Supplementary Information (SI) for New Journal of Chemistry.

Original gel images (before cropping) that were used for manuscript preparation

Note: In all gels, SC stands for supercoiled native DNA, OC refers to open circular damaged DNA, and Linear denotes the cleaved linear form of DNA.

Figure 1. The impact of pH on antioxidant activities. The left panels show samples at pH 4, the middle panels at pH 7, and the right panels at pH 9. In each panel, lane 1 contains native DNA, and lane 2 consists of DNA + AAPH. Lanes 3-6 are DNA + AAPH + antioxidant at various concentrations: 41.7 µM, 20.8 µM, 10.4 µM, and 5.2 µM, respectively. If protection did not stop, four additional concentrations (Lanes 7-10: 2.6 µM, 1.3 µM, 0.65 µM, and 0.33 µM) were tested. Hydrophilic antioxidants: (A) Sodium ascorbate; (B) Compound **3**. Hydrophobic antioxidants: All controls and antioxidants contain 1% DMSO. (C) Quercetin; (D) Compound **1**; (E) Compound **2**; (F) Compound **4**.

Fig 1A. Sodium ascorbate

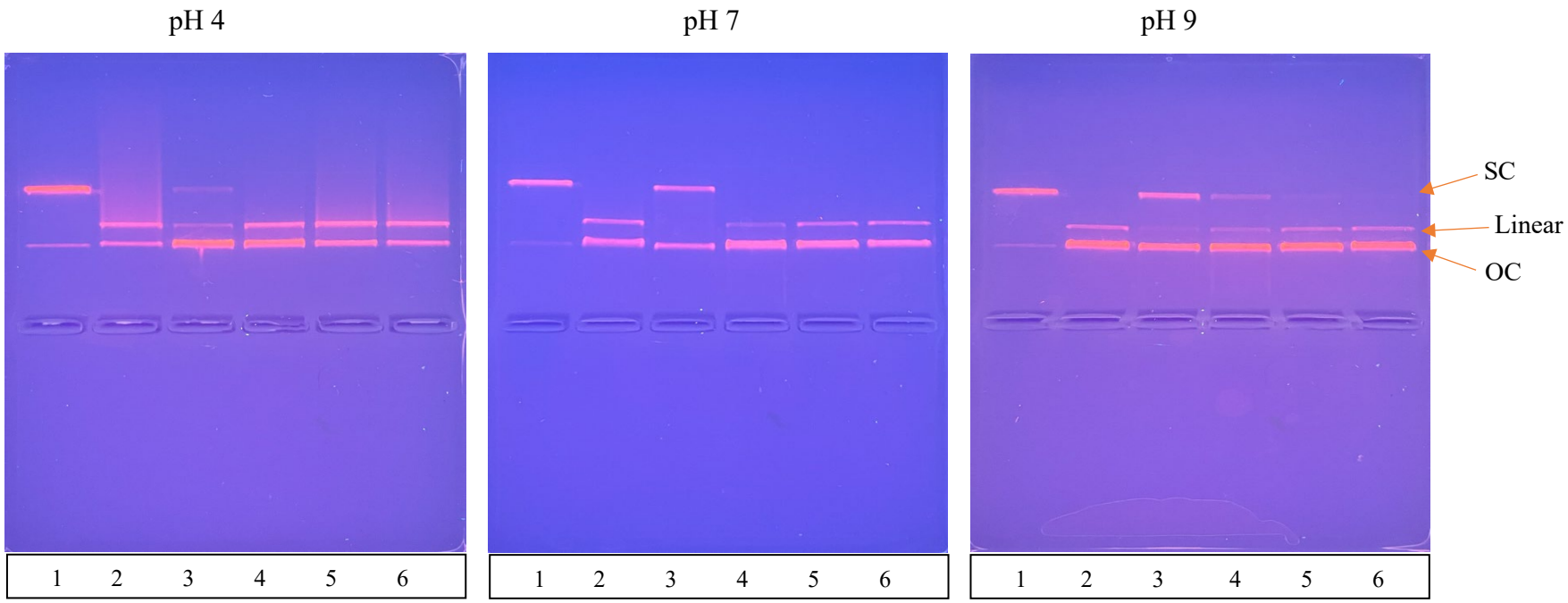


Fig. 1B. Compound **3**

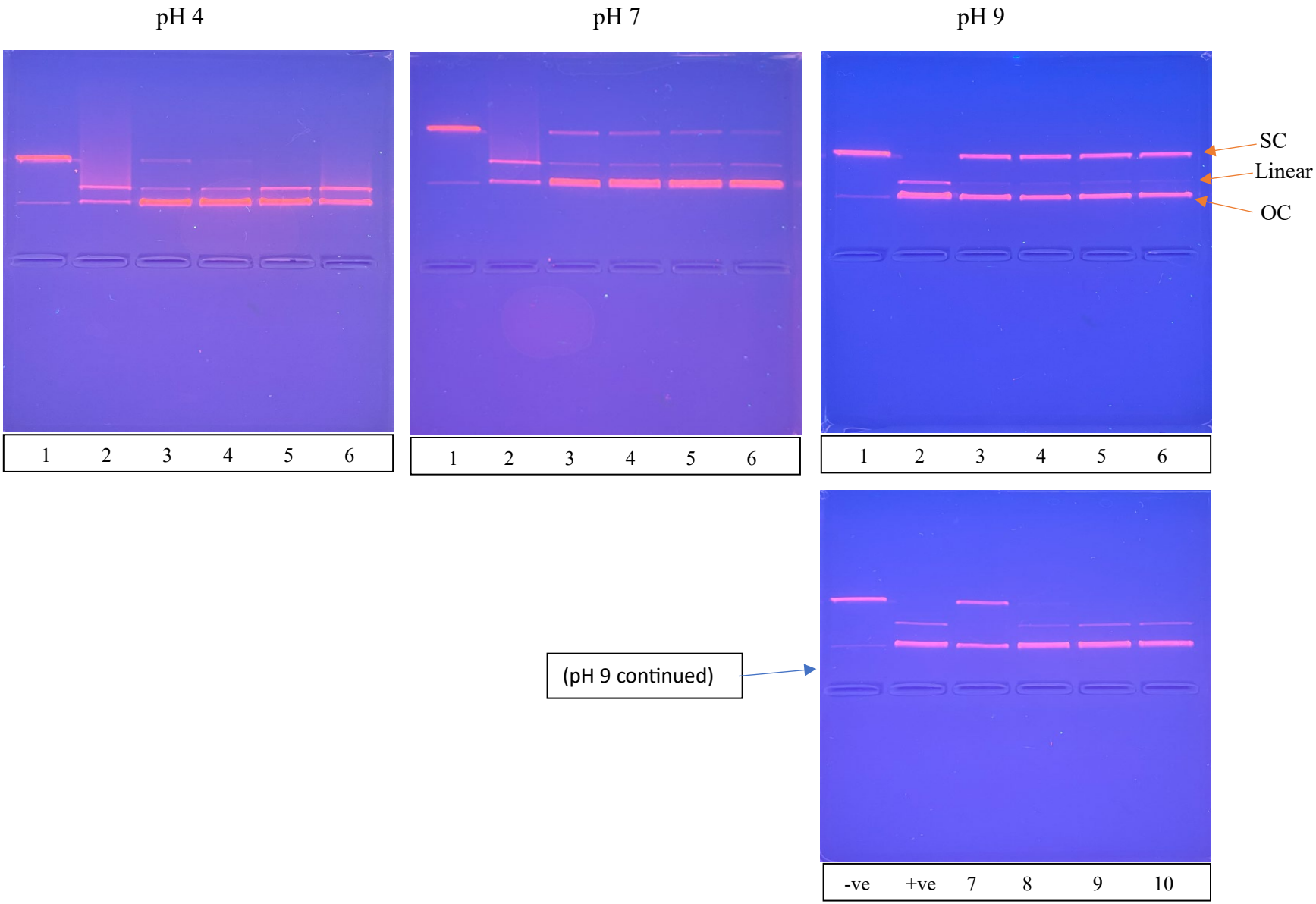


Fig. 1C. Quercetin

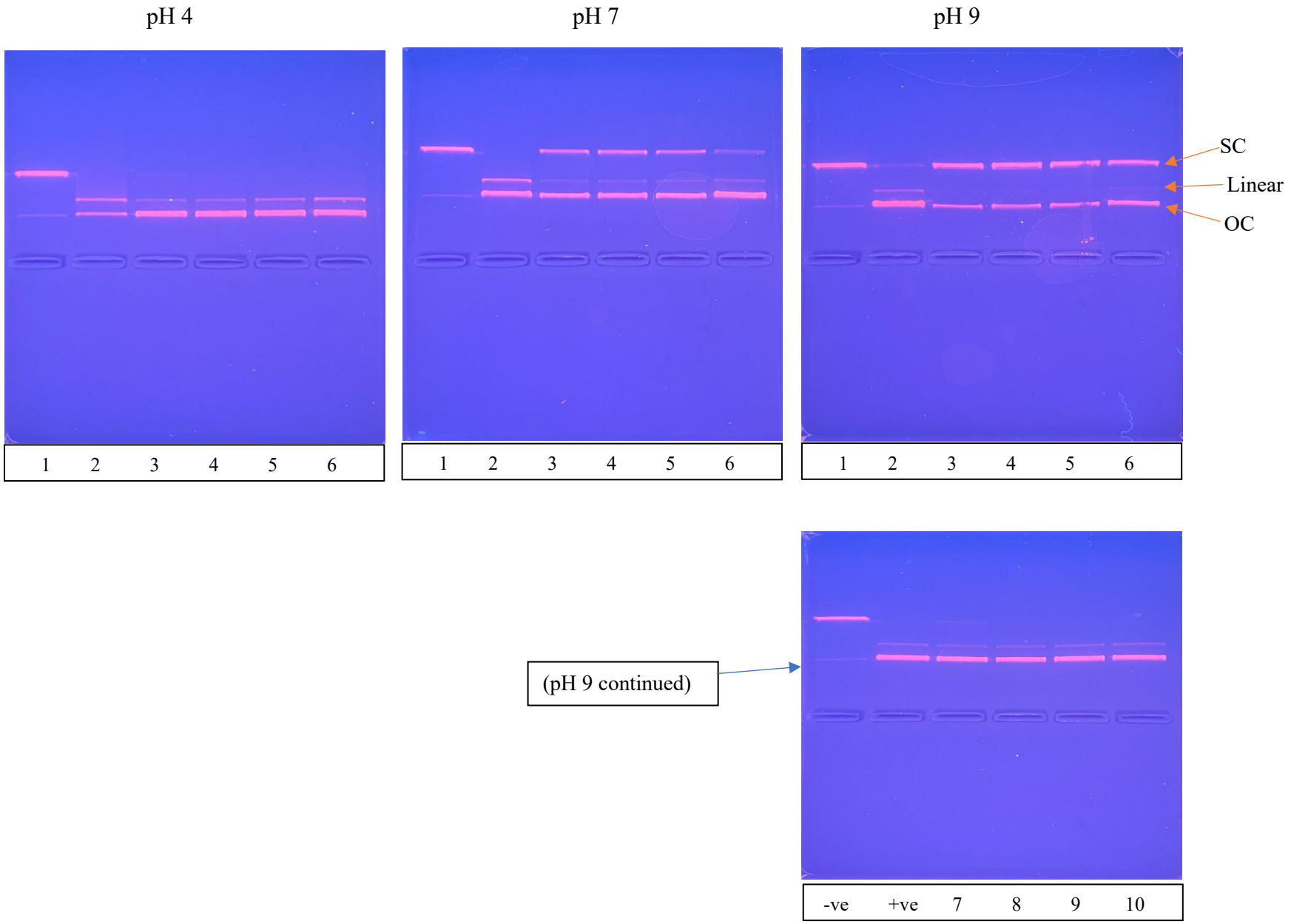


Fig. 1D. Compound **1**

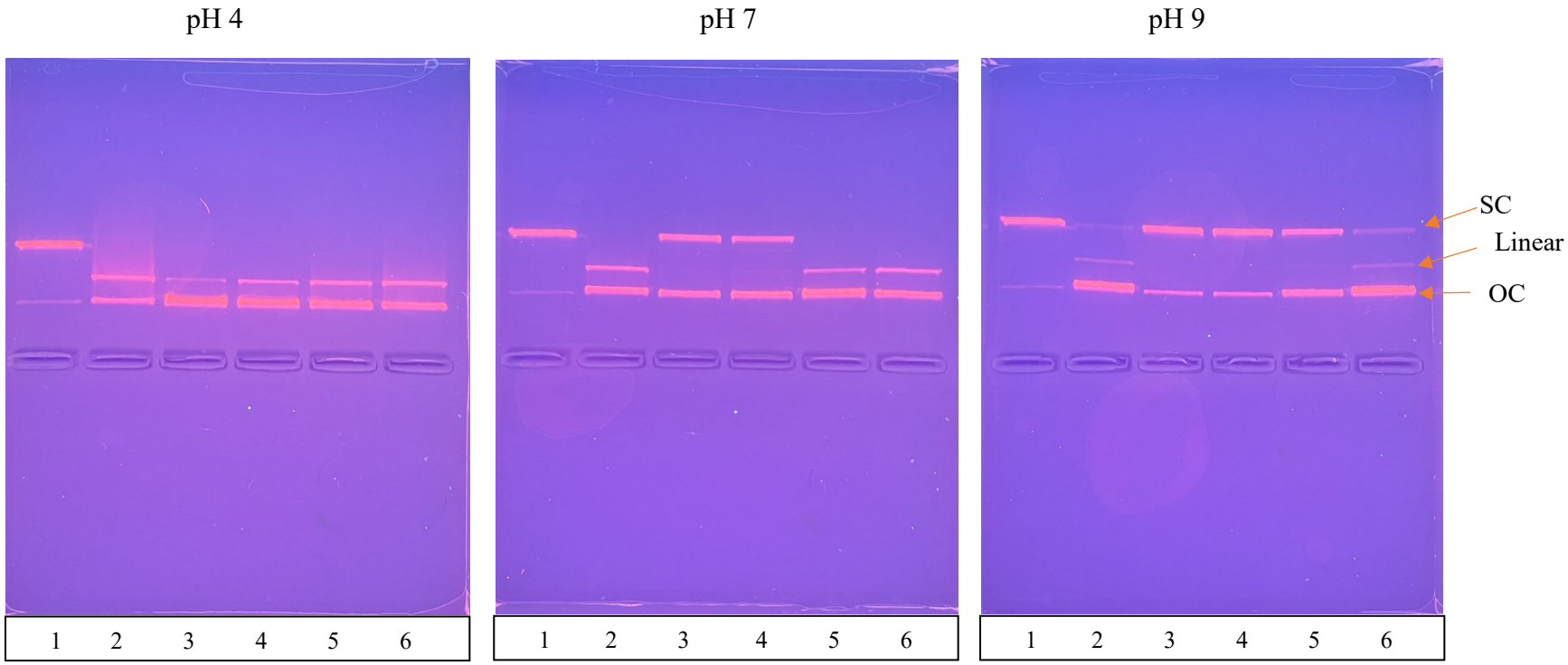


Fig. 1E. Compound **2**

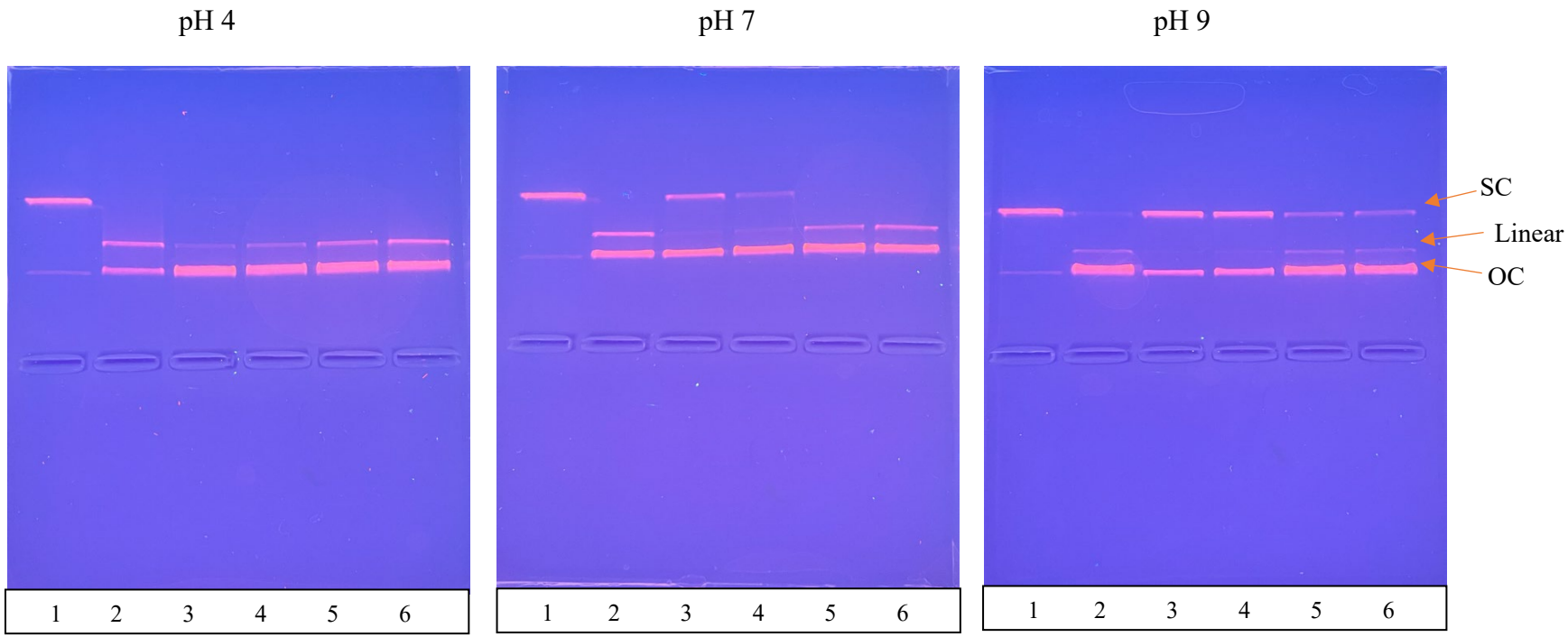


Fig. 1F. Compound **4**.

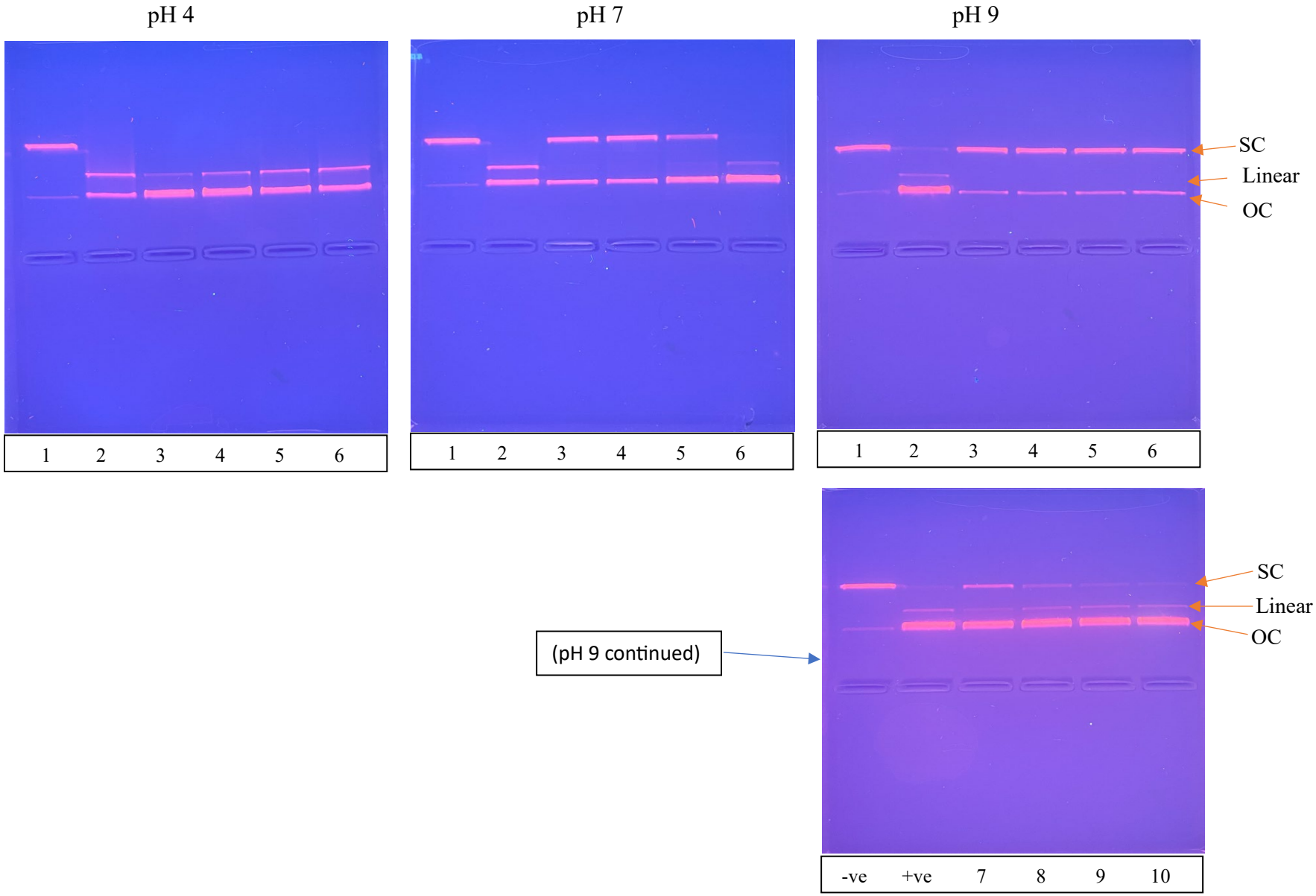


Figure 2. The pro-oxidant effects of antioxidant standards in PBS.
Lane 1 (native DNA), lane 2 (native DNA + Cu(II) ions, without antioxidant), and lanes 3–12 contain native DNA + Cu(II) ions + antioxidant at various concentrations: 83.3 µM, 41.7 µM, 20.8 µM, 10.4 µM, 5.2 µM, 2.6 µM, 1.3 µM, 0.65 µM, 0.33 µM, and 0.16 µM, respectively. (A) Sodium ascorbate; (B) Quercetin.

Fig 2A. Sodium ascorbate

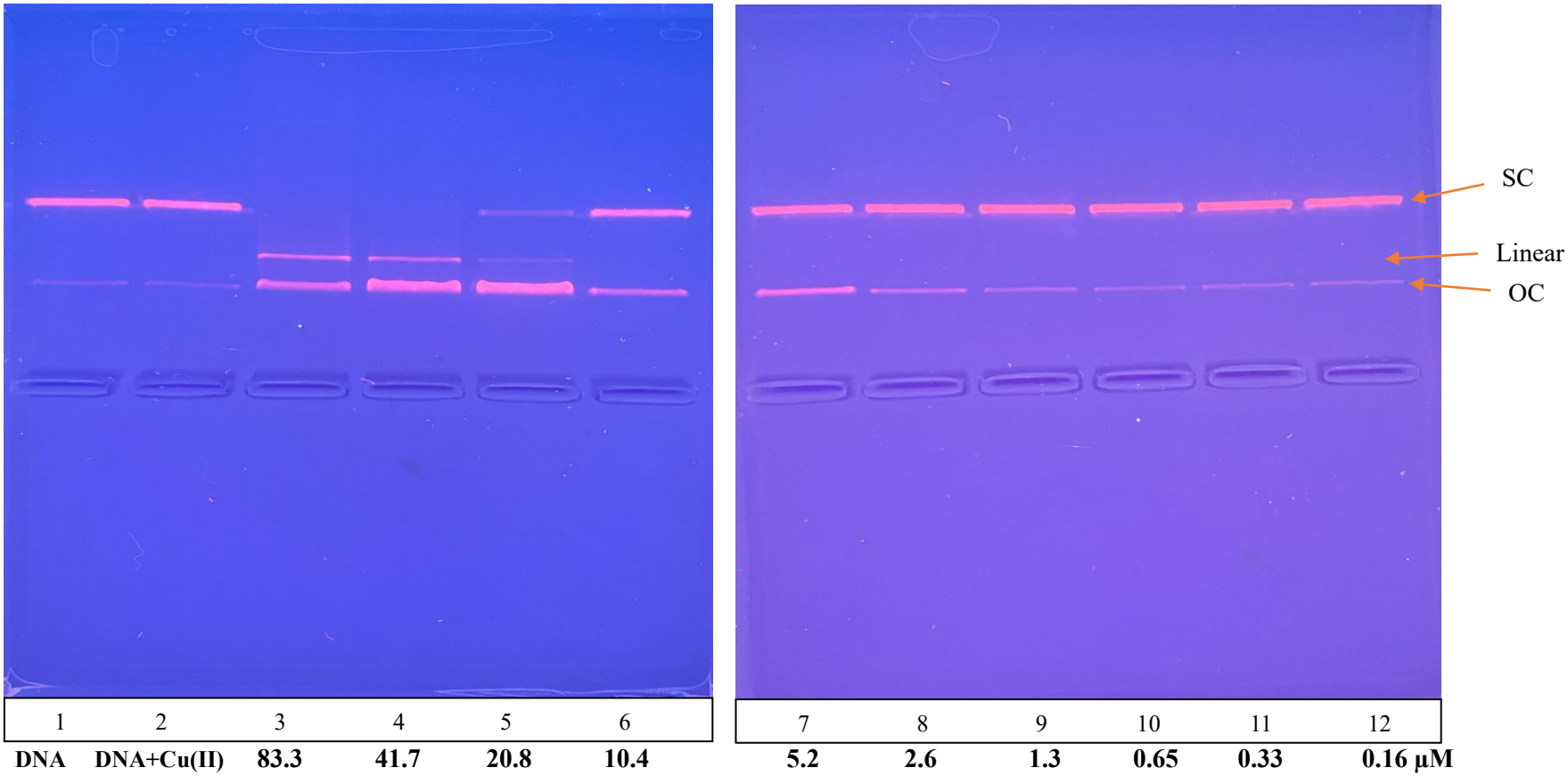


Fig 2B. Quercetin

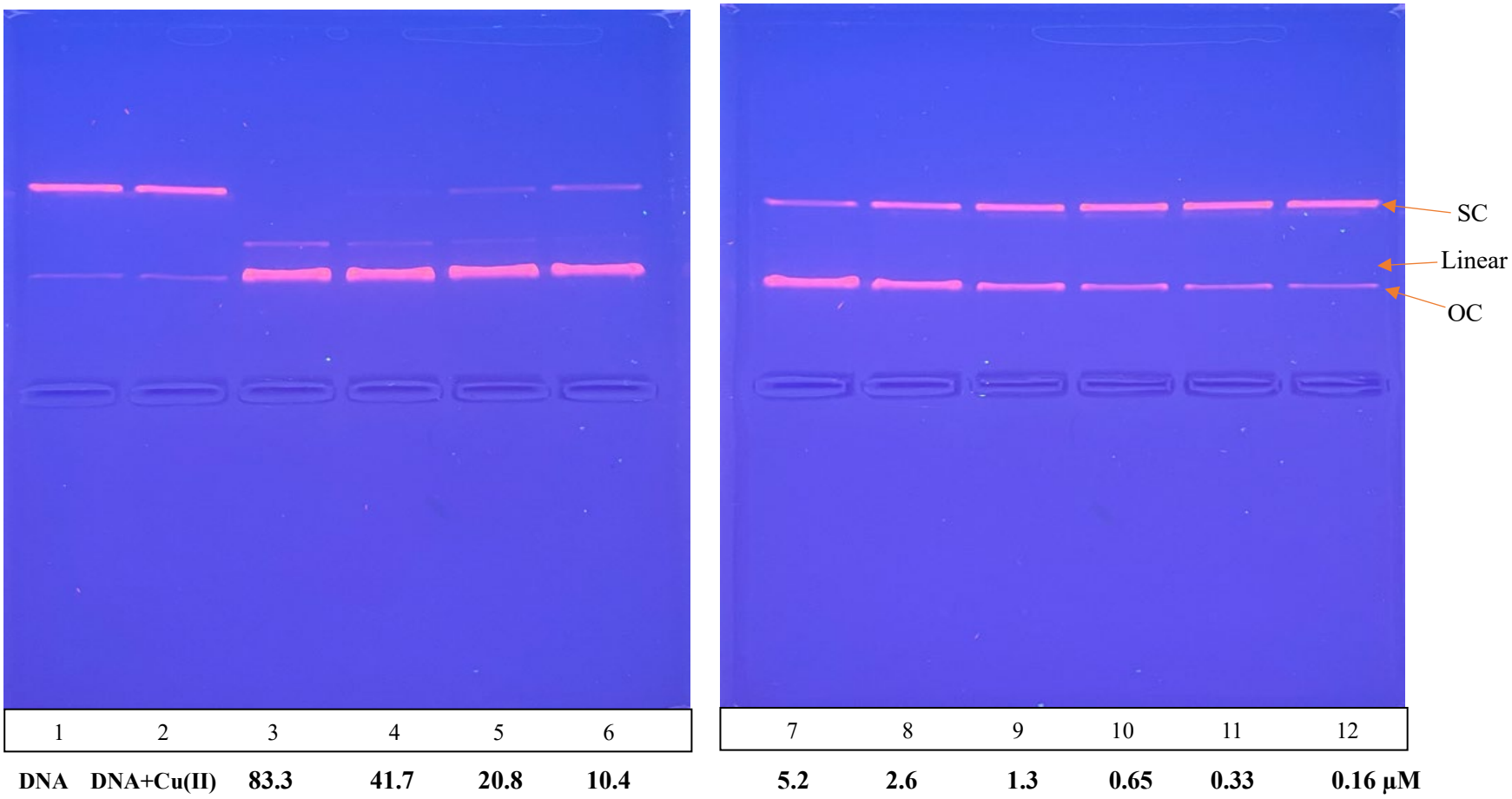


Figure 3. The impact of pH on the pro-oxidant properties of antioxidant standards. The left panels display samples at pH 4, the middle panels at pH 7, and the right panels at pH 9. In the quercetin tests, 1% DMSO was used for the controls and the sample solutions. In each panel, lane 1 contains native DNA, and lane 2 contains DNA + Cu(II) ions. Lanes 3-6 show DNA + Cu(II) ions + antioxidants at various concentrations: 41.7 µM, 20.8 µM, 10.4 µM, and 5.2 µM, respectively. (A) Sodium ascorbate; (B) Quercetin.

Fig. 3A. Sodium ascorbate

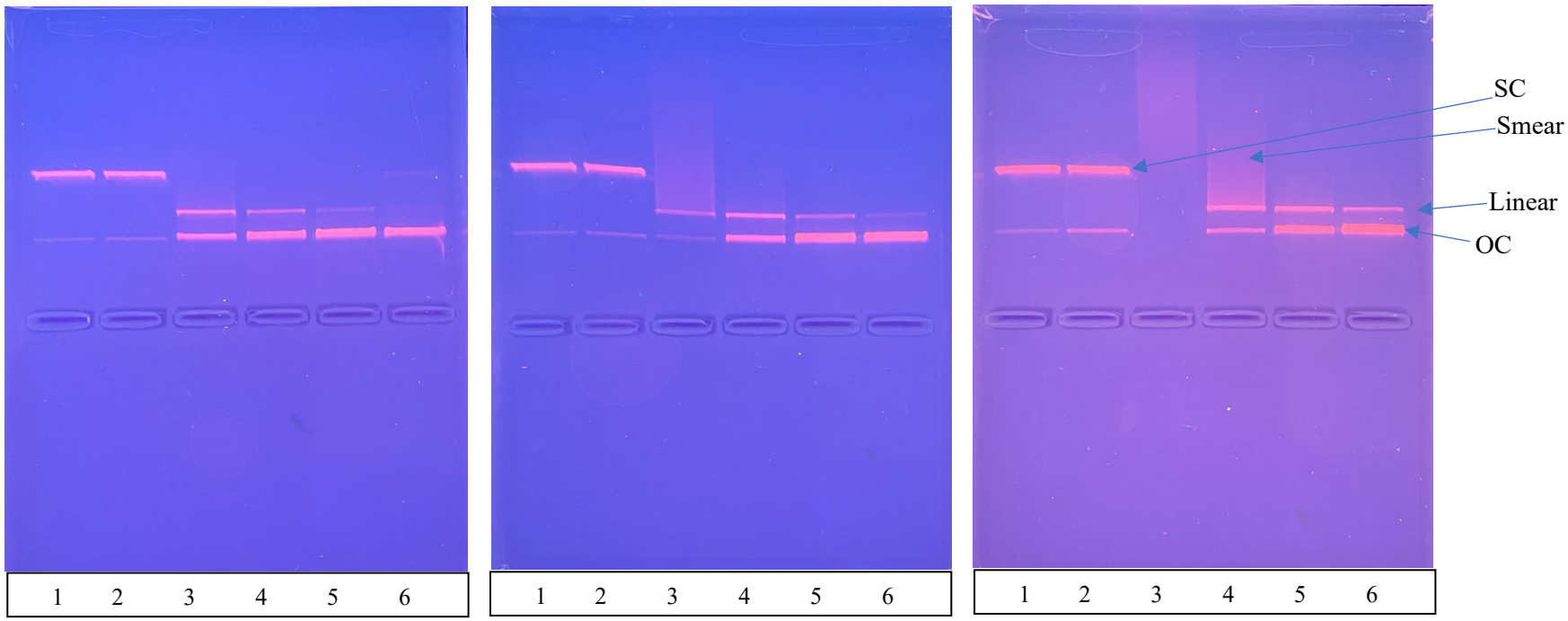
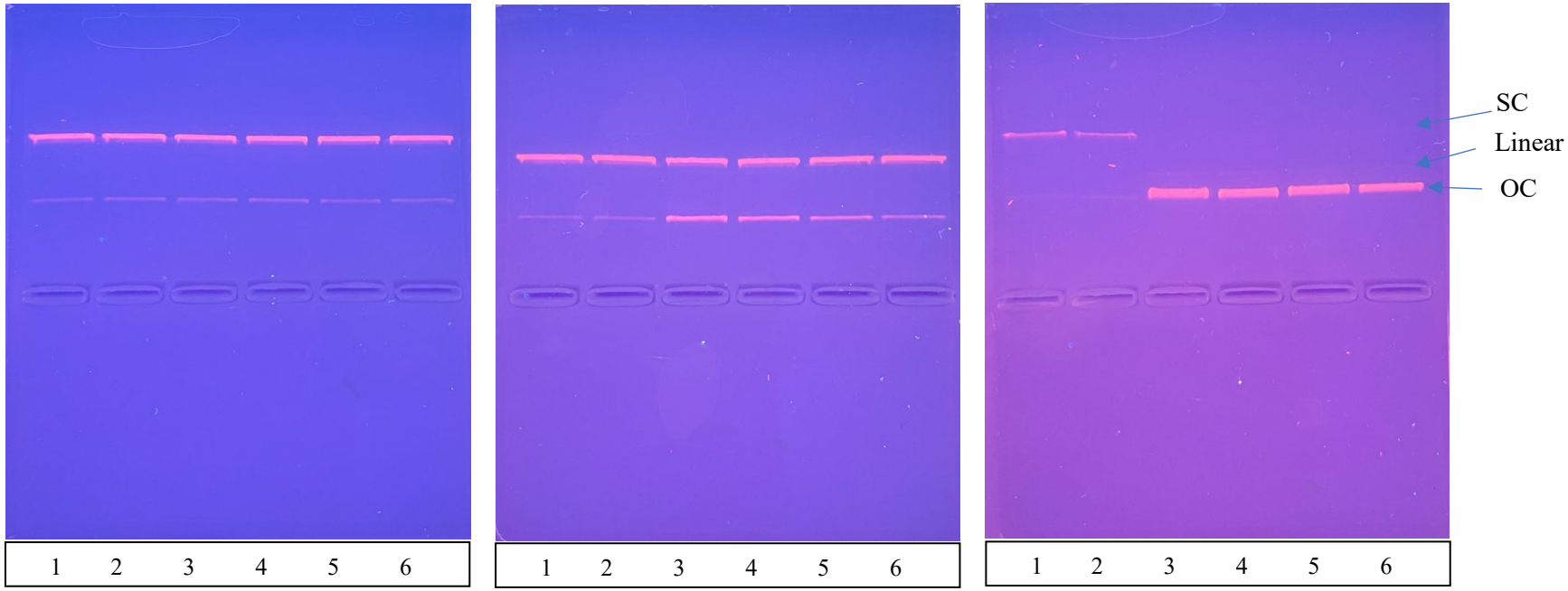


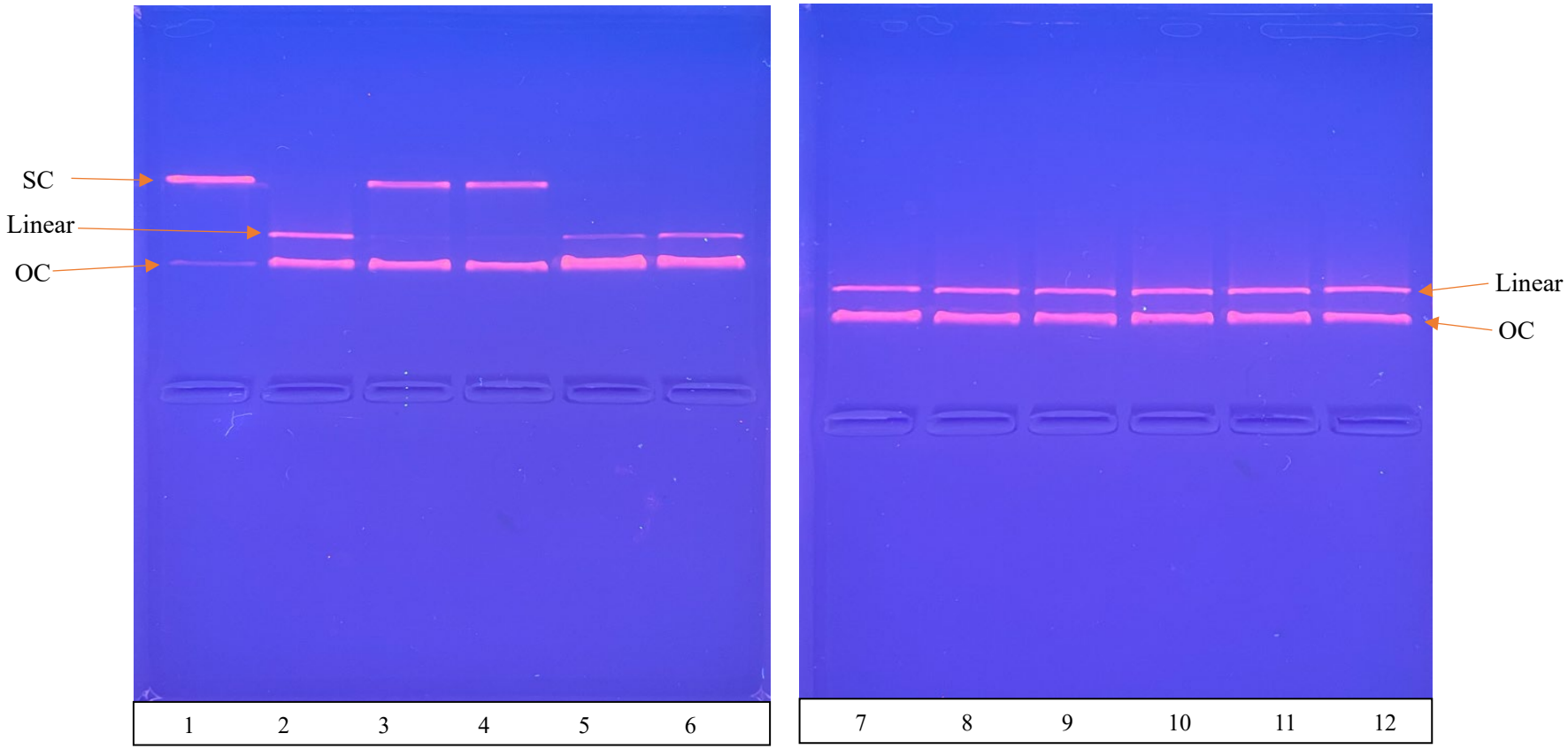
Fig. 3B. Quercetin



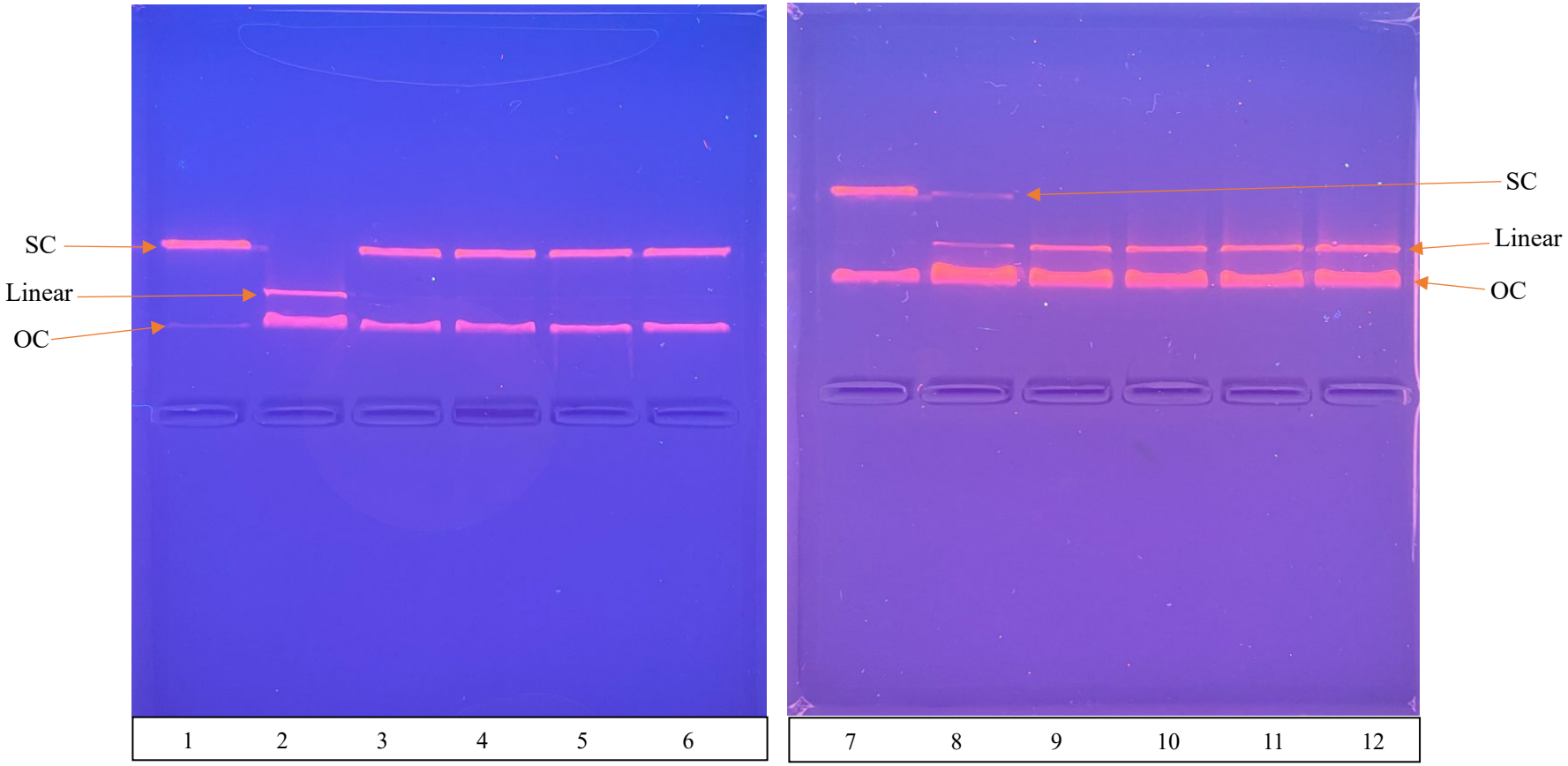
Original gel images (before cropping) used for supplementary information

S1. Protection against AAPH-induced DNA oxidation by antioxidants (in PBS). Lane 1 (native DNA), lane 2 (AAPH + DNA, without antioxidant), and lanes 3–12 (AAPH + DNA with antioxidant at various concentrations: 83.3 µM, 41.7 µM, 20.8 µM, 10.4 µM, 5.2 µM, 2.6 µM, 1.3 µM, 0.65 µM, 0.33 µM, and 0.16 µM, respectively. (A) Sodium ascorbate; (B) Compound **3**; (C) Quercetin; (D) Compound **1**; (E) Compound **2**; (F) Compound **4**.

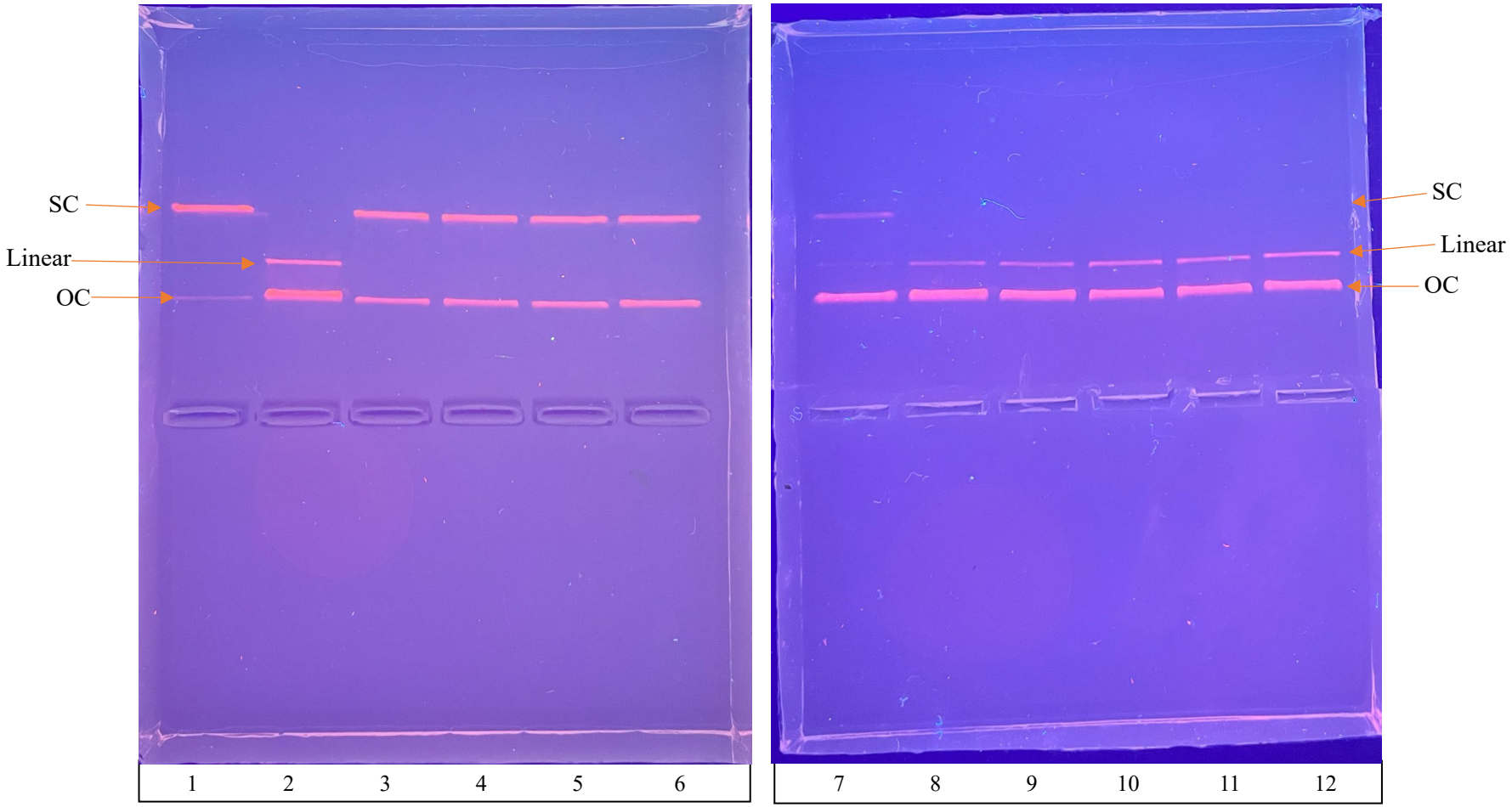
S1A. Sodium Ascorbate



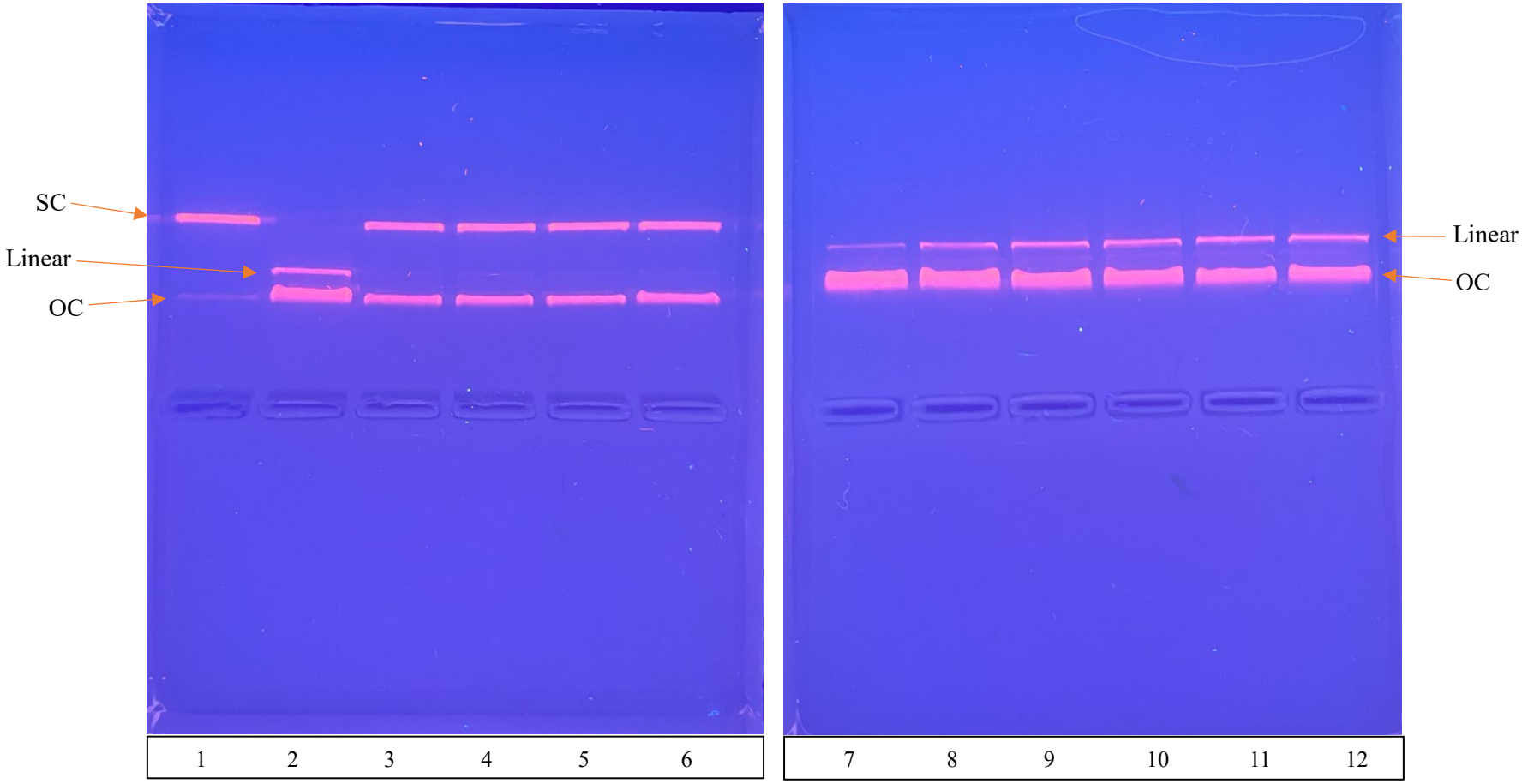
S1B. Compound **3** (Lysine-Syringaldehyde derivative)



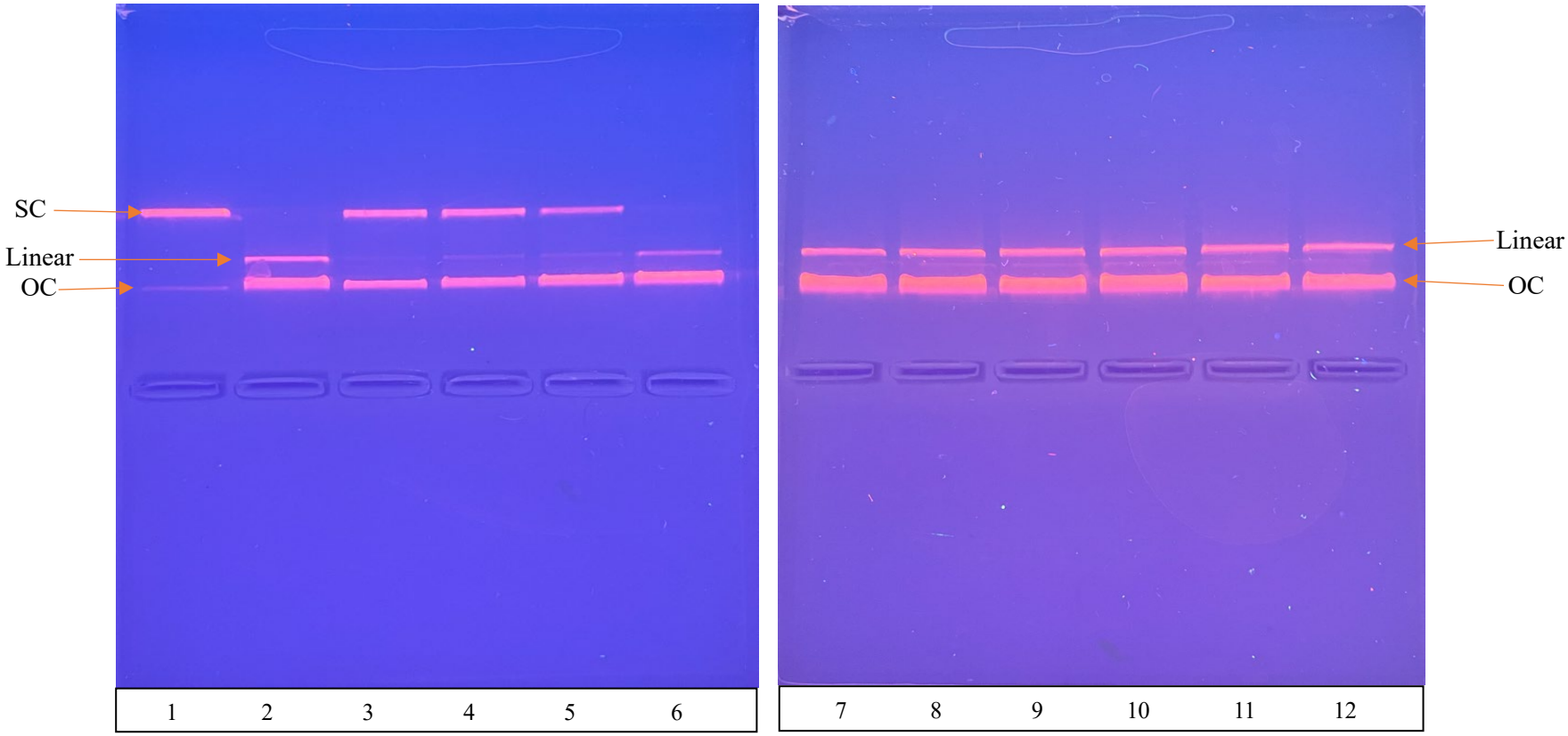
S1C. Quercetin



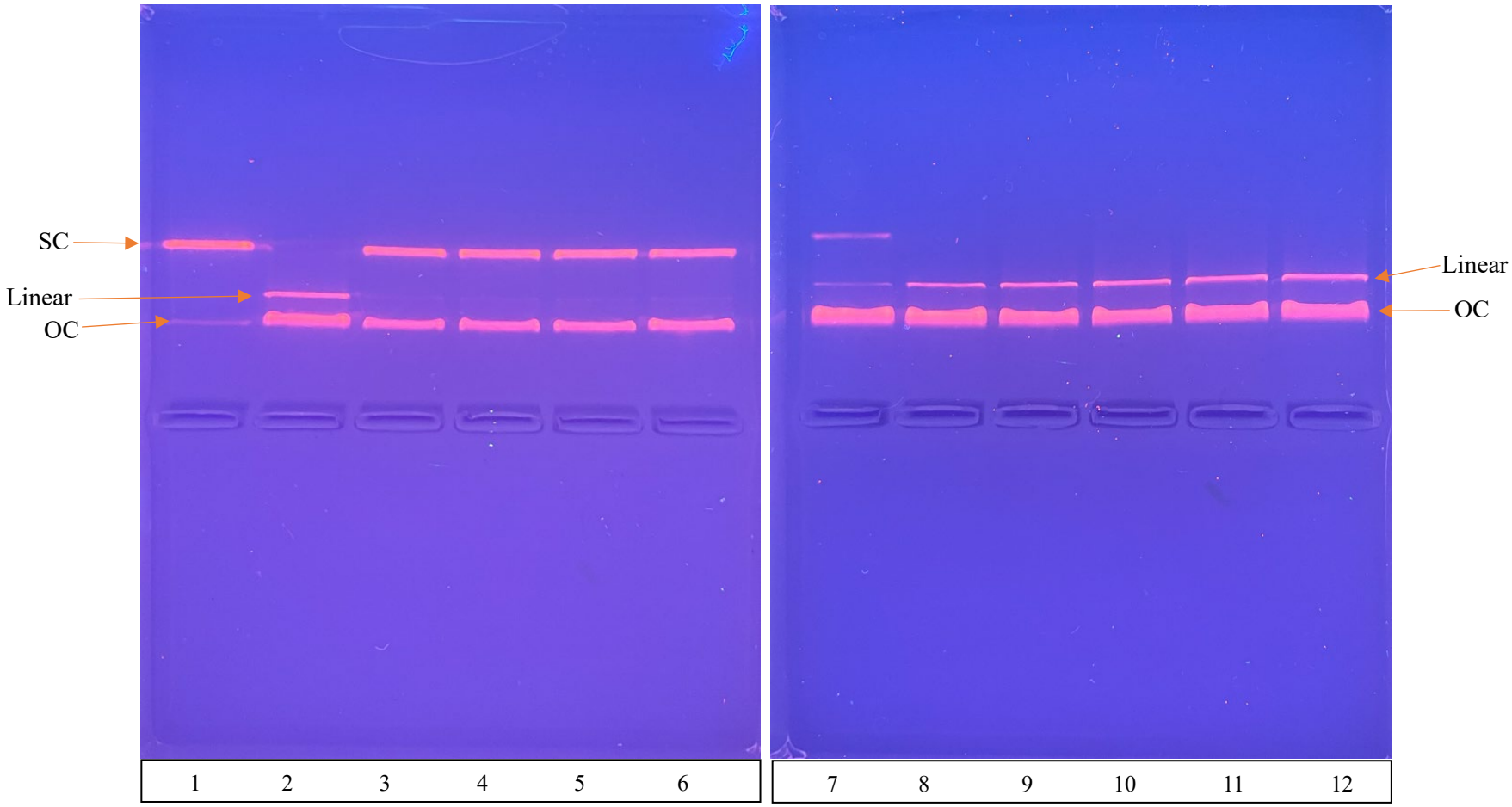
S1D. Compound **1** (Lysine methyl ester-Syringaldehyde derivative)



S1E. Compound **2** (Lysine methyl ester-Vanillin derivative)

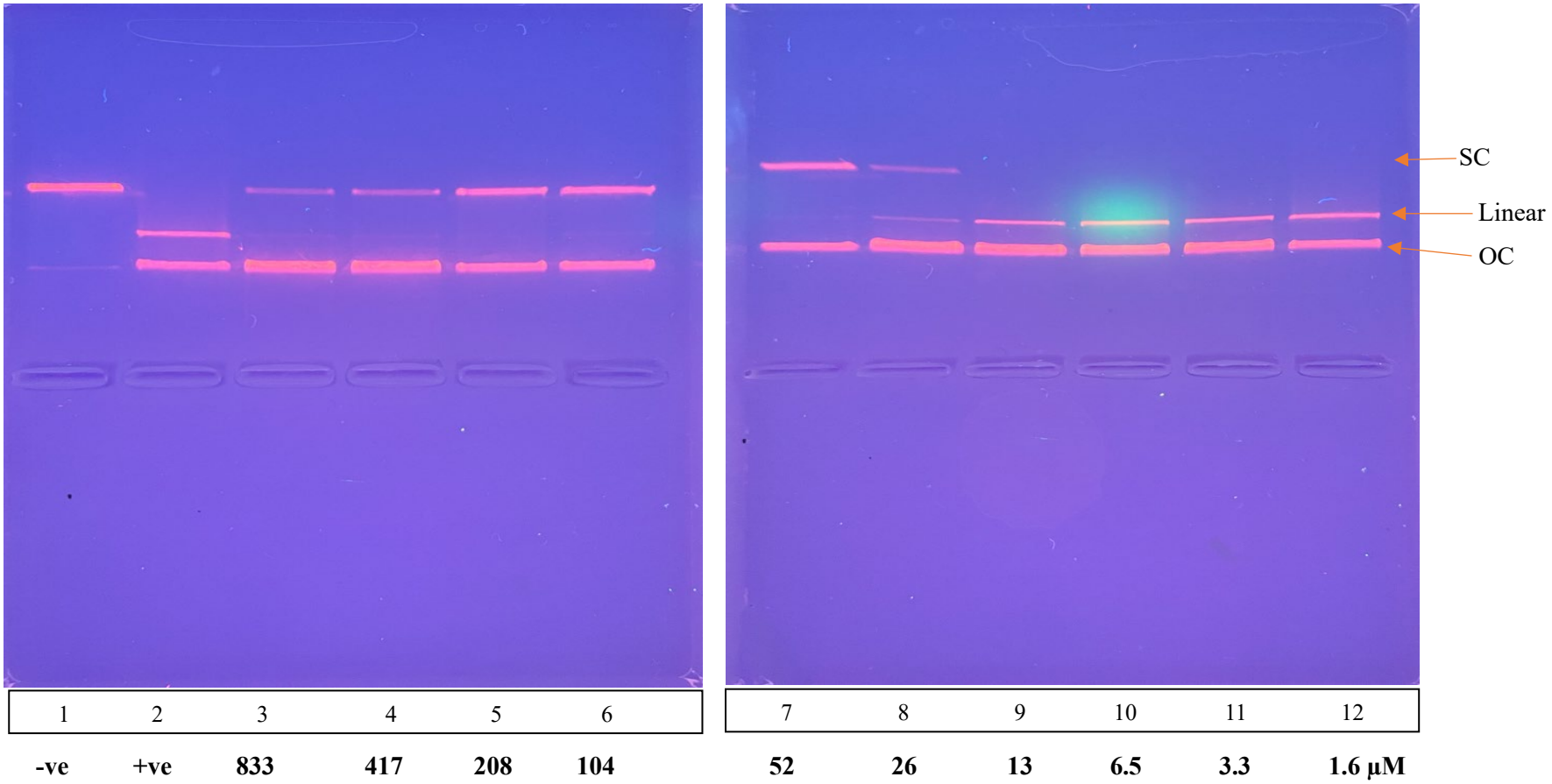


S1F. Compound **4** (Lysine-Vanillin derivative)

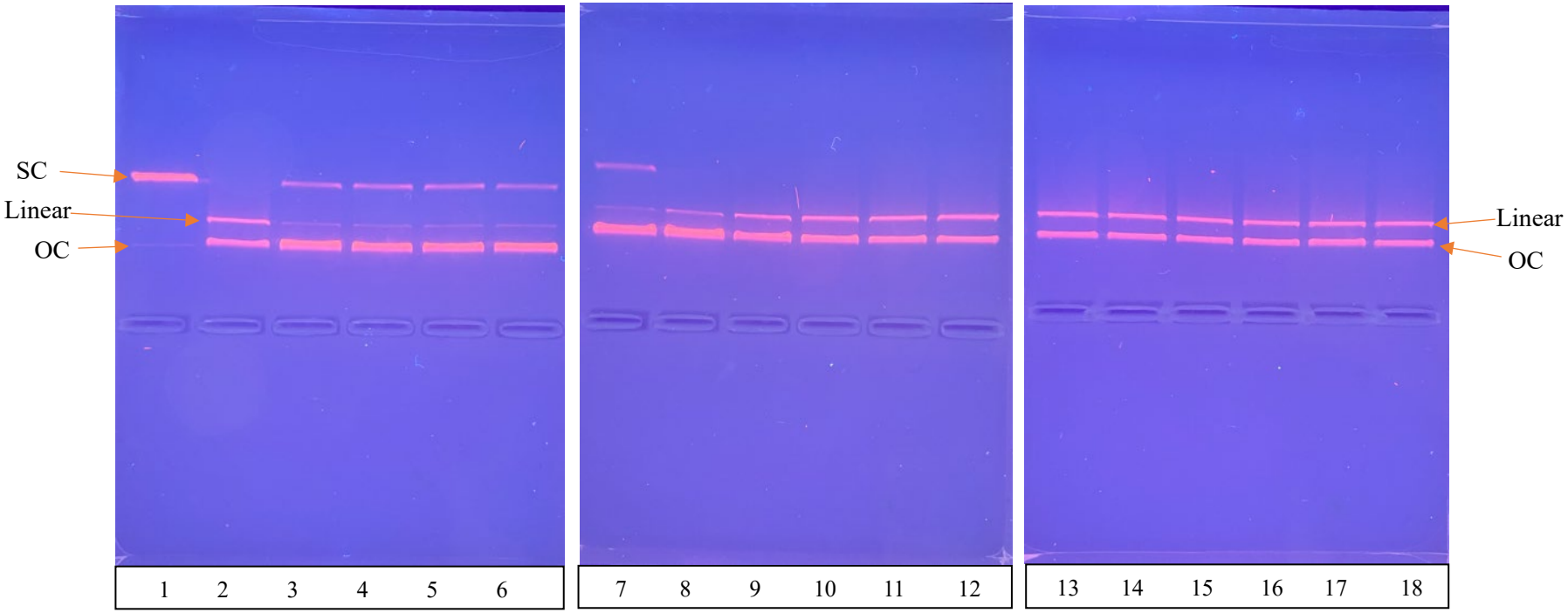


S2. Protection against AAPH-induced DNA oxidation in PBS at high concentrations.
Lane 1 (native DNA), lane 2 (AAPH + DNA, without antioxidant), and lanes 3–12 (AAPH + DNA + antioxidant at various concentrations). (A) Sodium ascorbate; (B) Compound **3**; (C) Quercetin; (D) Compound **4**.

S2A. Sodium ascorbate

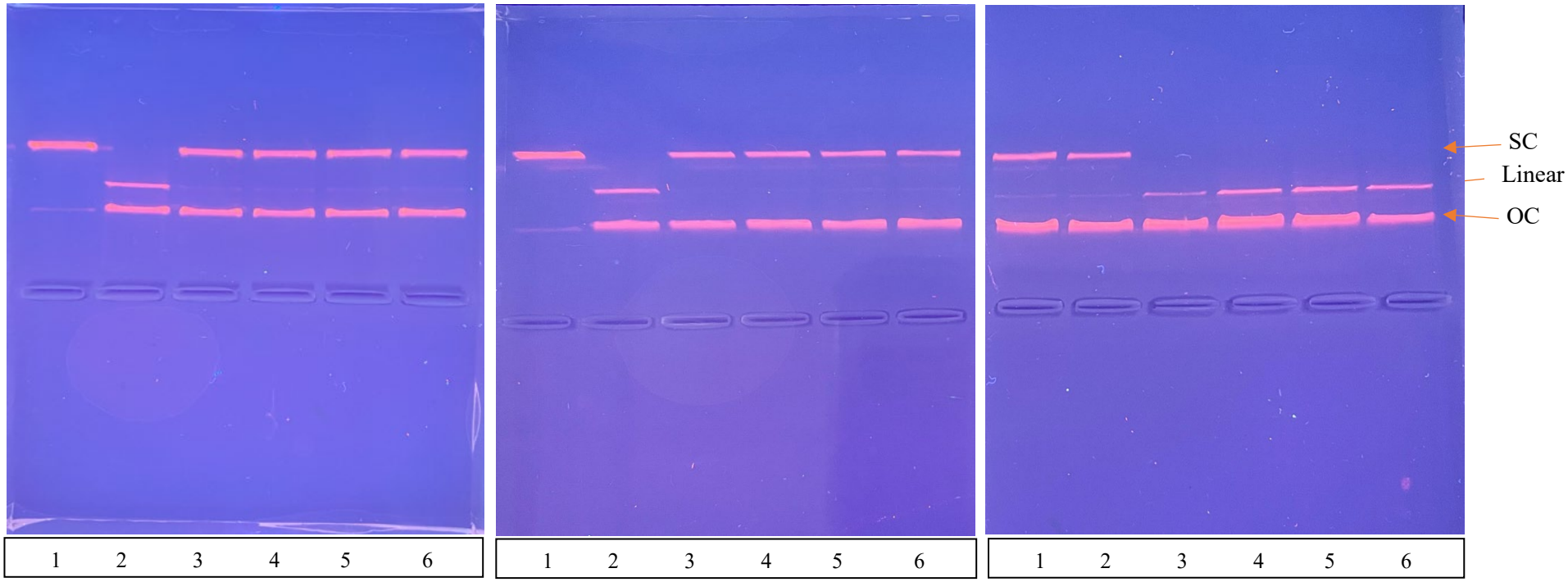


S2B. Sodium ascorbate



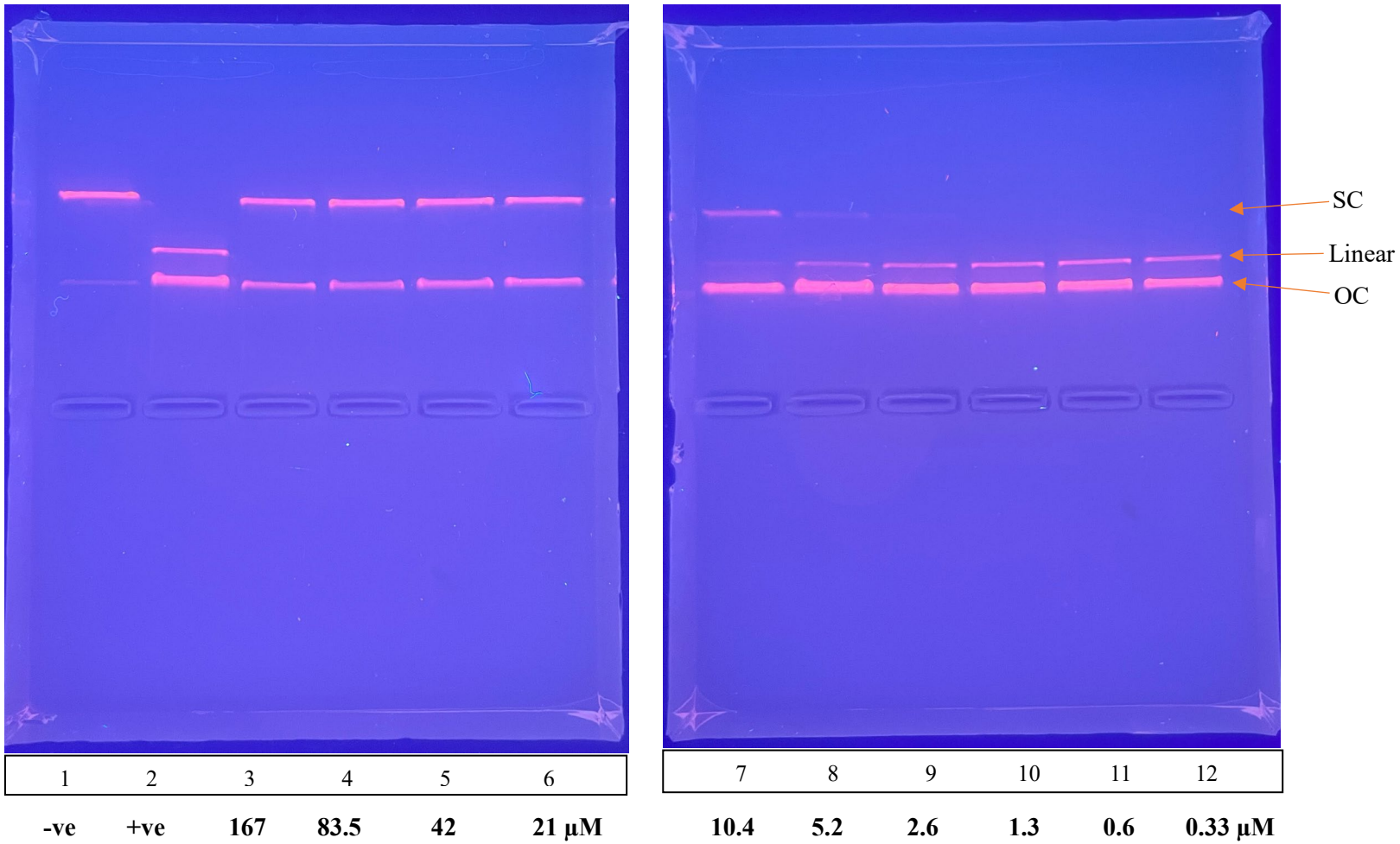
***To be consistent with other samples, any concentration below 0.33 µm is cropped.**

S2C. Compound **3** (In the left and middle panels, the 1st lane is native DNA (-ve control) and the 2nd lane is DNA + AAPH (+ve control)

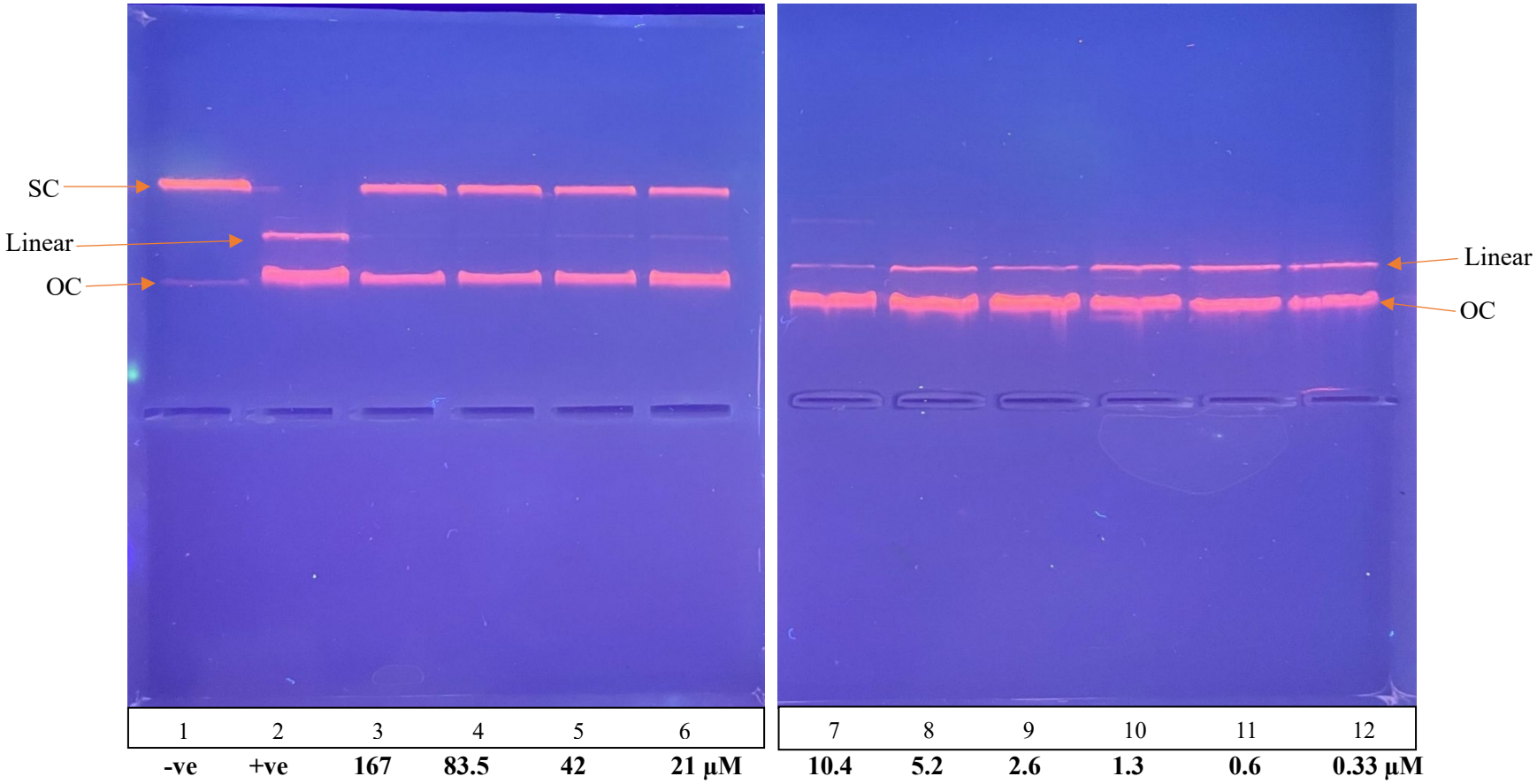


(the same concentrations repeated, so cropped)

S2D. Quercetin

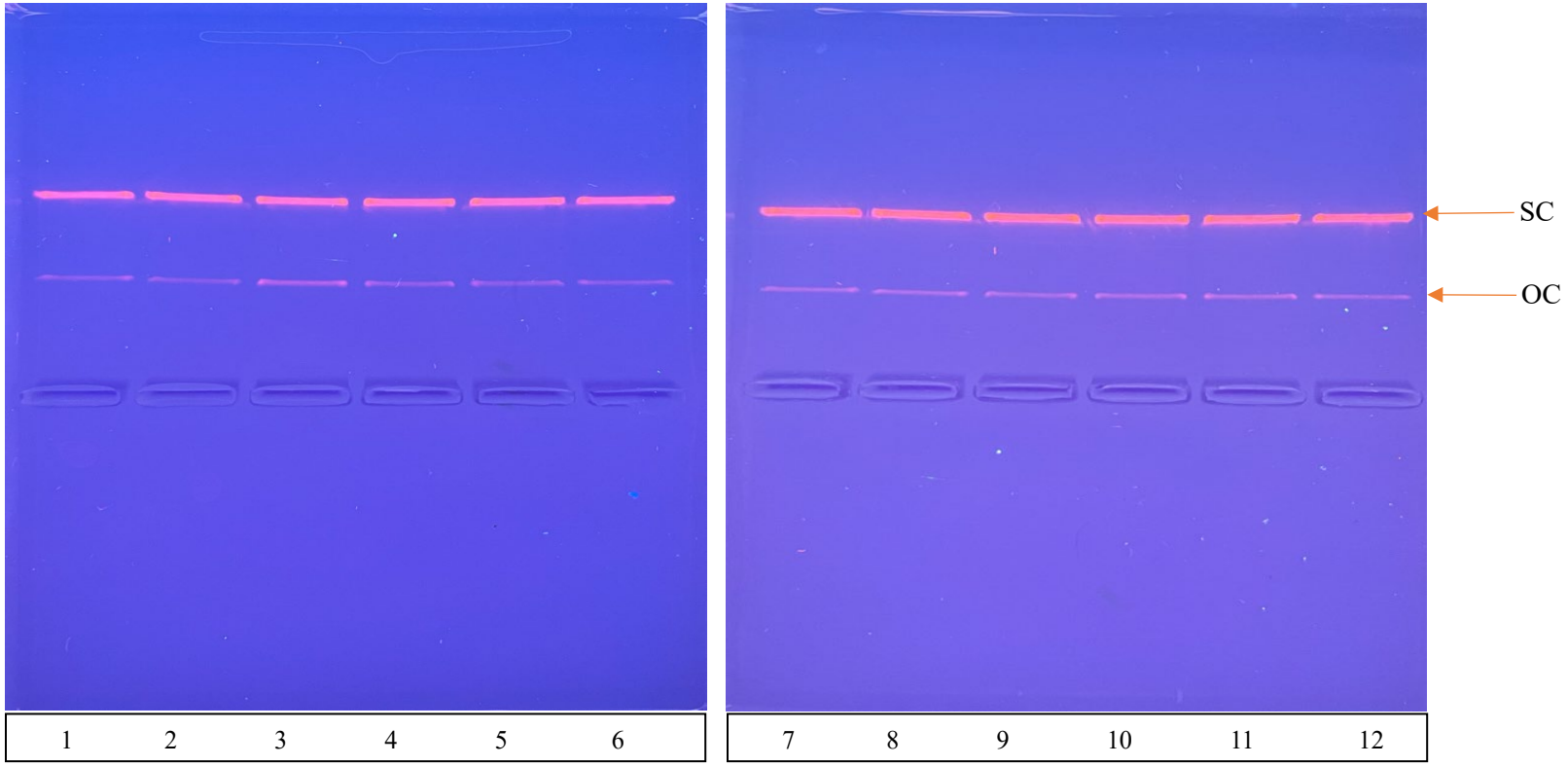


S2E. Compound **4** (Lysine-Vanillin derivative).

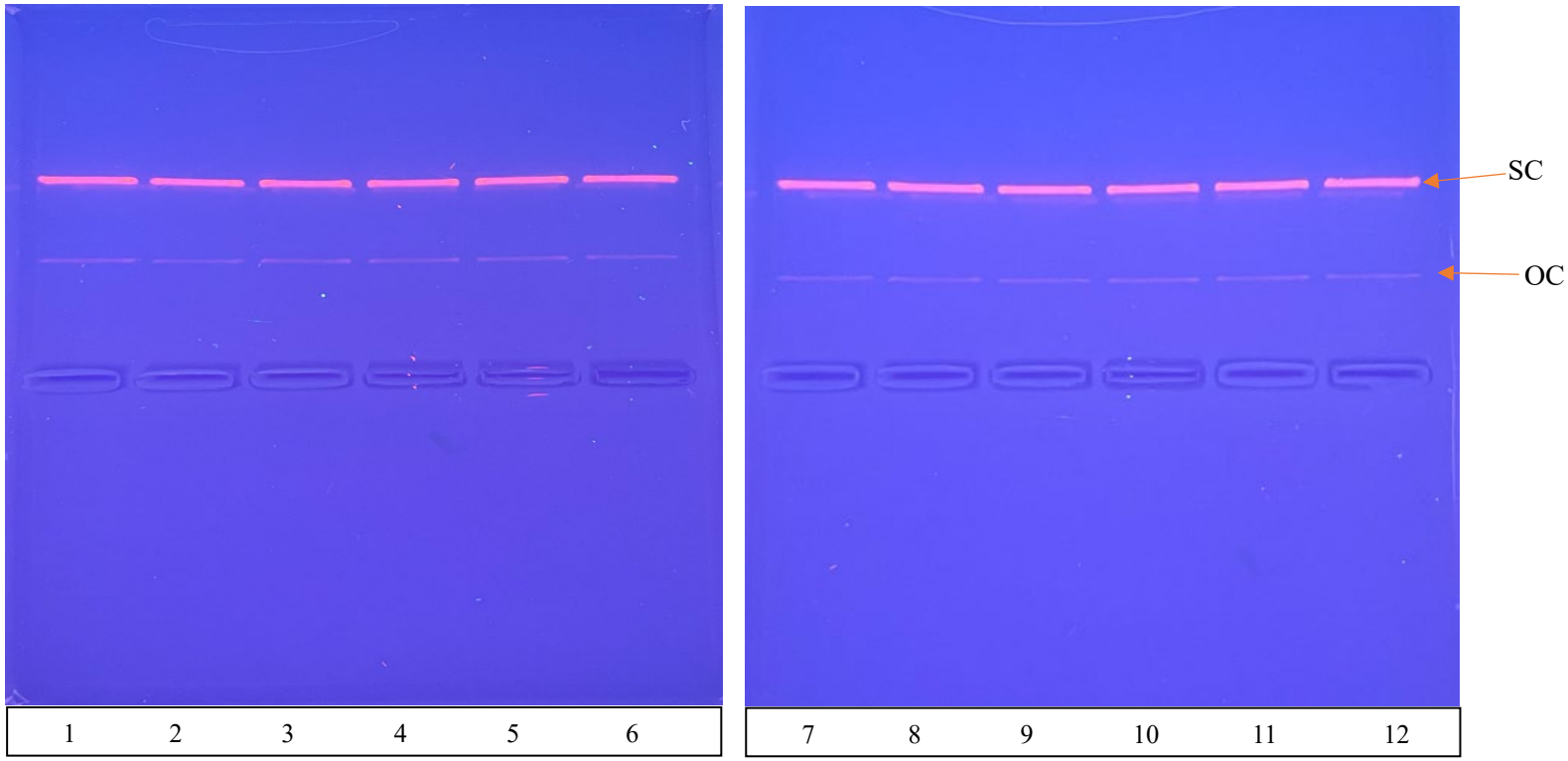


S4. Pro-oxidant effects of tetrameric antioxidants (in PBS).
(A) Lane 1 (native DNA), lane 2 (native DNA + Cu(II) ions, without antioxidant), and lanes 3–12 contain native DNA + Cu(II) ions + antioxidant at various concentrations: 83.3 µM, 41.7 µM, 20.8 µM, 10.4 µM, 5.2 µM, 2.6 µM, 1.3 µM, 0.65 µM, 0.33 µM, and 0.16 µM, respectively. (A) Compound **3**; (B) Compound **1**; (C) Compound **2**; (D) Compound **4**.

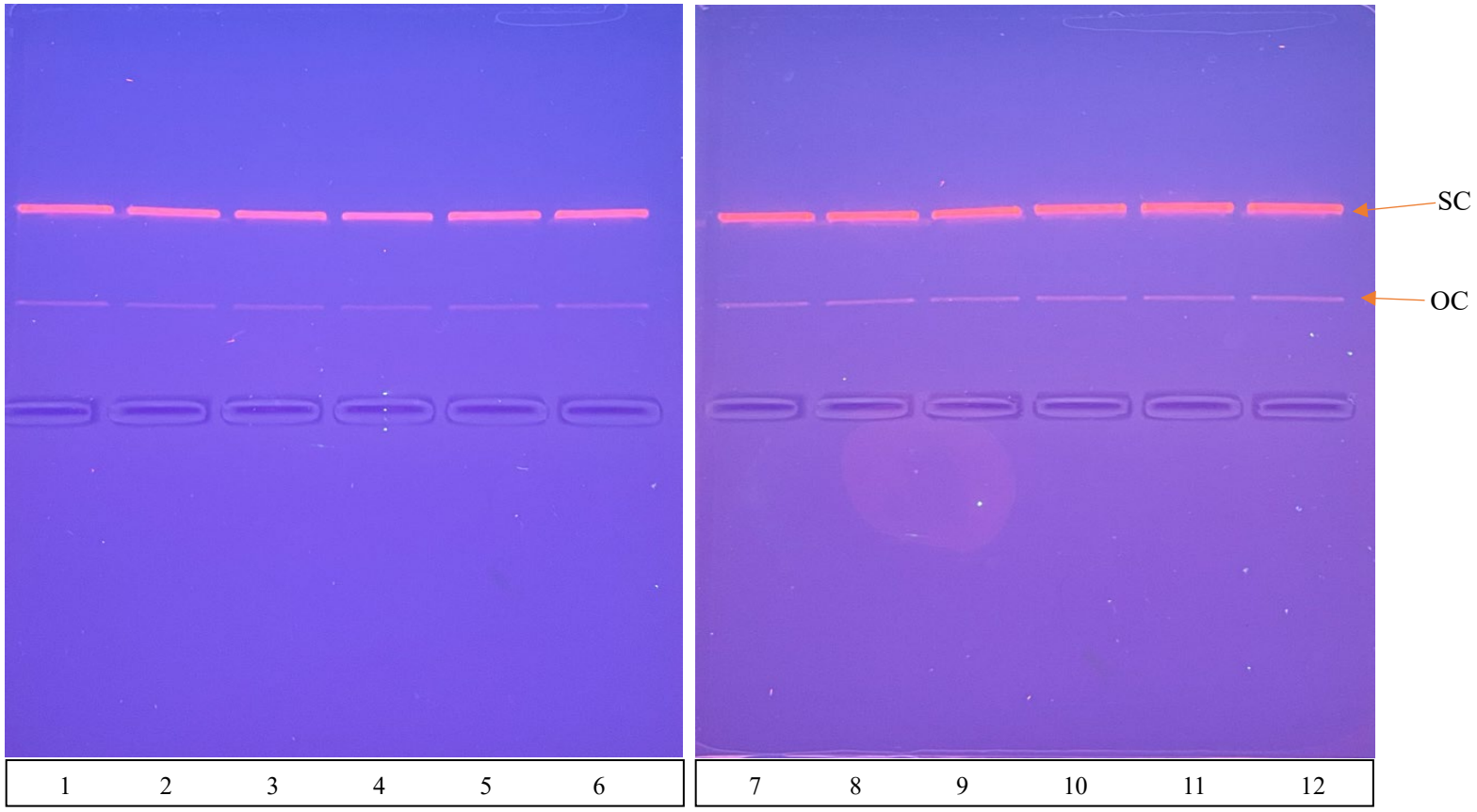
S4A. Compound 3 (Lysine-Syringaldehyde derivative)



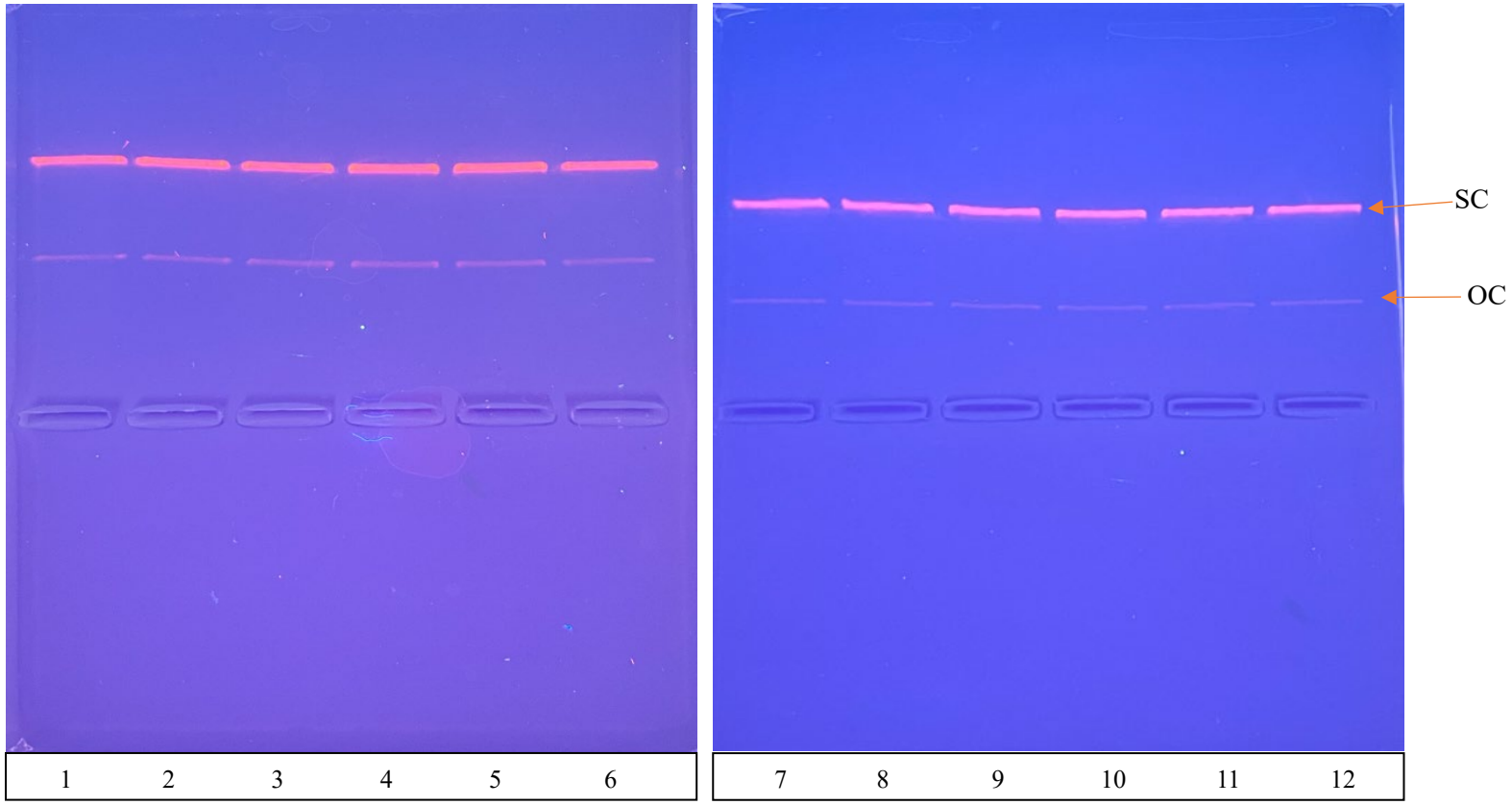
S4B. Compound **1** (Lysine methyl ester-Syringaldehyde derivative)



S4C. Compound **2** (Lysine methyl ester-Vanillin derivative)

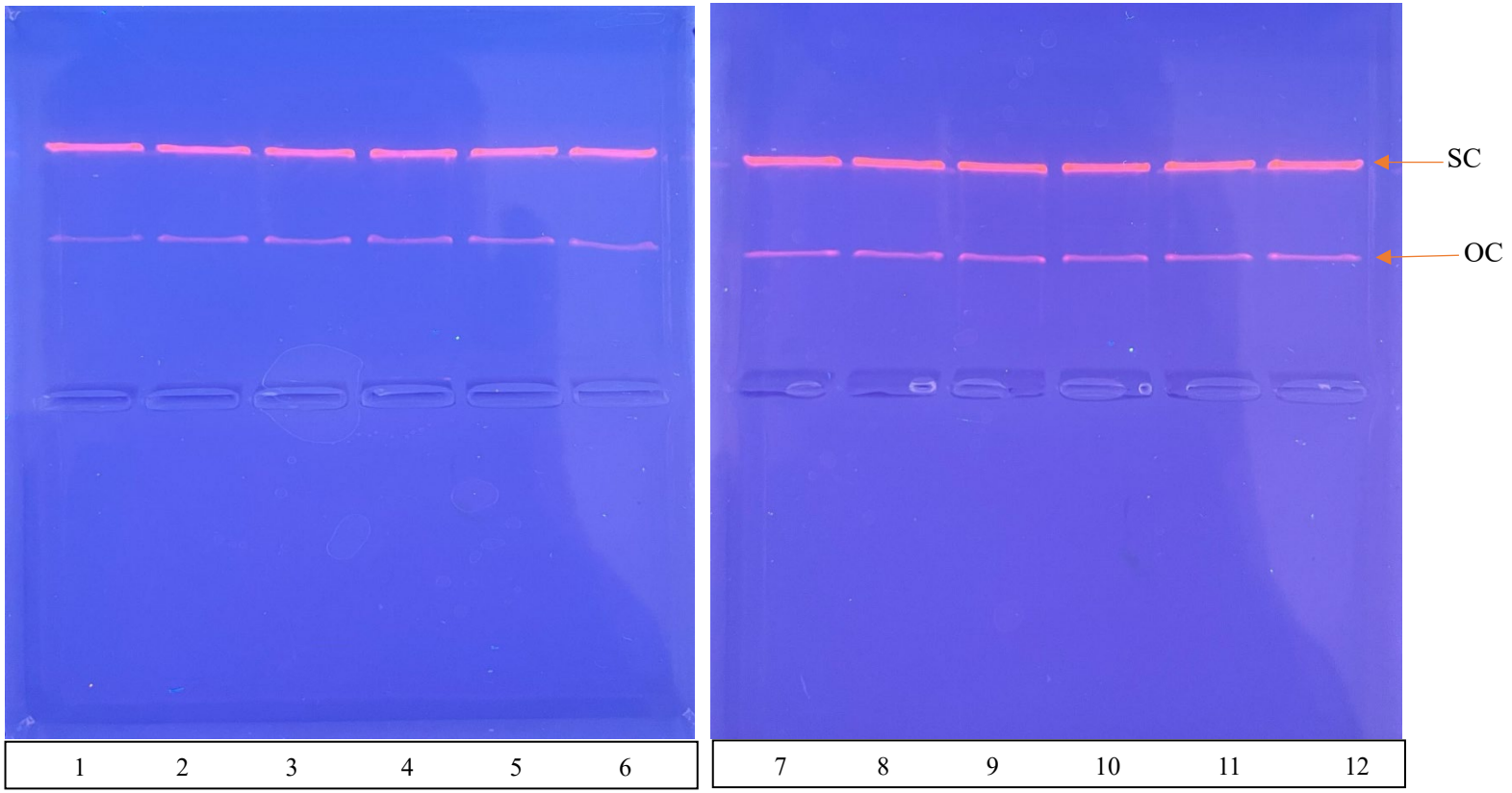


S4D. Compound **4** (Lysine-Vanillin derivative)

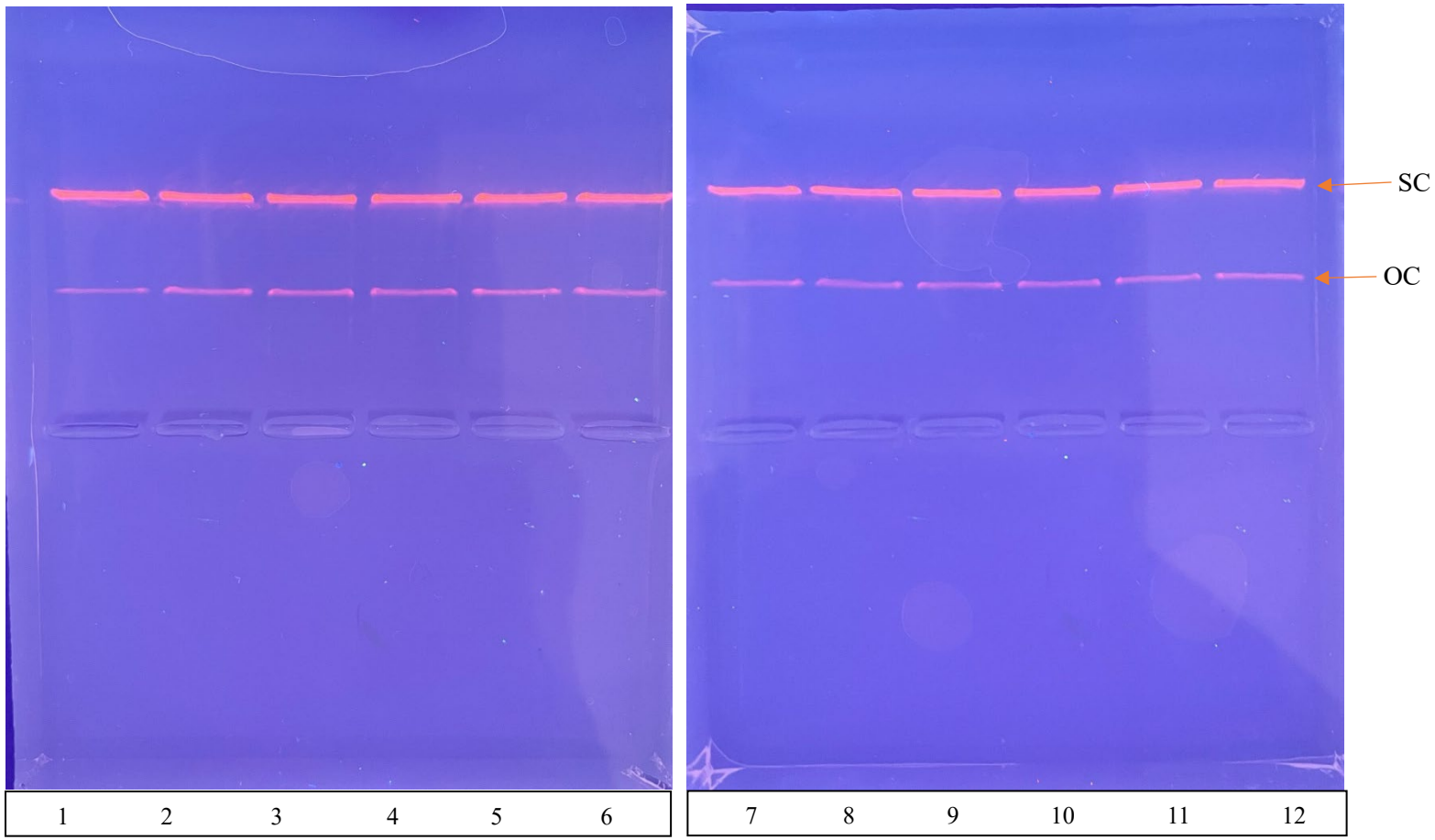


S5. Pro-oxidant effects at high concentrations (166.7 µM–0.33 µM) in PBS. Lane 1 (native DNA), lane 2 (native DNA + Cu(II) ions, without antioxidant), and lanes 3–12 contain native DNA + Cu(II) ions + antioxidant at various concentrations: 166.7 µM, 83.3 µM, 41.7 µM, 20.8 µM, 10.4 µM, 5.2 µM, 2.6 µM, 1.3 µM, 0.65 µM, and 0.33 µM, respectively. (A) Compound **3**; (B) Compound **4**.

S5A. Compound **3** (Hydrophilic Lysine-Syringaldehyde derivative)

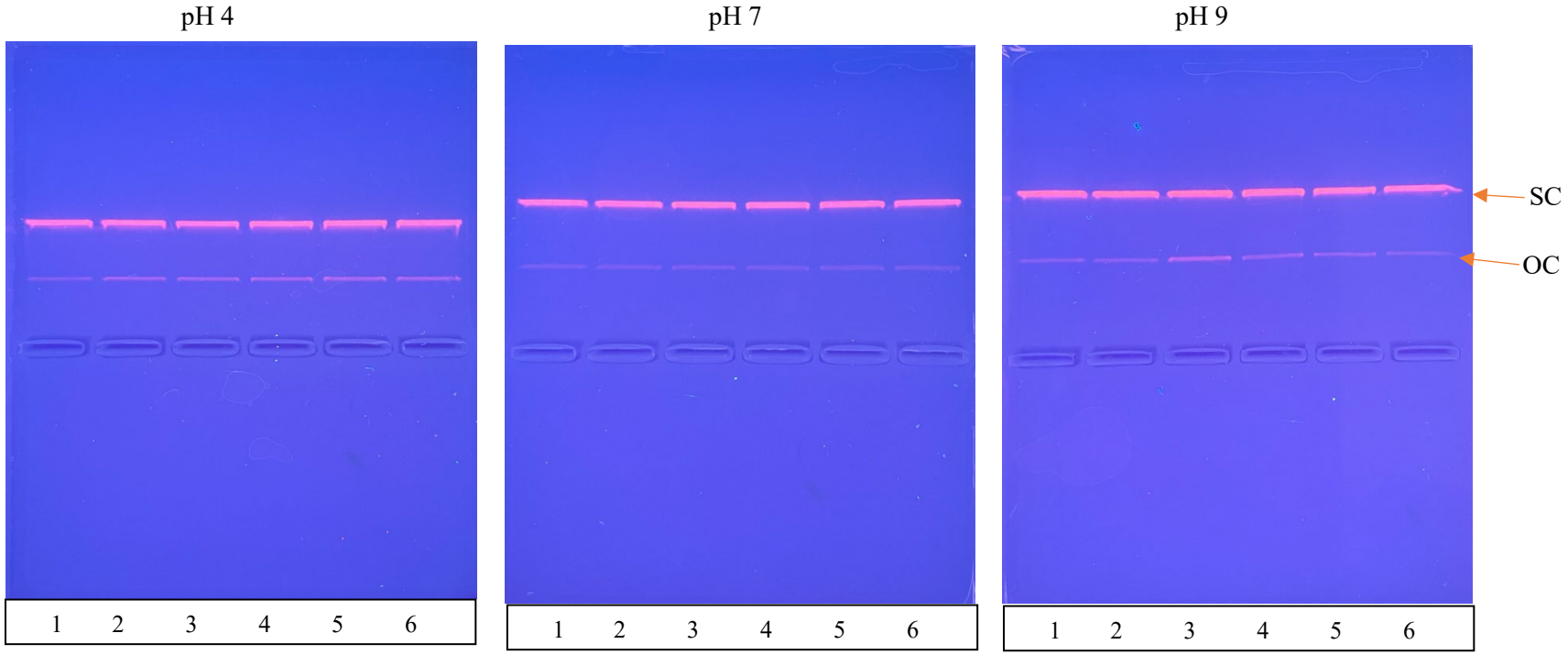


S5B. Compound **4** (Hydrophobic Lysine-Vanillin derivative)

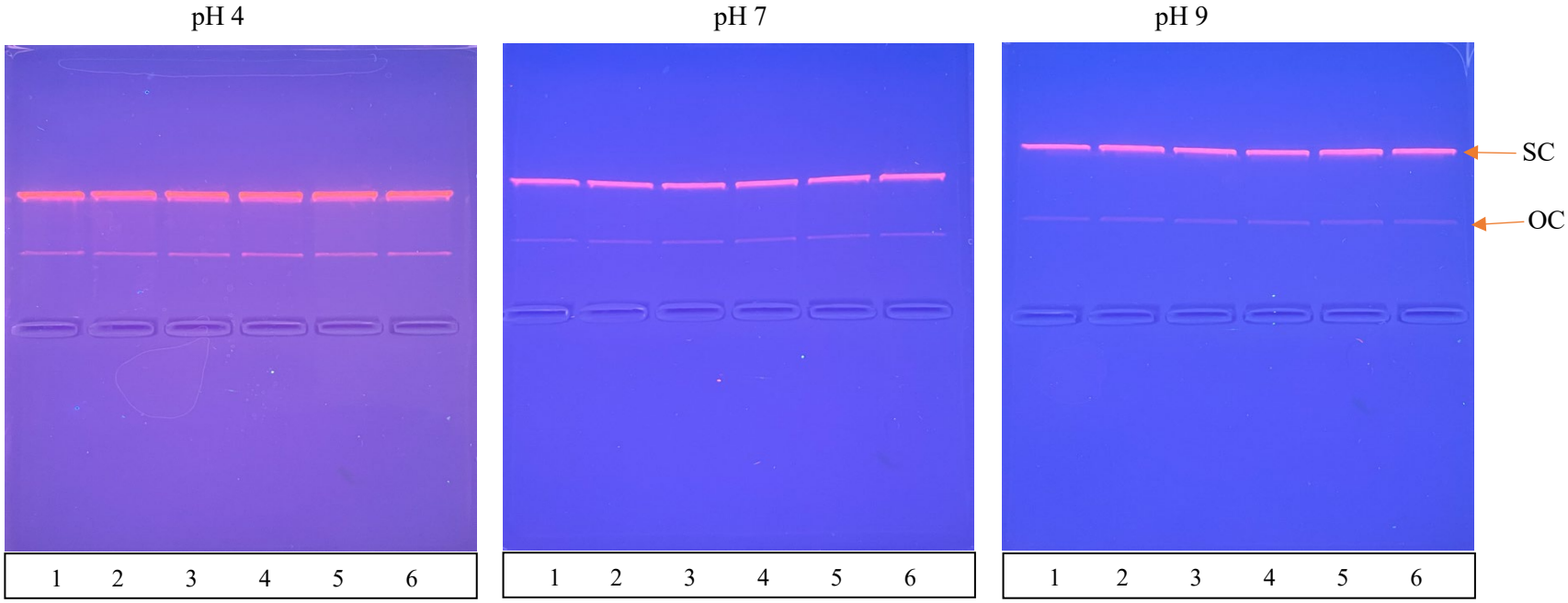


S6. Effects of pH on the pro-oxidant activities of tetrameric antioxidants. All controls and antioxidants contain 1% DMSO. The left panels show samples at pH 4, the middle panels at pH 7, and the right panels at pH 9. In each panel, lane 1 contains native DNA and lane 2 contains DNA + Cu(II) ions. Lanes 3-6 contain DNA + Cu(II) ions + antioxidants at various concentrations: 41.7 µM, 20.8 µM, 10.4 µM, and 5.2 µM, respectively. (A) Compound **1**; (B) Compound **2**; (C) Compound **3**; (D) Compound **4**.

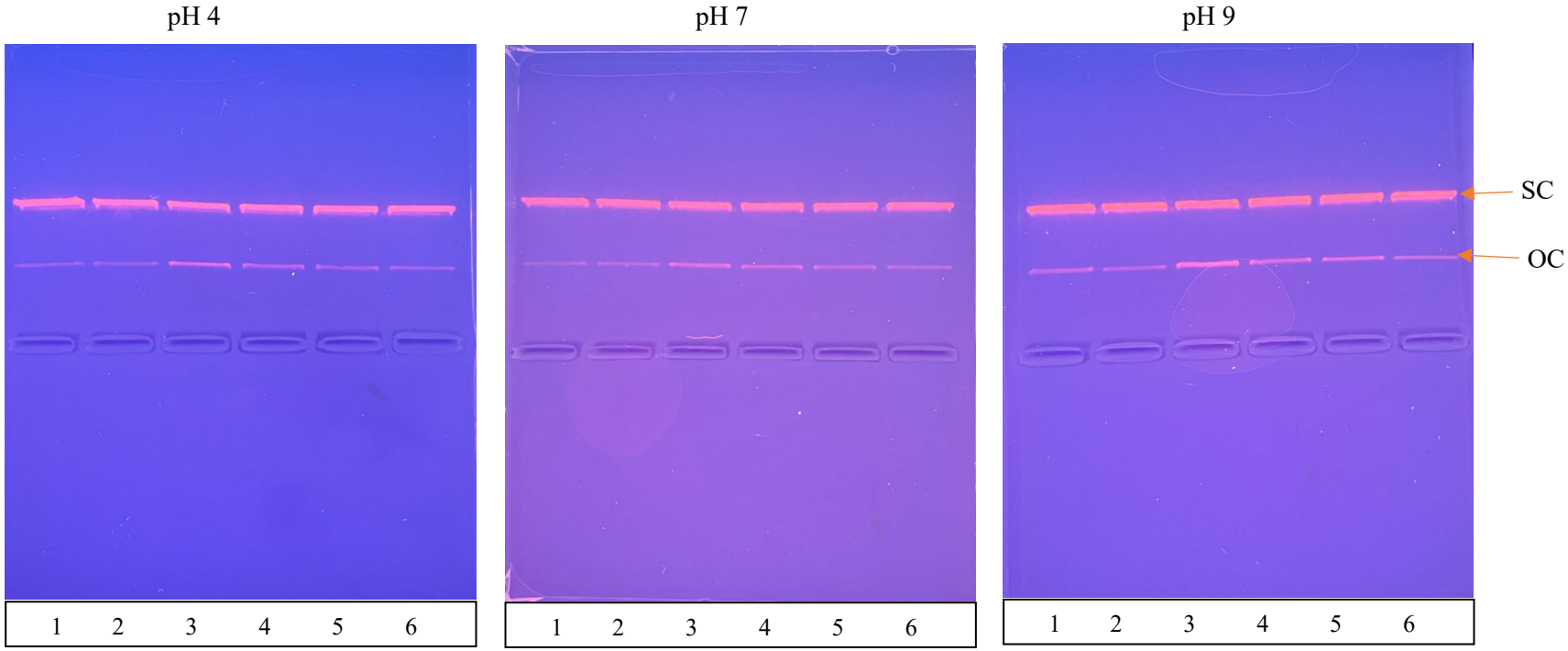
S6A. Compound **1** (Hydrophobic Lysine methyl ester-Syringaldehyde derivative)



S6B. Compound **2** (Hydrophobic Lysine methyl ester-Vanillin derivative)



S6C. Compound **3** (Hydrophilic Lysine-Syringaldehyde derivative)



S6D. Compound **4** (Hydrophobic Lysine-Vanillin derivative)