Supporting Information for:

Formation of Bulky DNA Adducts by Non-Enzymatic Production of 1,2-Naphthoquinone-Epoxide from 1,2-Naphthoquinone under Physiological Conditions

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Contents:

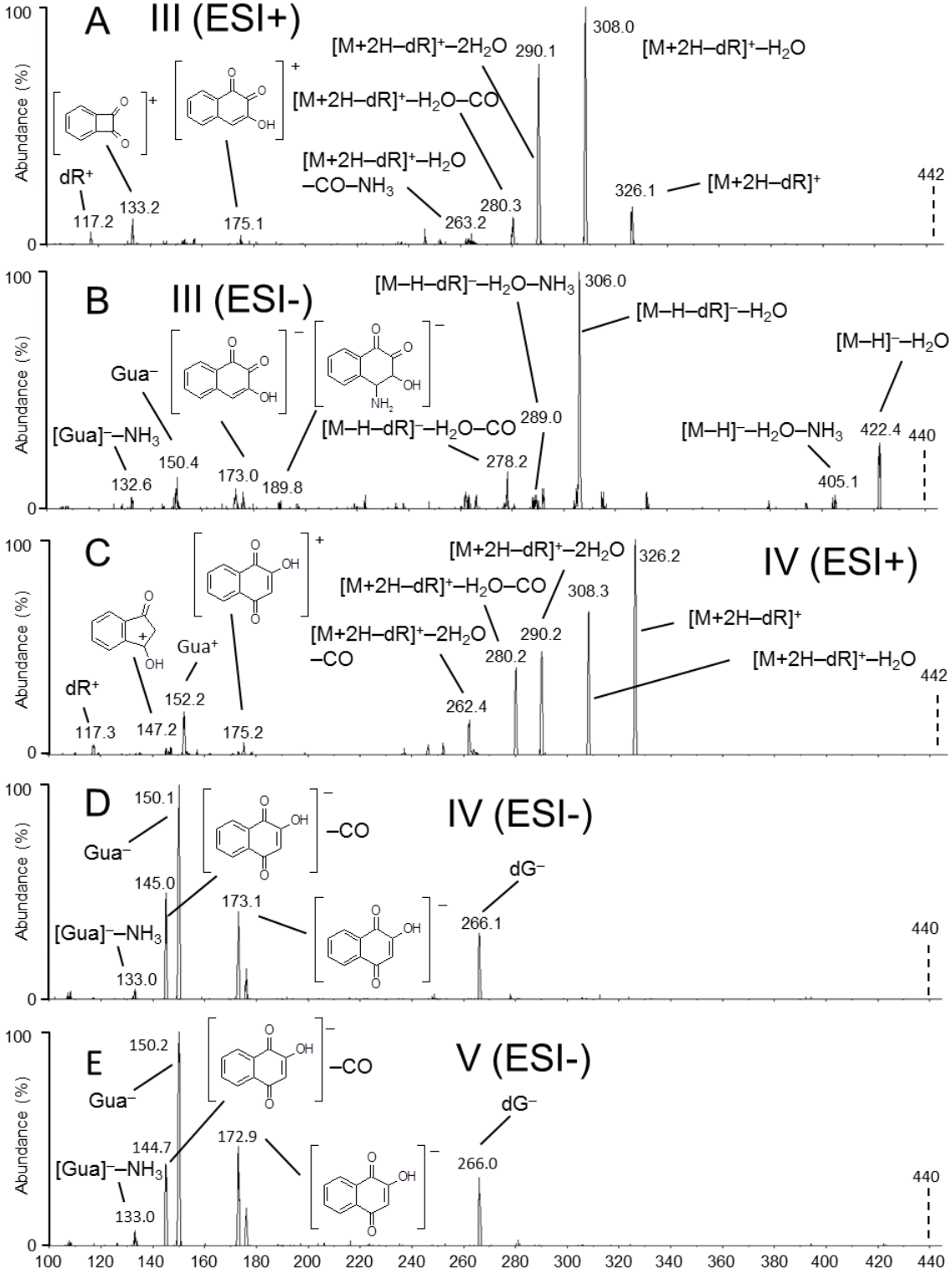

Figure S1 Mass spectra acquired from product ion scan analyses for products III through IV.

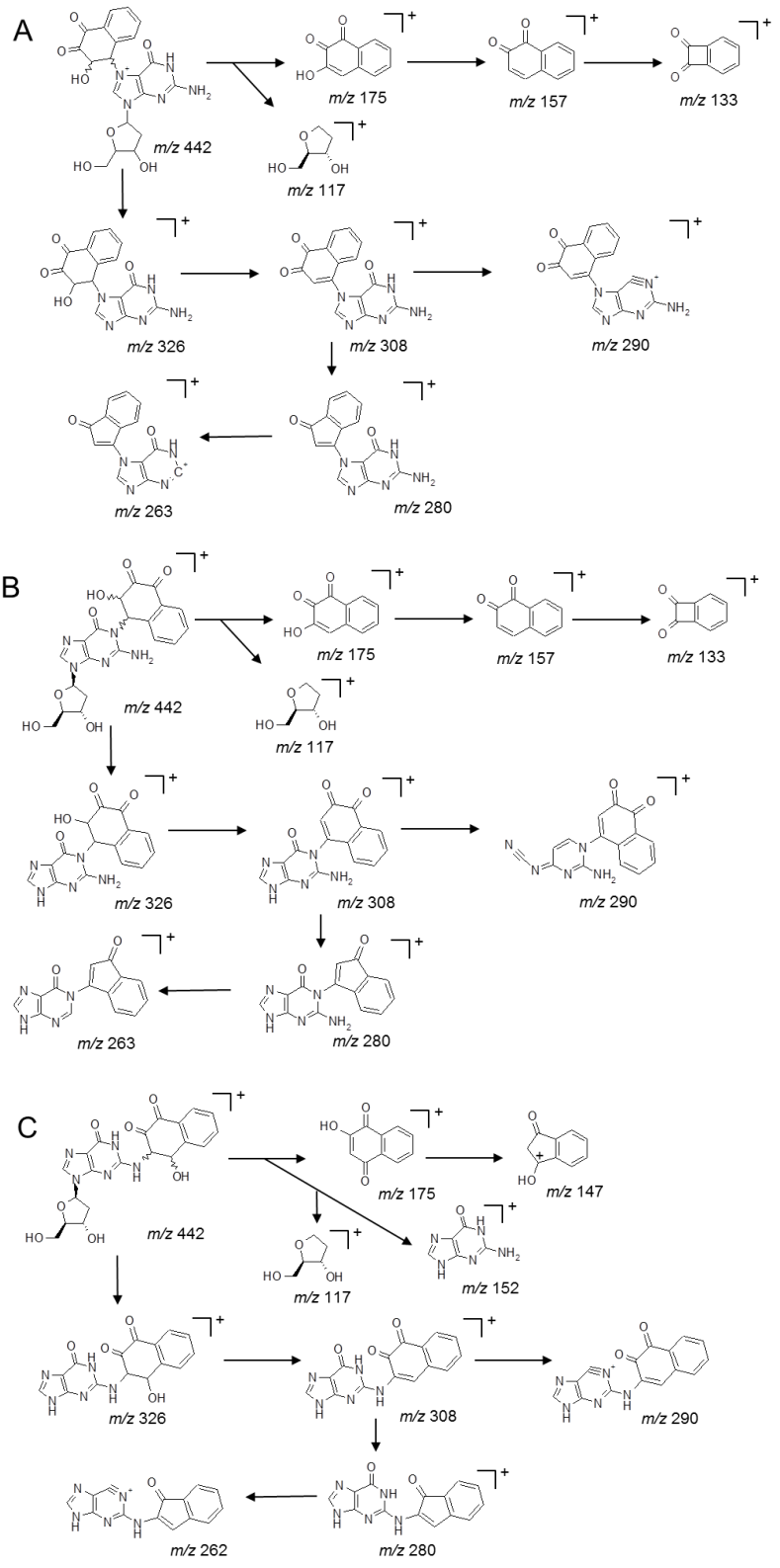

Figure S2 CID fragmentation pathways of products II and III (A; N7, B; N1) and products IV and V (C; N2).

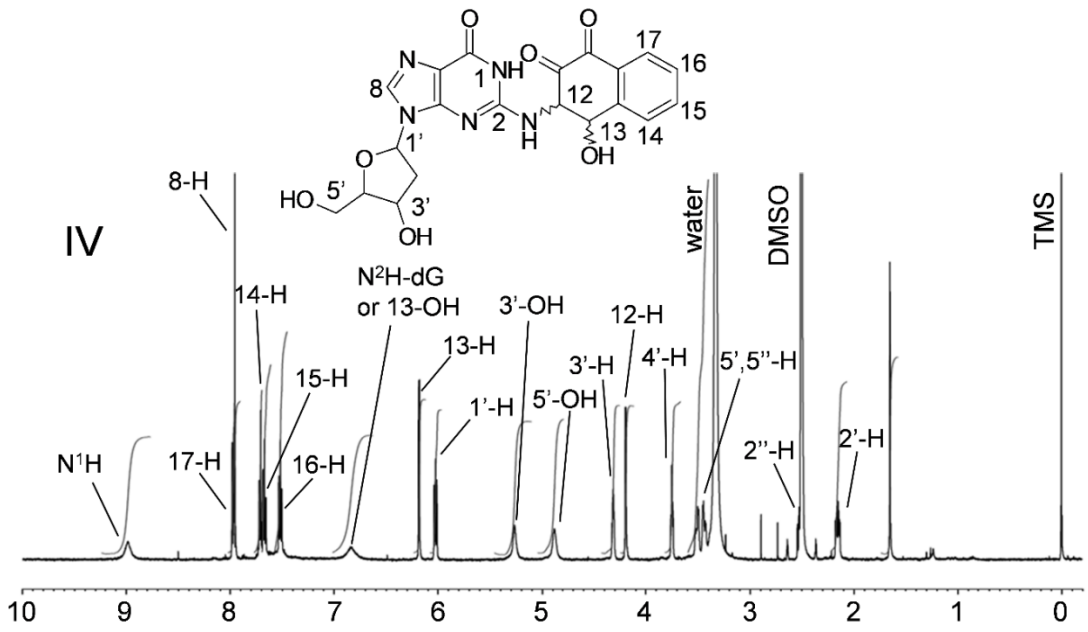

Figure S3 ^{1}H NMR spectrum for product IV.

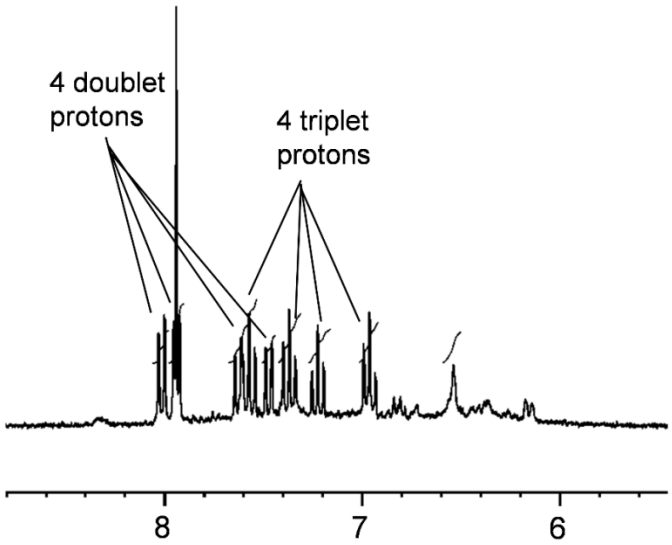

Figure S4 ^{1}H NMR spectrum for product II. Expansion around aromatic protons of the ^{1}H NMR spectrum for product II showed 4 doublet protons and 4 triplet protons, indicating that aromatic substitution did not occur on the aromatic moiety of 1,2-NQ.

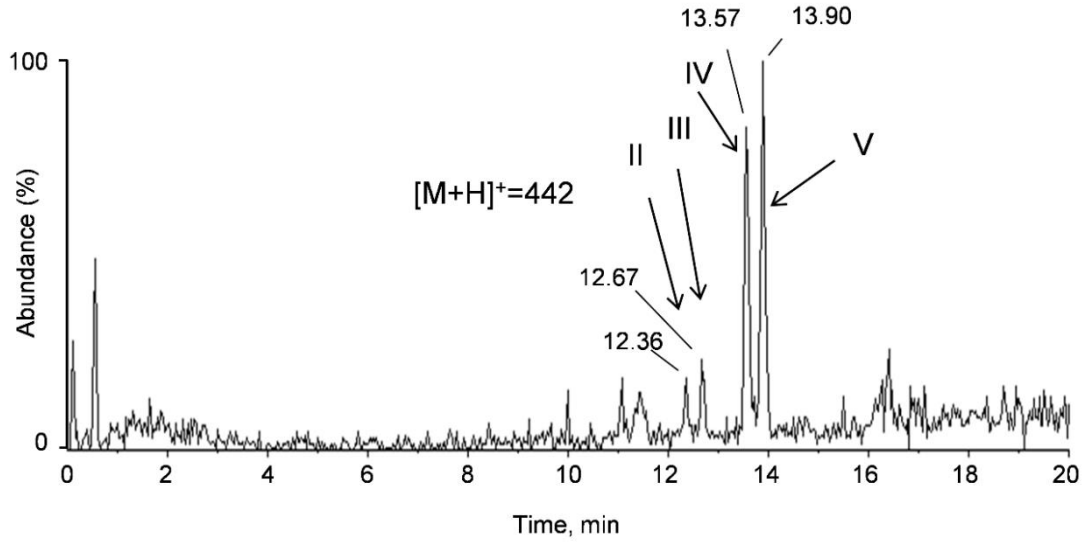

Figure S5 Extracted ion chromatogram from full scan MS analysis of the reaction of isolated product I with dG under pH 7.4 conditions. The peaks which corresponded to $[M + H]^+ = 442$ with retention times that were identical to products II through V were detected.

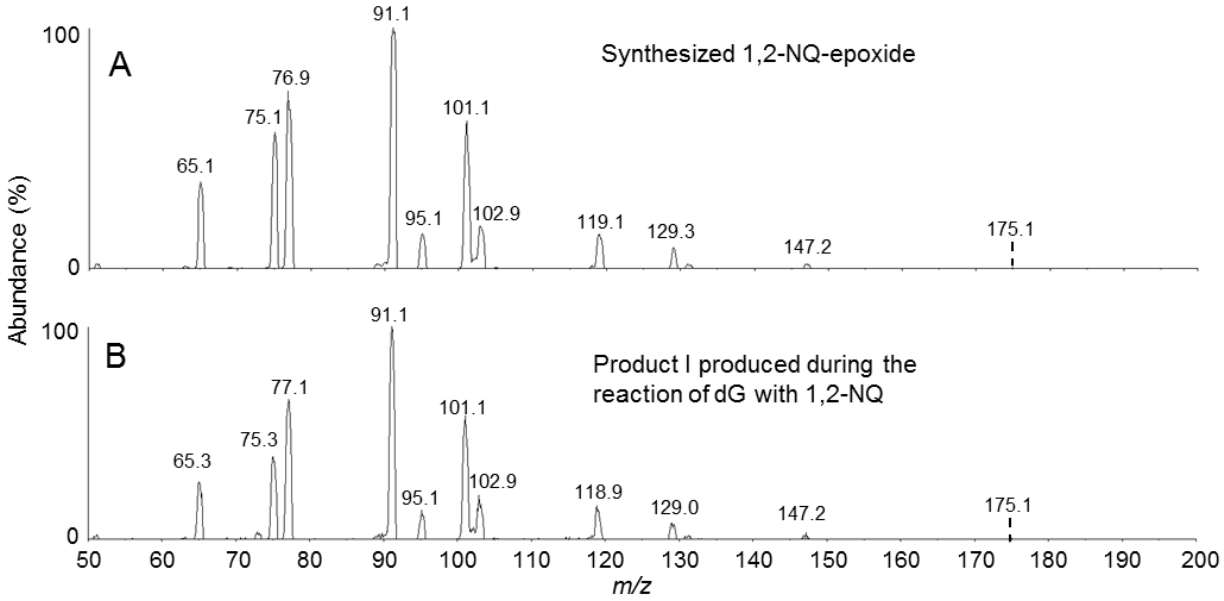

Figure S6 Results of LC/ESI(+)-MS/MS product ion scan analyses of (A) synthesized 1,2-NQ-epoxide and (B) product I produced during the reaction of 1,2-NQ with dG, Collision energy was 45V. Results were nearly identical.

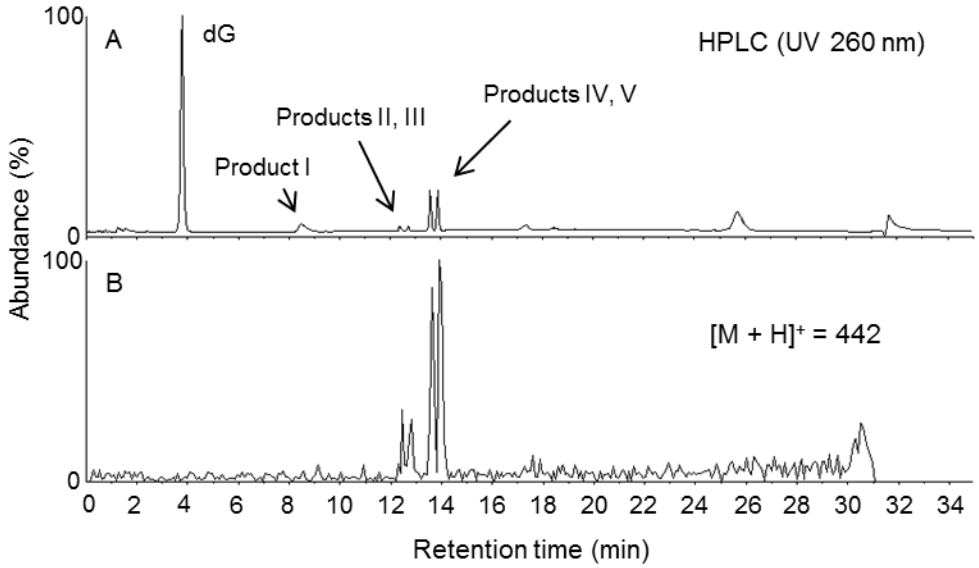

Figure S7 Results of LC/ESI(+)-MS analyses of reaction mixtures of 1,2-NQ-epoxide with dG in phosphate buffer, pH 7.4, after 17 hours (A) UV (260 nm); (B) EIC, $[M + H]^+ = 442$.

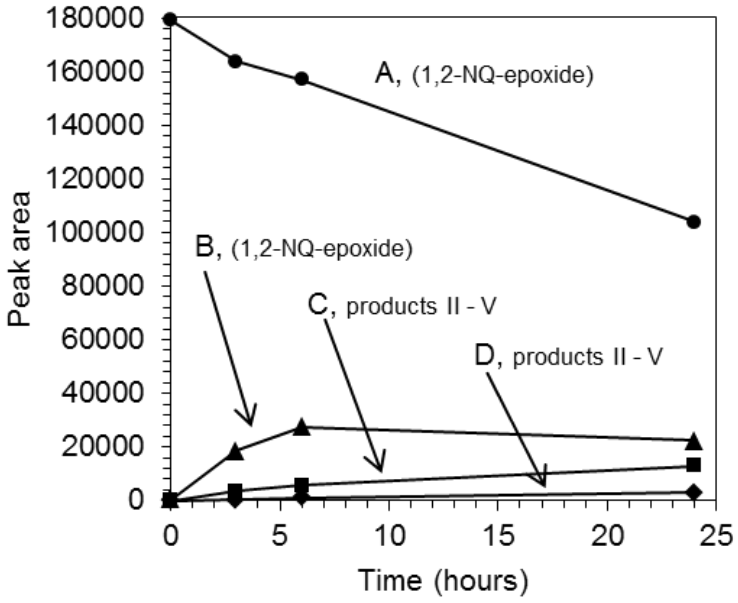

Figure S8 Monitoring of 1,2-NQ-epoxide by peak area measurement (HPLC-UV_{260nm}) when (A) synthesized 1,2-NQ-epoxide (6.2 mM) was incubated directly in phosphate buffer with dG and (B) when 1,2-NQ (6.2 mM) was incubated in phosphate buffer with dG. Measurement of the total amount of products II through V as the sum of their 4 peak areas when (C) synthesized 1,2-NQ-epoxide was incubated directly in phosphate buffer with dG and (D) when 1,2-NQ was incubated in phosphate buffer with dG from the same experiments.

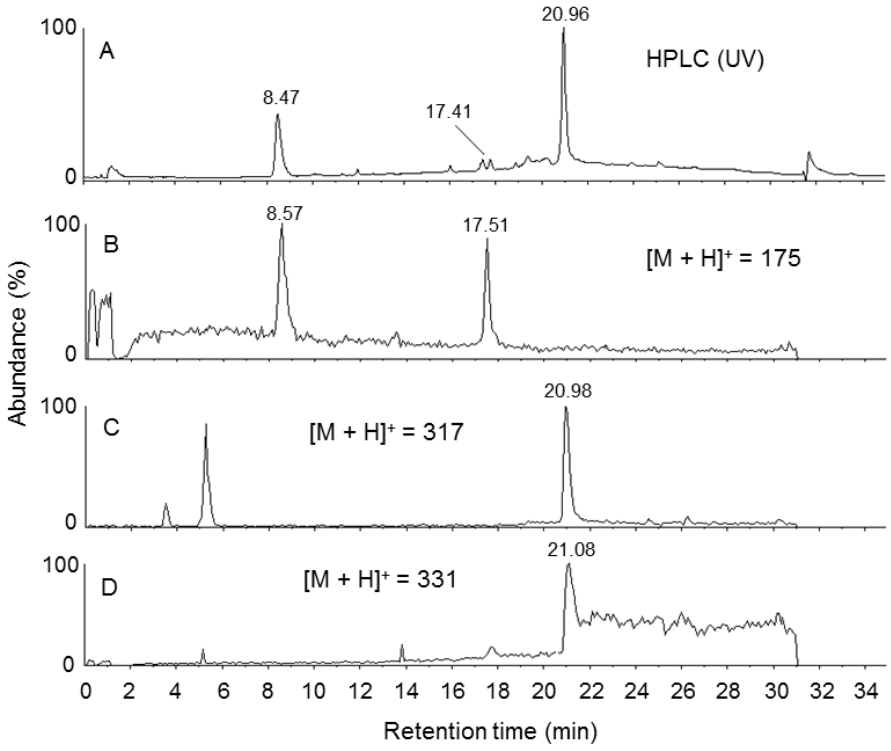

Figure S9 Results of LC/ESI(+)-MS/MS analyses of reaction products formed after addition of 1,2-NQ to phosphate buffer, pH 7.4, after 24 hours. (A) UV_{260nm}; (B) extracted ion chromatogram of $[M + H]^+ = 175$ (1,2-NQ-epoxide, 8.5 min; lawsone, 17.4 min); (C) extracted ion chromatogram of $[M + H]^+ = 317$; (D) extracted ion chromatogram of $[M + H]^+ = 331$.

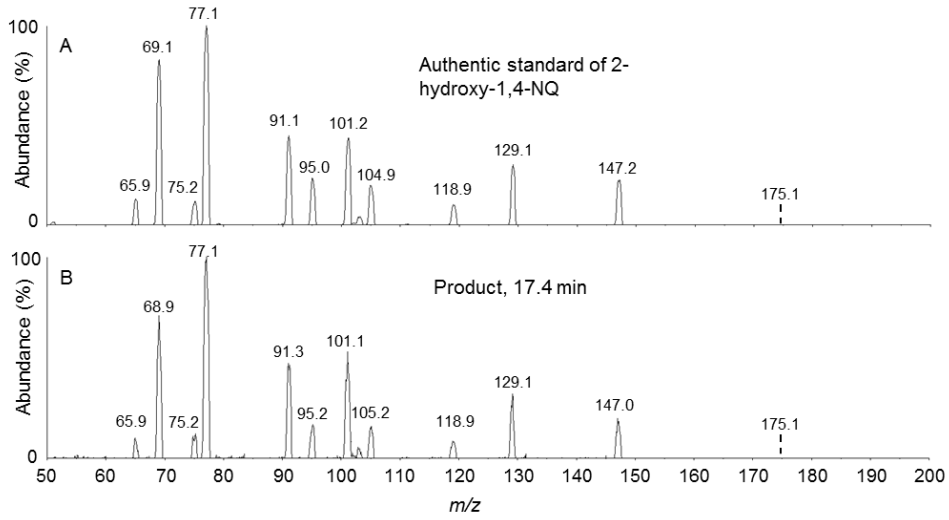

Figure S10 Results of LC/ESI(+)-MS/MS product ion scan analyses of (A) an authentic standard of 2-hydroxy-1,4-naphthoquinone and (B) the product detected at $[M + H]^+ = 175$ after 1,2-NQ was added to phosphate buffer, pH 7.4, for 24 hours. Collision energy was 45V for each analysis.

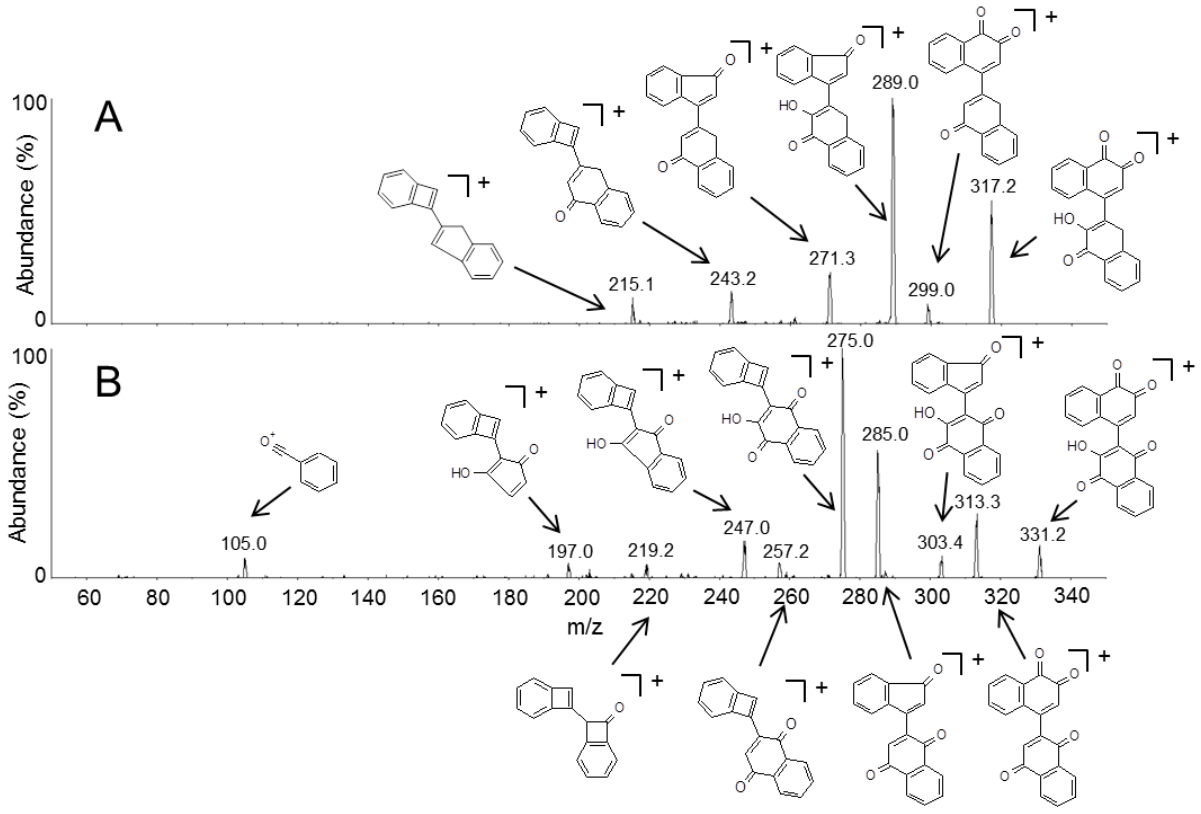

Figure S11 Results of LC/ESI(+)-MS/MS product ion scan analyses of high molar mass products detected during the reaction of 1,2-NQ in phosphate buffer, pH 7.4, for 13 hours; (A) the spectrum of the product that corresponded to $[M + H]^+ = 317$; (B) the spectrum of the product that corresponded to $[M + H]^+ = 331$. Collision energy was 30V for each analysis.

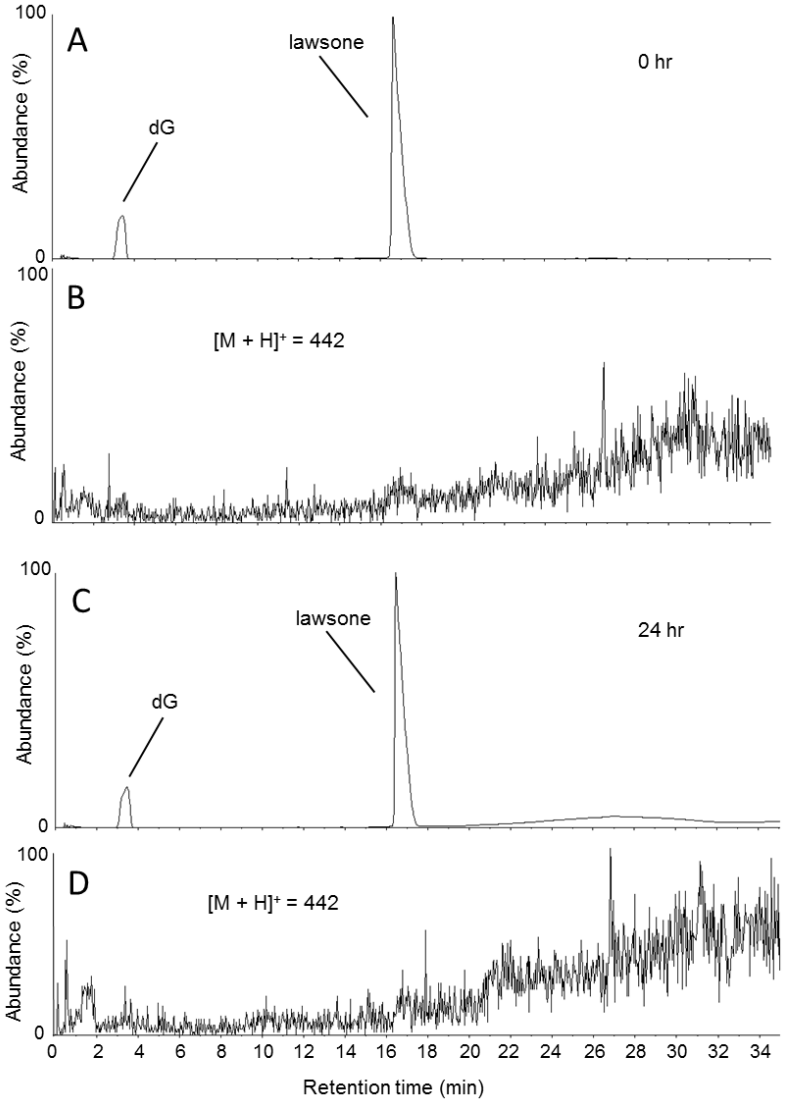

Figure S12 Results of LC/ESI(+)-MS/MS analyses of reaction products from reactions of 2-hydroxy-1,4-NQ (lawsone) with dG at 0 hours (A) UV_{260nm}, (B) extracted ion chromatogram of $[M + H]^+ = 442$; and after 24 hours (C) UV_{260nm}, (D) extracted ion chromatogram of $[M + H]^+ = 442$.

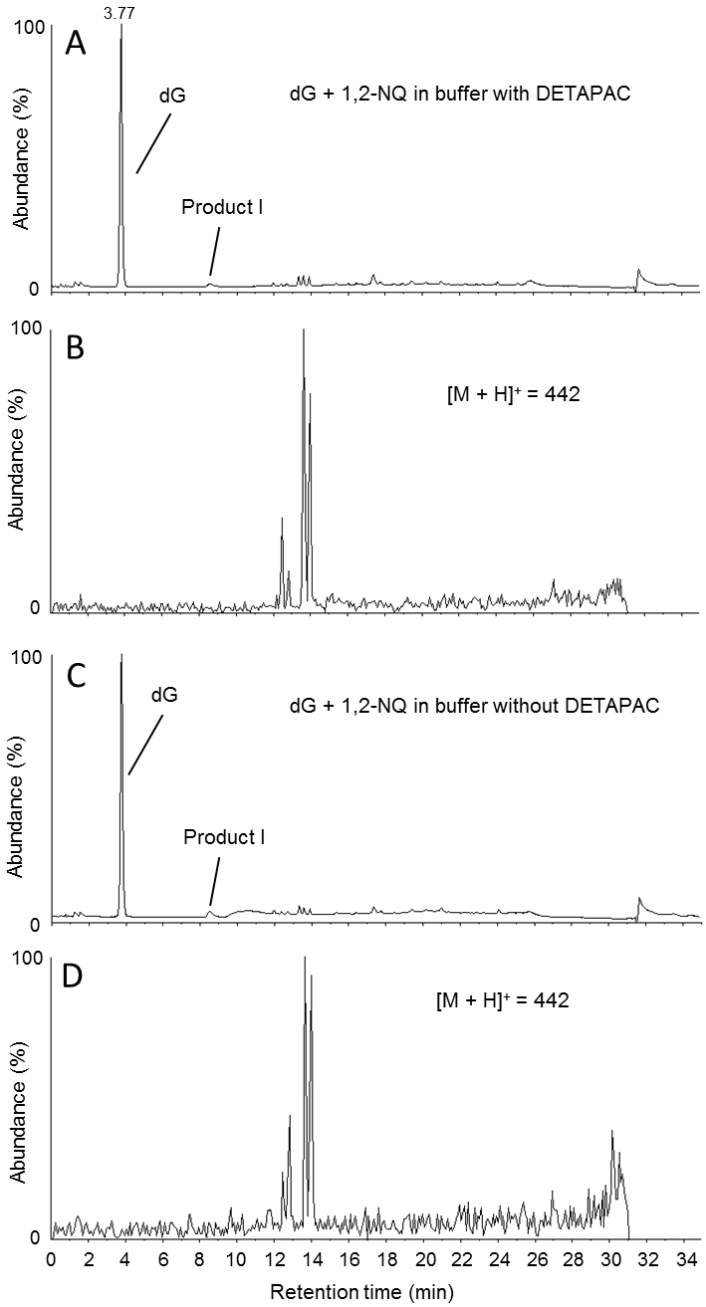

Figure S13 Results of LC/ESI(+)-MS/MS analyses of reaction products from reactions of 1,2-NQ with dG after 15 hours at 37 °C, with DETAPAC, (A) UV_{260nm}, (B) extracted ion chromatogram of $[M + H]^+ = 442$; without DETAPAC, (C) UV_{260nm}, (D) extracted ion chromatogram of $[M + H]^+ = 442$.

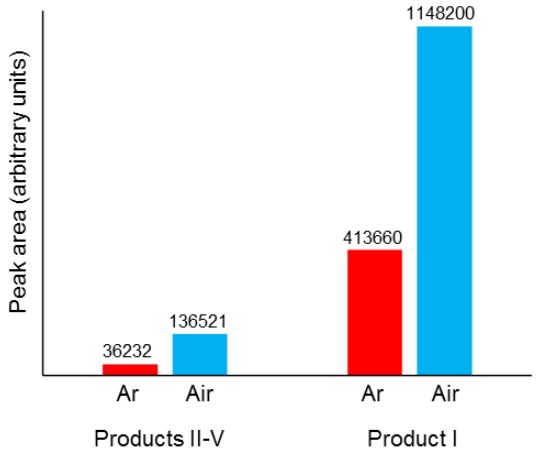

Figure S14 Relative amounts of products II through V (sum of 4 peaks) and product I detected under Ar gas atmosphere conditions and under ambient air conditions when 1,2-NQ was reacted with dG in phosphate buffer, pH 7.4, for 8 hours in the dark.