

# Calcium binding and transport by Coenzyme Q

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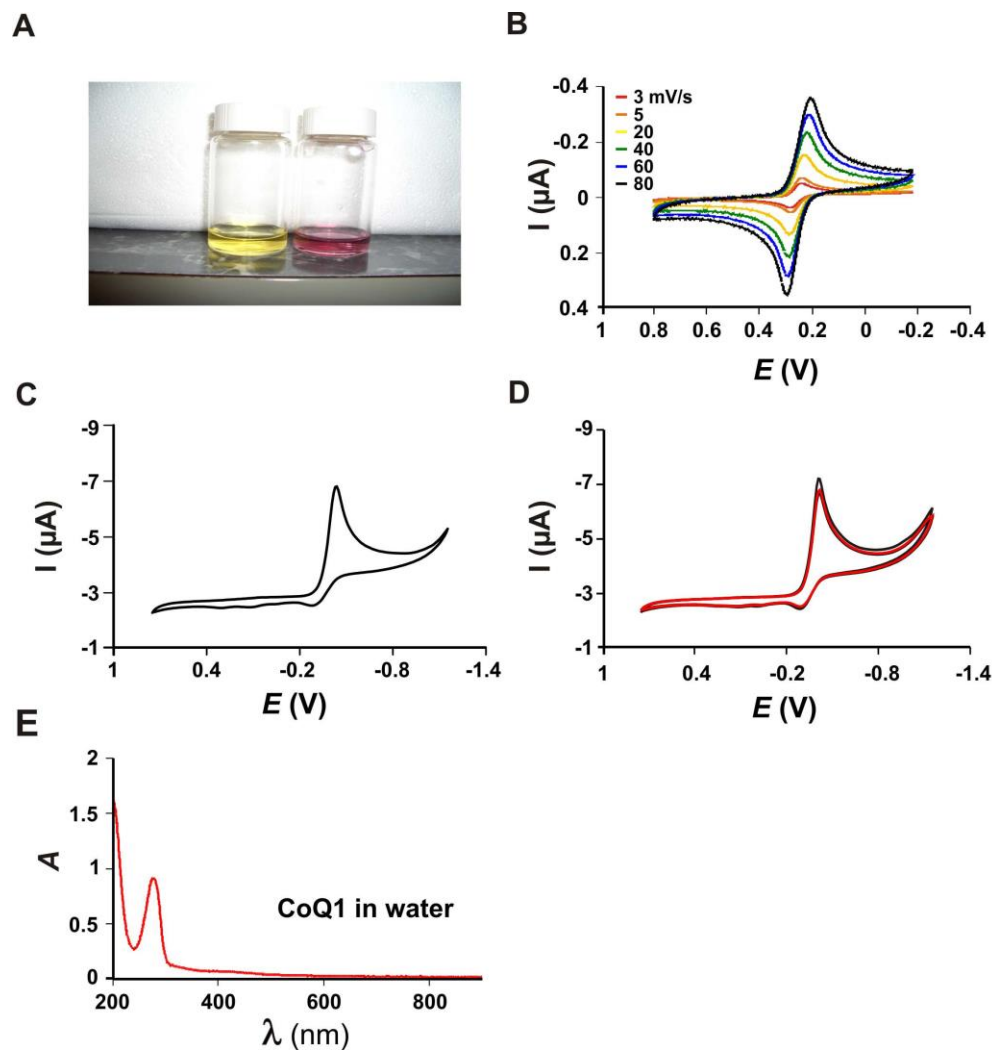
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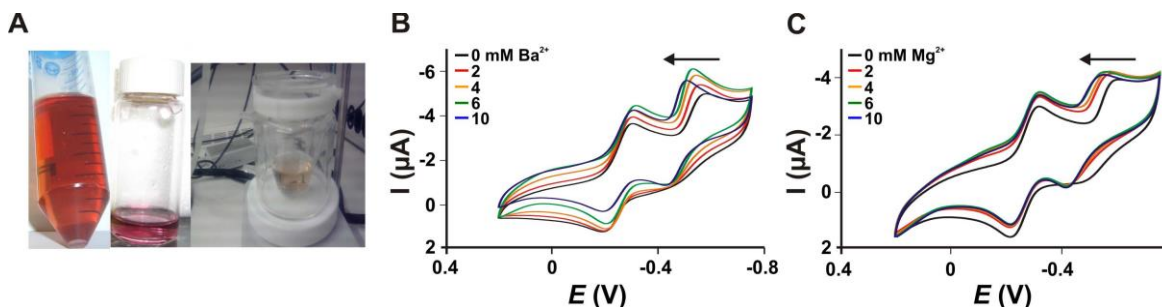
## **Abstract**

This is a set of experimental data of Coenzyme Q1 and Coenzyme Q10 related to the redox chemistry and the ability of native and hydroxylated CoQ's forms to bind earth-alkaline cations. While there is an evident potential of hydroxylated CoQ1 and CoQ10 to bind strongly calcium ions, a bit less complexing potential exists towards binding Ba<sup>2+</sup> and Mg<sup>2+</sup>.



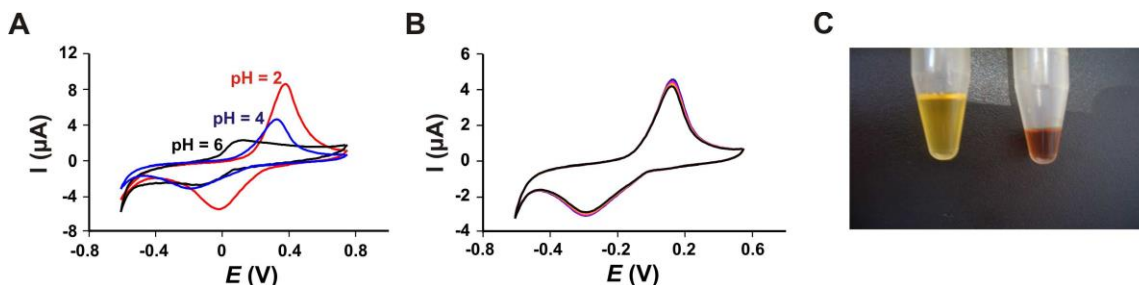
**Figure S1: Native CoQ1 is insensitive to  $\text{Ca}^{2+}$**

(A) Snapshots of 50  $\mu\text{M}$  CoQ1 dissolved directly in water (neutral pH) (left), and 50  $\mu\text{M}$  CoQ1 initially dissolved in 1 M NaOH for 1h, and then retitrated to pH of 7.4 (right). (B) Scan rate analysis of CVs recorded from 20  $\mu\text{M}$  CoQ1 dissolved in 1 M HCl. (C) CVs of 50  $\mu\text{M}$  native (yellow form) CoQ1 recorded in 0.1 M aqueous solution of KCl at pH of 7.4. Scan rate of 30 mV/s. (D) CVs showing the insensitivity of the native CoQ1 dissolved in 0.1 M KCl, to  $\text{Ca}^{2+}$  ions in pH of 7.4.  $c(\text{Ca}^{2+})$  was 10 mM (red curve). The black curve is the same as in C. Scan rate was 30 mV/s.  $c(\text{CoQ1}) = 50 \mu\text{M}$ . (E) UV-VIS spectrum of the native CoQ1 (10  $\mu\text{M}$ ) dissolved in water.



**Figure S2: Hydroxy CoQ1 is less sensitive for Ba<sup>2+</sup> and Mg<sup>2+</sup> as for Ca<sup>2+</sup>**

(A) Comparison of the colored solutions of 2,5-dihydroxy-benzoquinone (left snapshot), the hydroxylated CoQ1 (middle) and the 2-hydroxy-hydroquinone (right). pH of the aqueous solution was ~ 7. CoQ1 was initially kept in contact with 0.1 M NaOH for 1h, and was retitrated afterwards to pH of 7. 2,5-dihydroxy-benzoquinone and the 2-hydroxy-hydroquinone were directly dissolved in 0.1 M KCl aqueous solution. pH was adjusted to ~ 7. CVs of  $c(\text{CoQ1}) = 50 \mu\text{M}$  (dissolved in 1 M NaOH for 60 minutes and retitrated to pH of 7), showing its complexating abilities towards earth-alkaline cations: (B) Ba<sup>2+</sup>; (C) Mg<sup>2+</sup>. pH of the aqueous solution was ~ 7, while the scan rate was 30 mV/s.



**Figure S3: Native CoQ10 is insensitive to Ca<sup>2+</sup> in bio-mimetic membranes**

CVs of the native form of CoQ10 dissolved in lipid biomimetic membrane showing its sensitivity toward (A) protons and insensitivity to (B) Ca<sup>2+</sup> ions.  $c(\text{Ca}^{2+})/\text{mM} = 0, 2; 10$  and  $50$ ,  $c(\text{CoQ10}) = 100 \mu\text{M}$ , scan rate = 30 mV/s, . (C) Snapshot of CoQ10 (50  $\mu\text{M}$ ) dissolved in dichloroethan in absence (left) or in presence (right) of the organic hydroxide (tetraoctylammonium hydroxide).

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