tert-Butyl Hydroquinone: an Effective Electrochemical Probe for Sensing Polymerase Chain Reaction and Loop-Mediated Isothermal Amplicons

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The quantitative monitoring of nucleic acid amplifications via polymerase chain reaction (PCR) and loop-mediated isothermal amplification (LAMP) are current approaches for high sensitive detection of DNA from pathogenic (micro) organisms. This work is continuous effort of our research group to find inexpensive and readily available DNA-redox intercalating probe for monitoring of amplicons. In this regard, we found *tert*-butyl hydroquinone (TBHQ), a readily available and low-cost redox molecule popularly used in food additive has good DNA binding ability and it is successful in the quantitative monitoring of DNA amplicons in PCR and LAMP. Our studies revealed that TBHQ has excellent DNA binding abilities and electrochemical behaviors in both PCR and LAMP buffer, and its binding parameters, binding constant, binding site size and diffusion coefficient are suitable for end point detection. The electrochemical end-point detections for monitoring DNA amplifications are established using target genomic DNA as models including λ phage, calf thymus and *E. coli* and the method is verified and authenticated by traditional methods, such as fluorescence and turbidimetric methods. Besides, we found good recoveries in the determination of target tpc gene spiked in λ phage, calf thymus and *E. coli* DNA.

Keywords: Polymerase chain reaction, LAMP, DNA, Biosensor, Molecular design, redox reporter

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