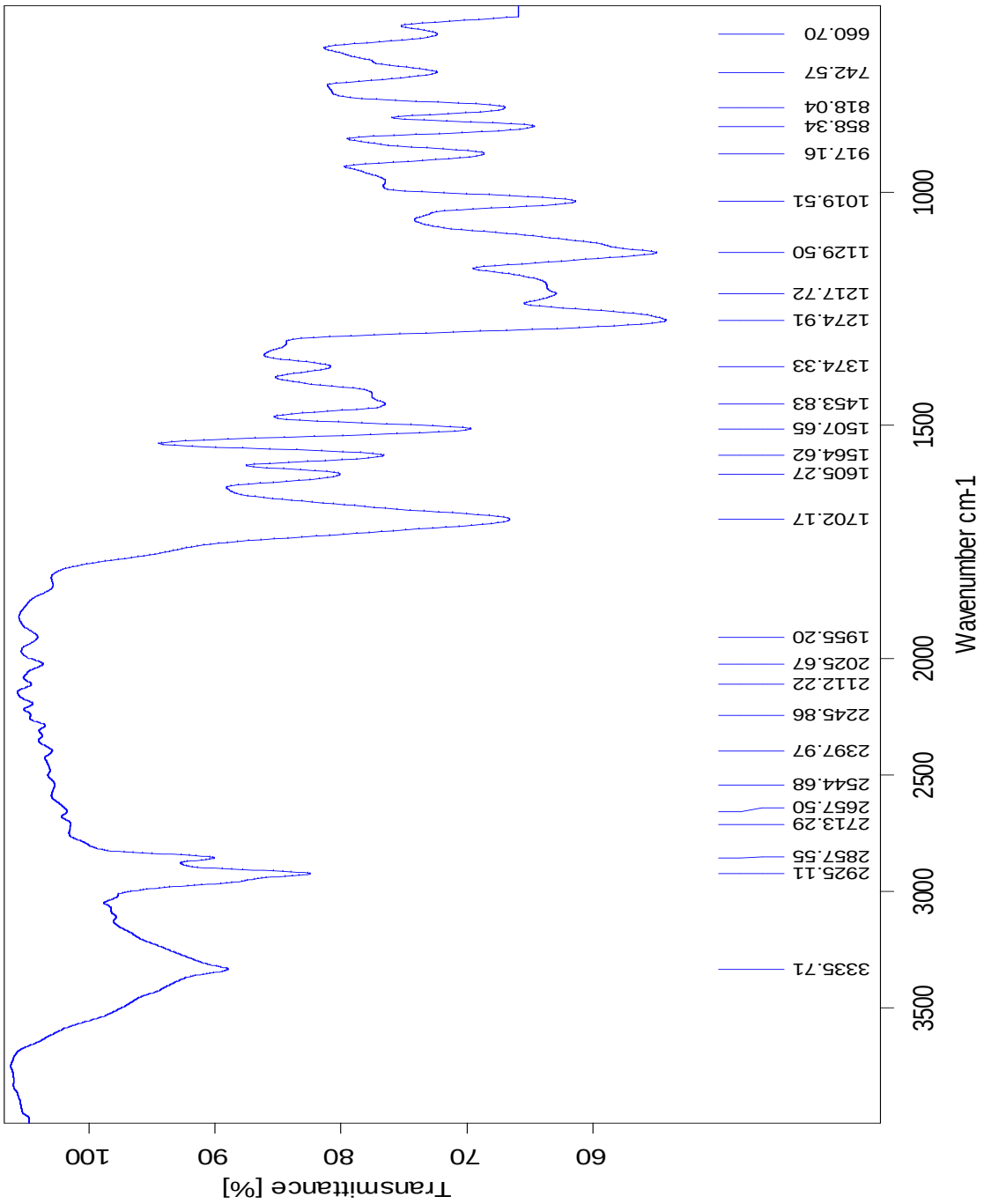
No	Reten. Time [min]	Area [mAU.s]	Height [mAU]	Area [%]	Height [%]	W 05 [min]	Compound Name
1	7.90	466.21	590.11	100.00	100.00	0.25	
	Total	466.21	590.11	100.00	100.00		



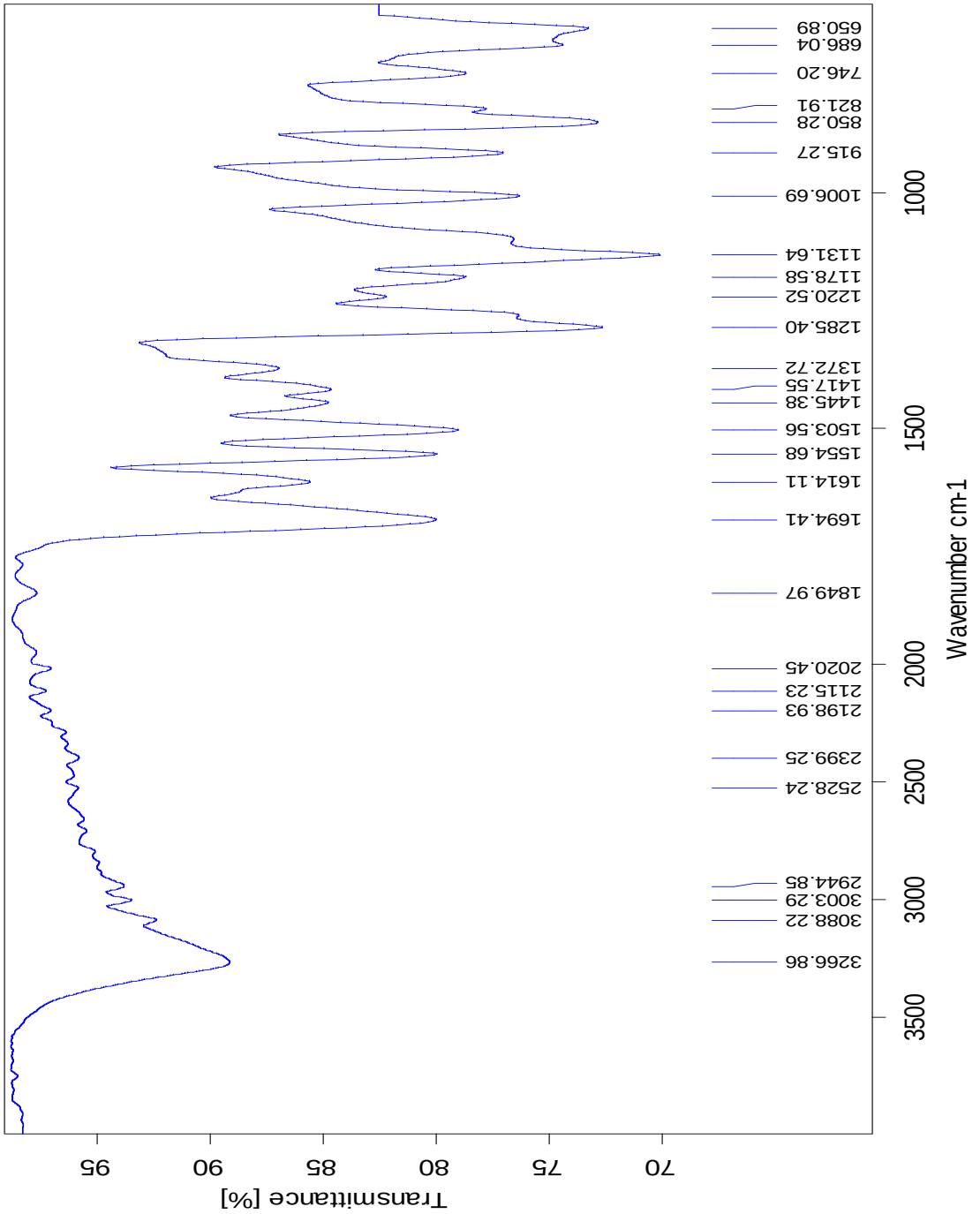
Result chromatography Table (Uncal - F:\ scopalatine isolation + st)

No	Reten. Time [min]	Area [mAU.s]	Height [mAU]	Area [%]	Height [%]	W 05 [min]	Compound Name
1	7.99	2032.69	901.42	100.00	100.00	0.25	
	Total	2032.69	901.42	100.00	100.00		

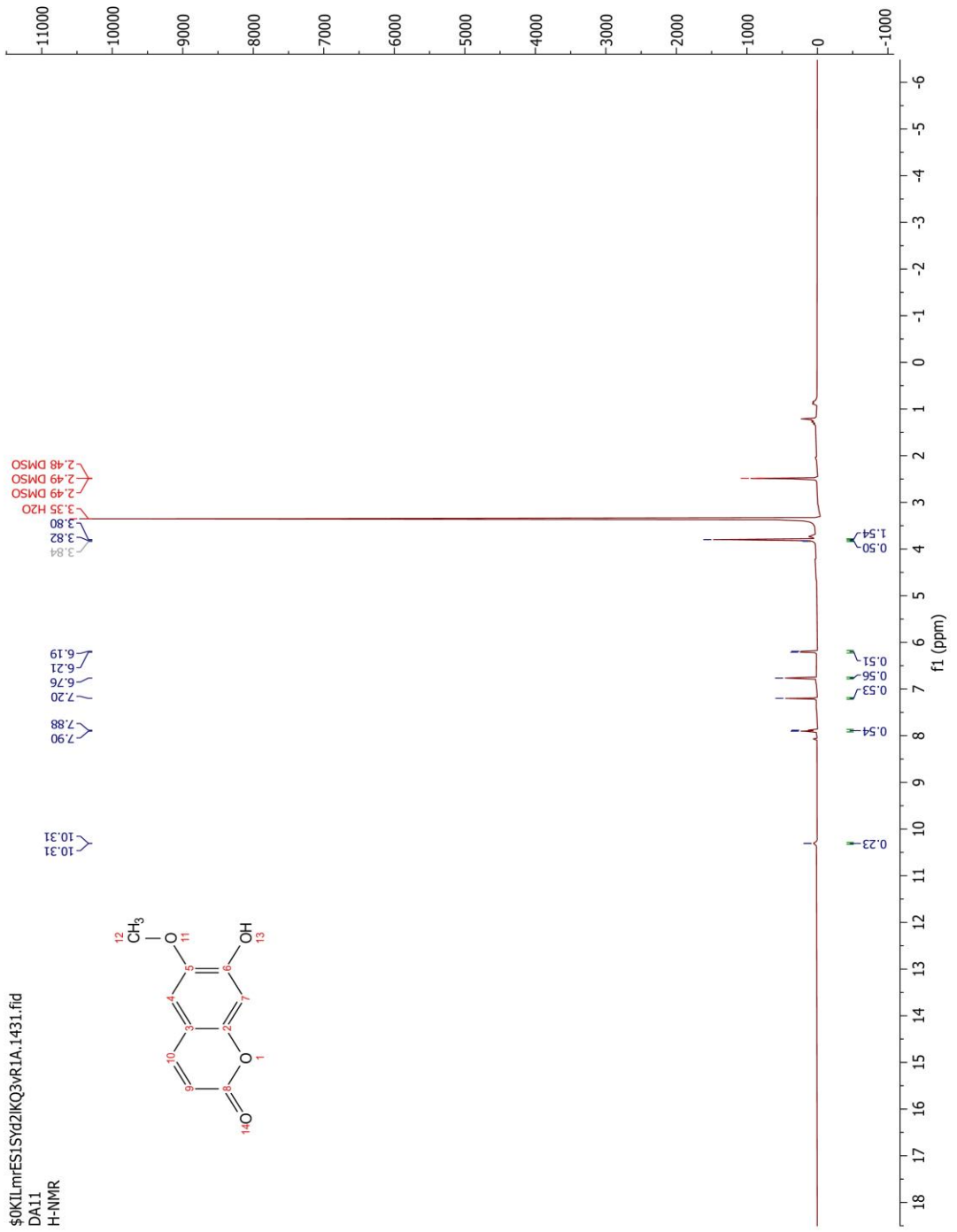
Supplementary Fig. 4. High-performance liquid chromatography chromatograms of (A) isolated compound DA10; (B) scopoletin standard; (C) isolated compound DA10 spiked with scopoletin standard. All chromatograms show a single peak at a similar retention time (~7.9 min), confirming the identity of DA10 as scopoletin.



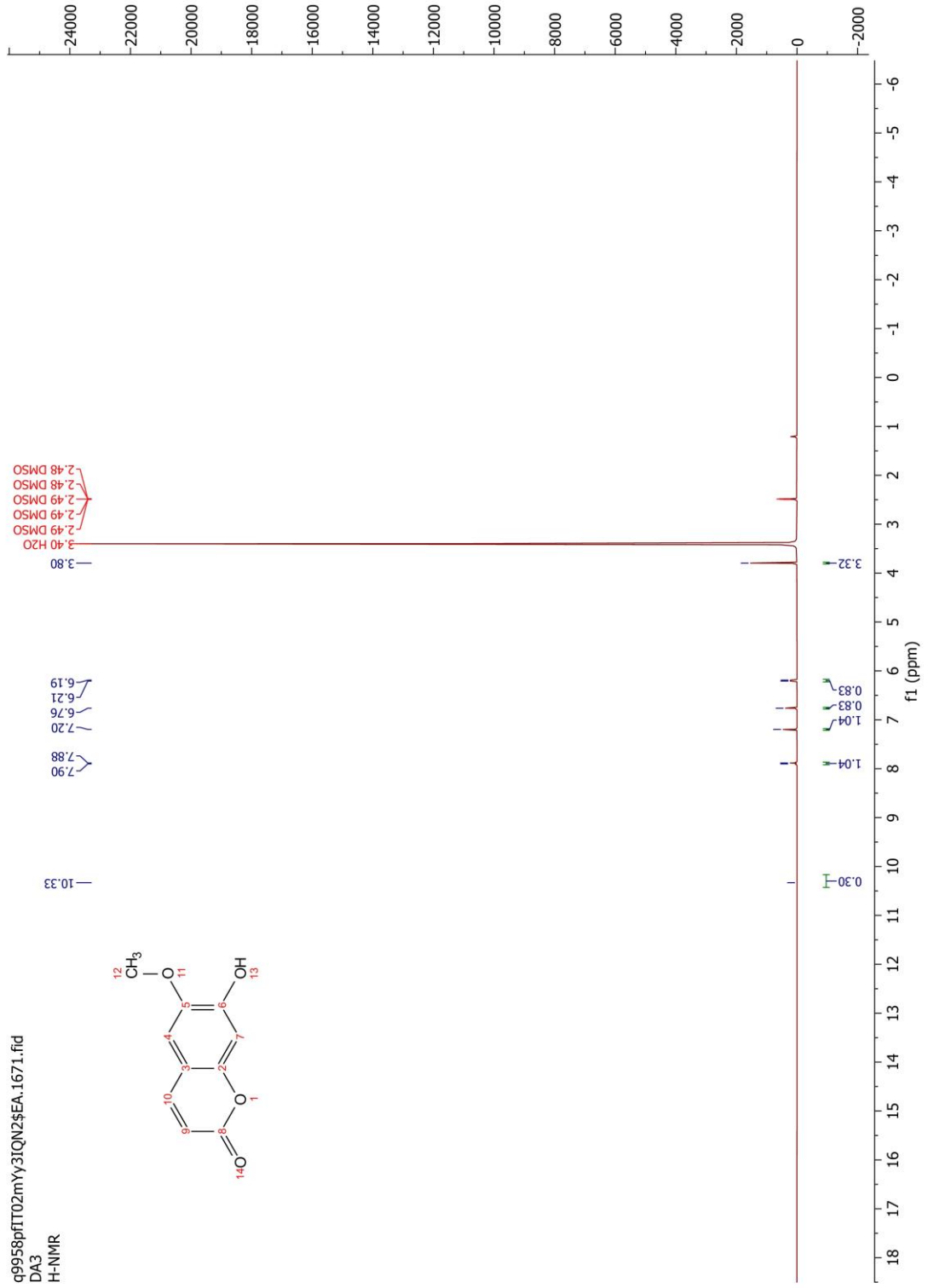
Supplementary Fig. 5. Fourier transform infrared spectrum of the isolated compound DA10, showing characteristic absorption bands corresponding to hydroxyl (O–H) stretching (~3335 cm^{-1}), carbonyl (C=O) stretching (~1702 cm^{-1}), aromatic C=C stretching (1600–1500 cm^{-1}) and C–O stretching vibrations (1200–1000 cm^{-1}), consistent with the functional groups of scopoletin.



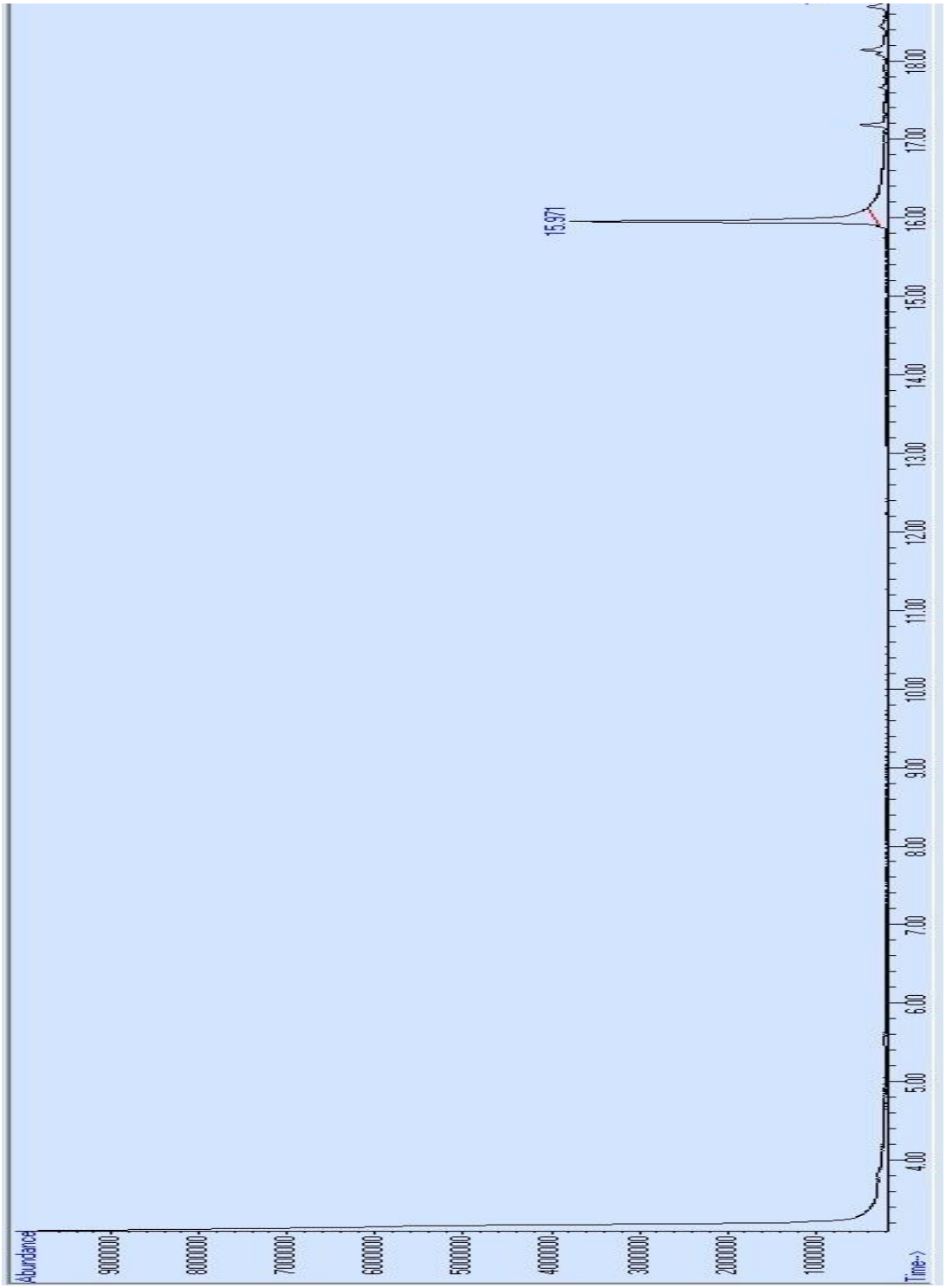
Supplementary Fig. 6. Fourier transform infrared spectrum of the scopoletin standard, showing characteristic absorption bands attributed to hydroxyl (O–H) stretching (~3266–3330 cm^{-1}), carbonyl (C=O) stretching (~1700 cm^{-1}), aromatic C=C vibrations (1600–1500 cm^{-1}) and C–O stretching bands in the region of 1200–1000 cm^{-1}.



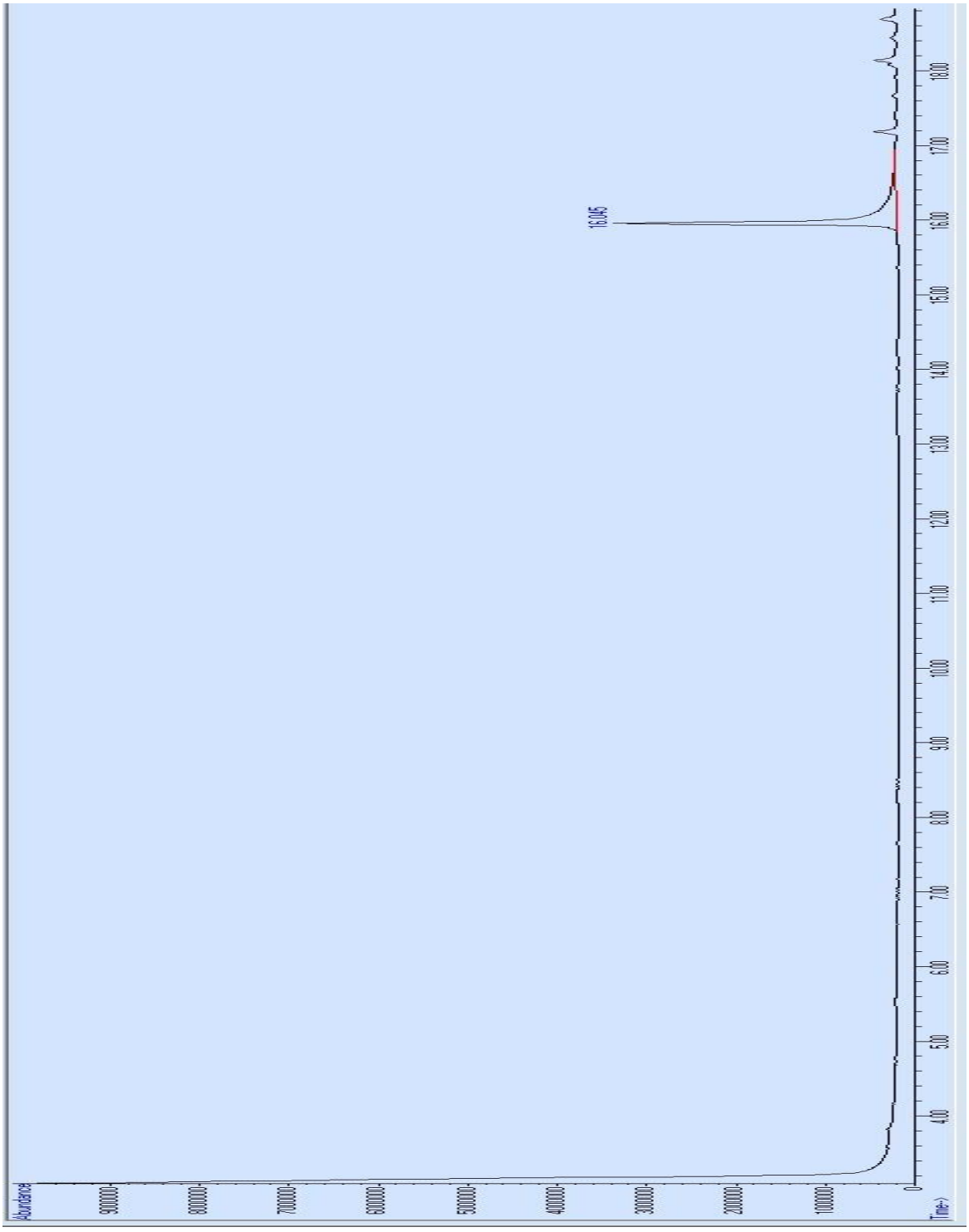
Supplementary Fig. 7. Proton nuclear magnetic resonance spectrum of the isolated compound DA10, displaying signals attributable to aromatic protons, a methoxy group and a phenolic hydroxyl proton, confirming its identification as scopoletin.



Supplementary Fig. 8. Proton nuclear magnetic resonance spectrum of the scopoletin standard, showing characteristic proton signals corresponding to aromatic protons, a methoxy (–OCH_3) group and a phenolic hydroxyl (–OH) proton, consistent with the reported structure of scopoletin.



Supplementary Fig. 9. Gas chromatography-mass spectrometry chromatogram of the isolated compound DA10, showing a retention time (R_t) of 15.971 min, which is comparable to that of the scopoletin standard, supporting the identification of DA10 as scopoletin.



Supplementary Fig. 10. Gas chromatography-mass spectrometry chromatogram of the scopoletin standard, showing a retention time (R_t) of 16.045 min, consistent with the retention time of the isolated compound DA10.