

Supporting Information for

Point-of-Care Testing Kit for the Detection of Hexavalent Chromium by Carbohydrazide-Derived Graphitic Carbon Nitride

Muniyandi Maruthupandi ¹ and Nae Yoon Lee ^{2,*}

¹ Department of Bio-Nano Convergence, Gachon University, 1342 Seongnam-daero, Sujeong-gu, Seongnam-si 13120, Gyeonggi-do, Republic of Korea; maruthu1328@gachon.ac.kr

² Department of BioNano Technology, Gachon University, 1342 Seongnam-daero, Sujeong-gu, Seongnam-si 13120, Gyeonggi-do, Republic of Korea

* Correspondence: nylee@gachon.ac.kr

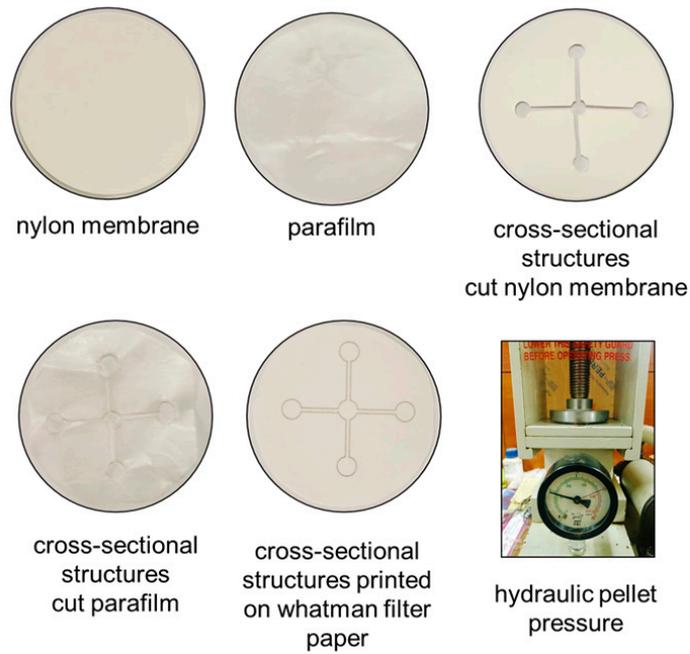


Figure S1. Starting materials for the preparation of the POCT kit.

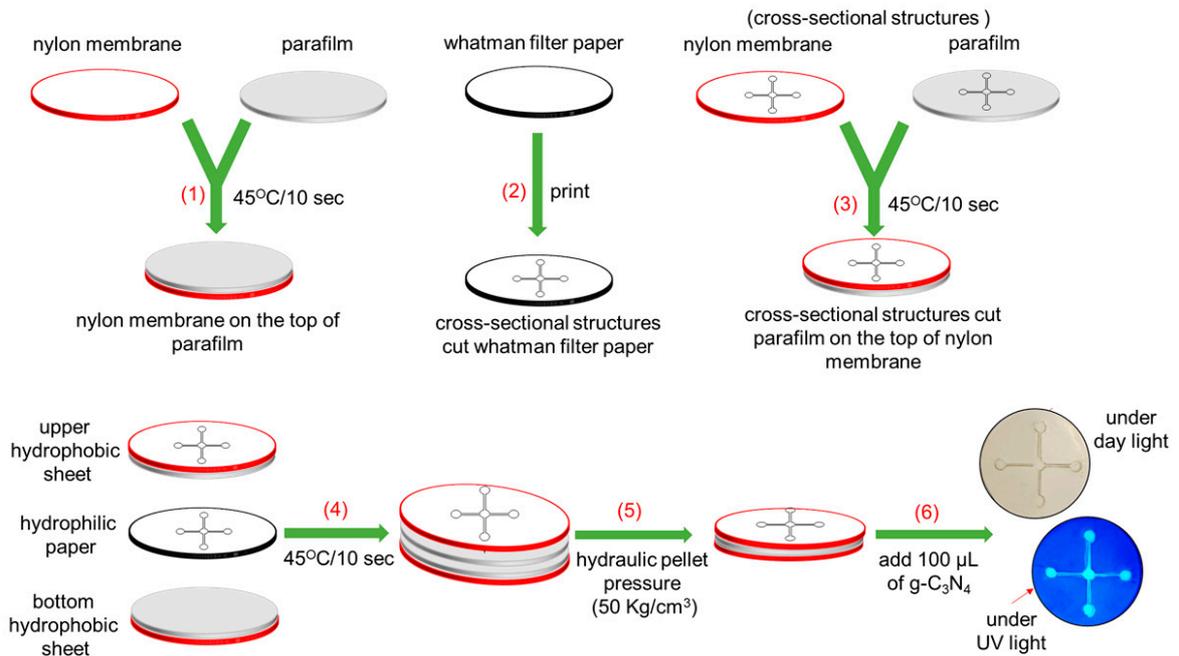


Figure S2. Schematic representation of the preparation of the POCT kit.

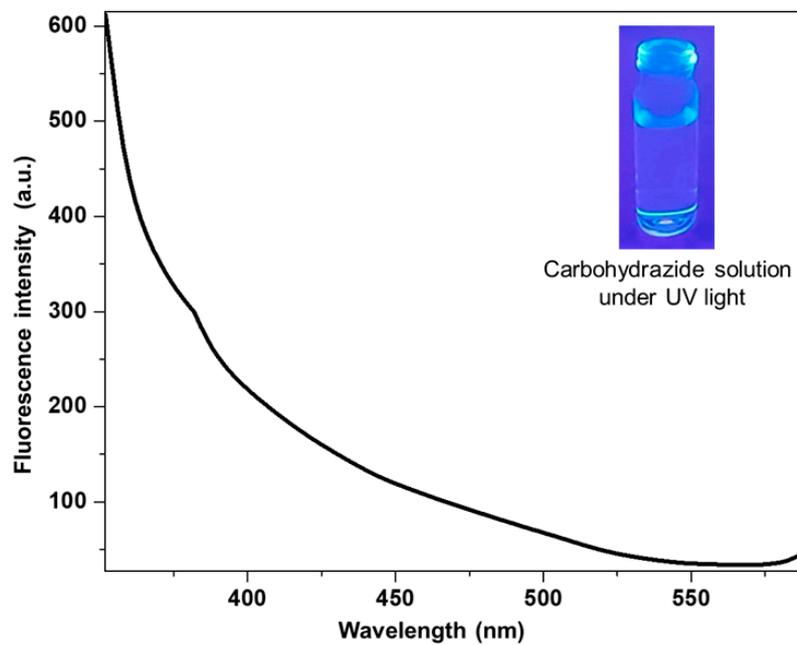


Figure S3. Fluorescence spectrum of carbohydrazide (inset: photograph of carbohydrazide under UV light).

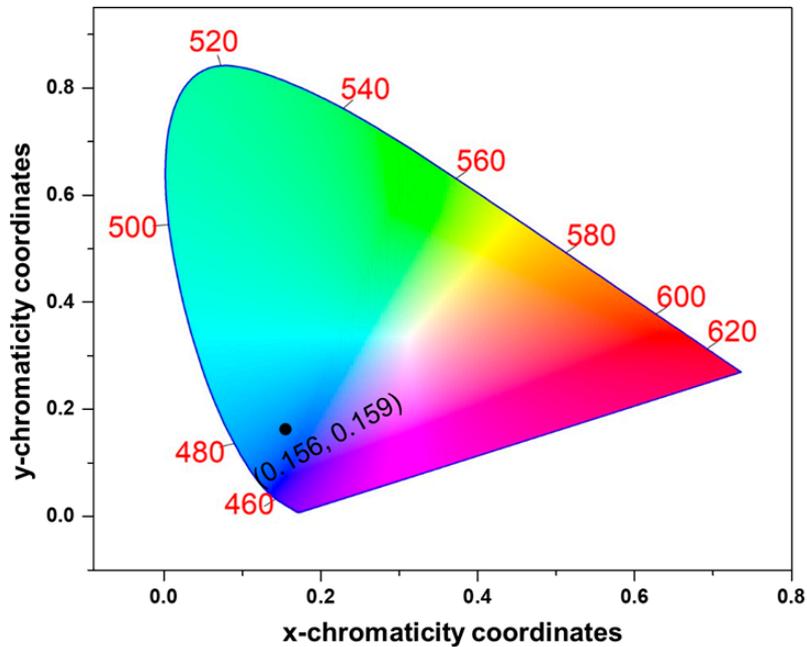


Figure S4. Chromaticity diagram of g-C₃N₄.

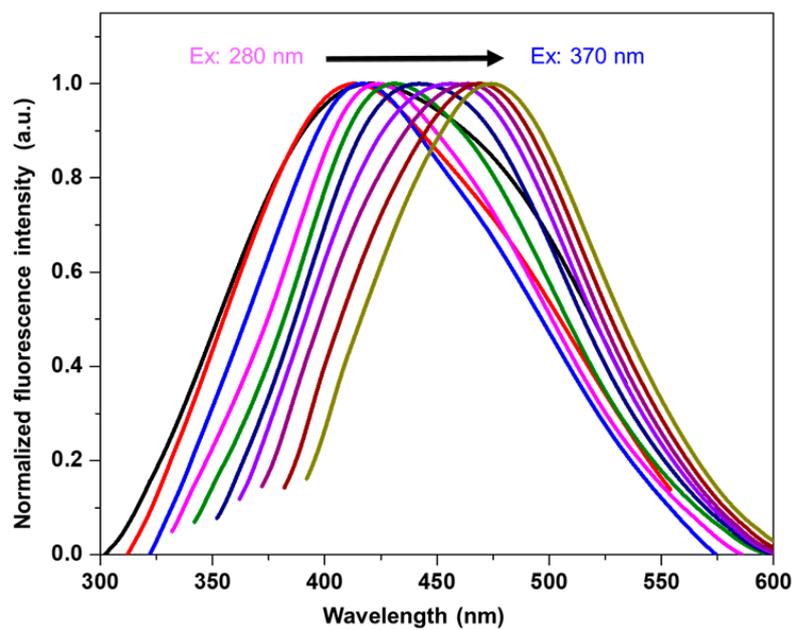


Figure S5. Normalized fluorescence spectra of g-C₃N₄ obtained at different excitation wavelengths.

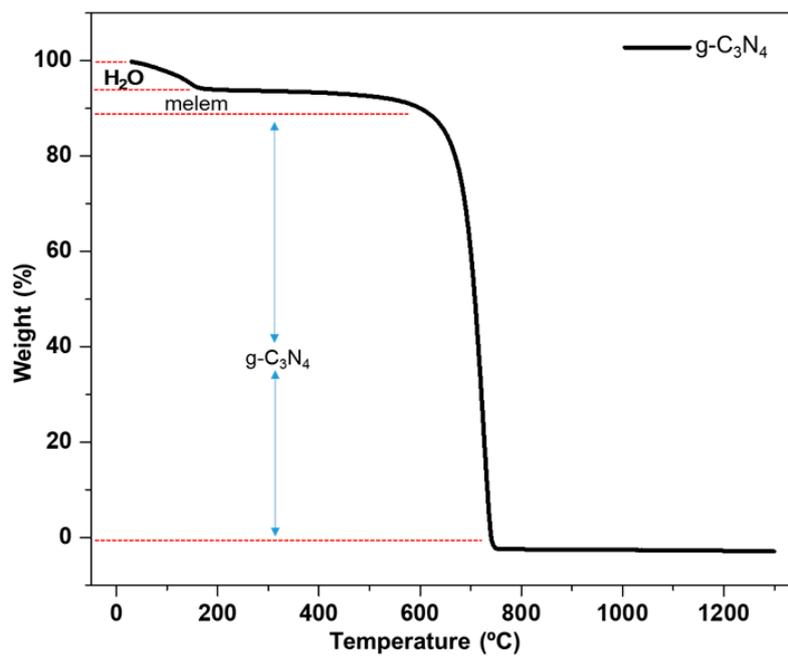


Figure S6. Thermogravimetric (TGA) curve of g-C₃N₄.

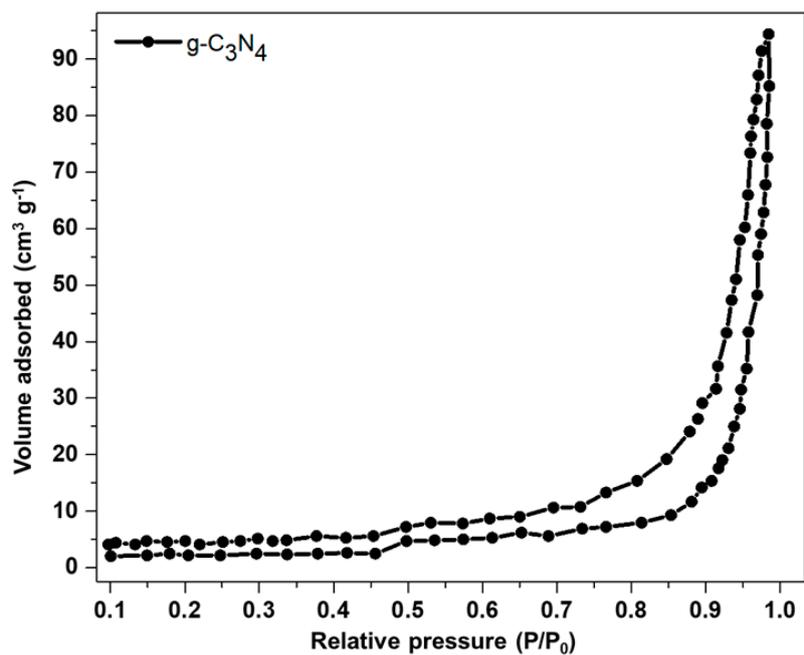


Figure S7. Nitrogen adsorption-desorption isotherms of g-C₃N₄.

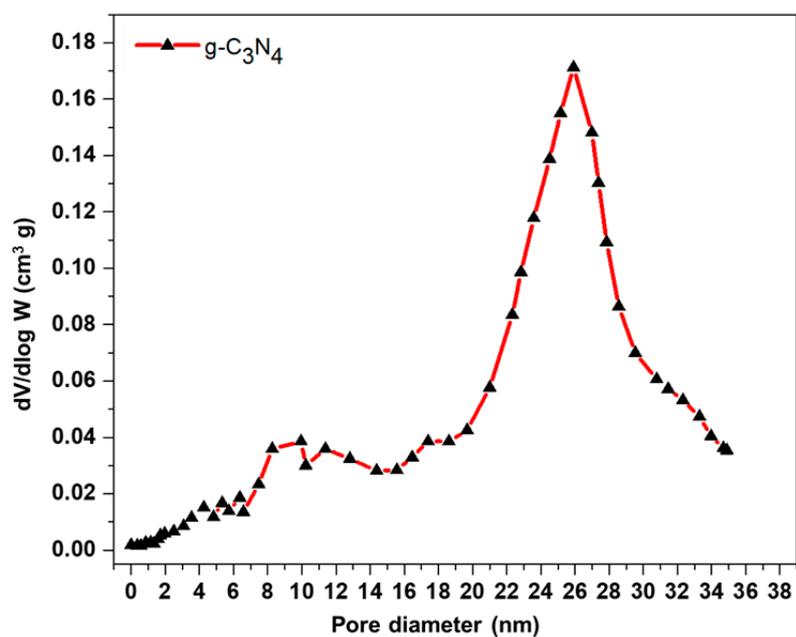


Figure S8. Pore size distribution of g-C₃N₄.

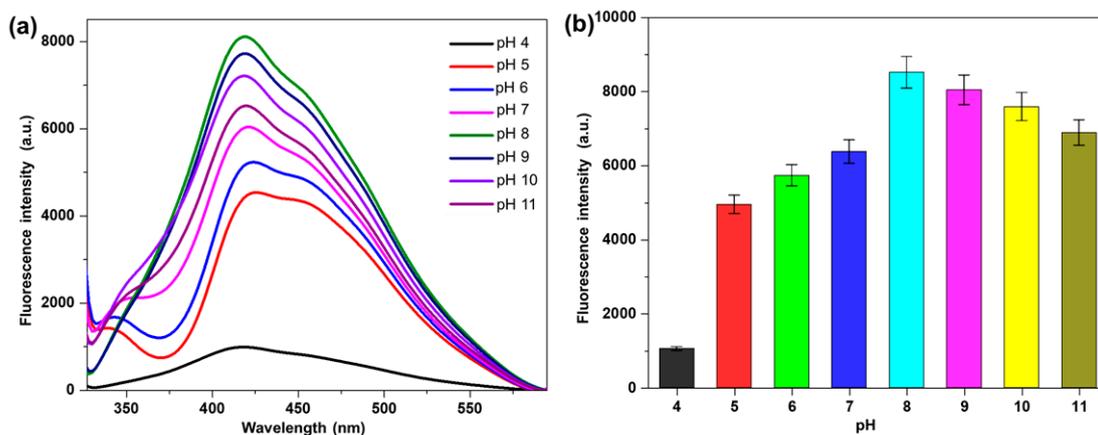


Figure S9. (a) Fluorescence spectra of $g\text{-C}_3\text{N}_4$ across a pH range from 4 to 11, (b) Bar diagram depicting the relationship between pH and fluorescence intensity of $g\text{-C}_3\text{N}_4$.

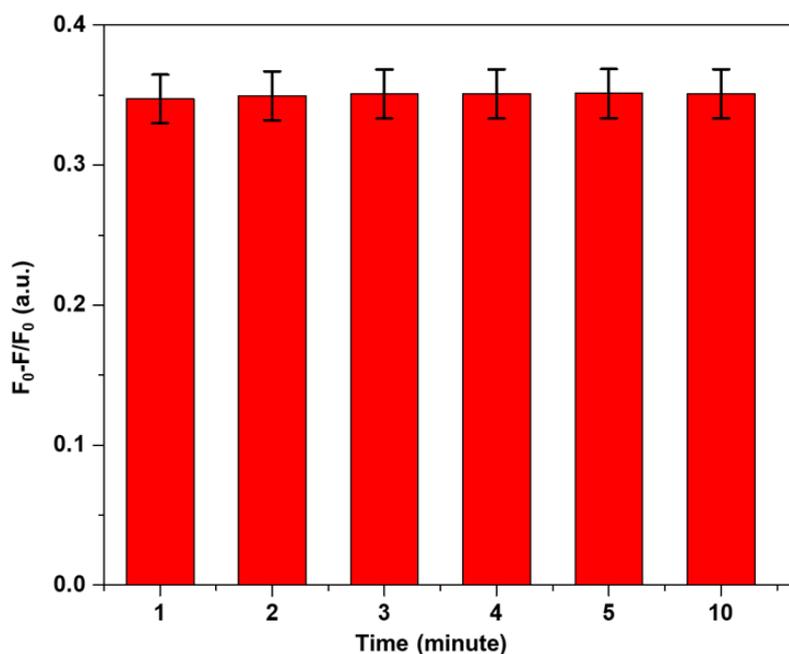


Figure S10. Effect of time: relative fluorescence intensity of $g\text{-C}_3\text{N}_4$ and $1.2 \mu\text{M Cr(VI)}$ ions mixture vs time.

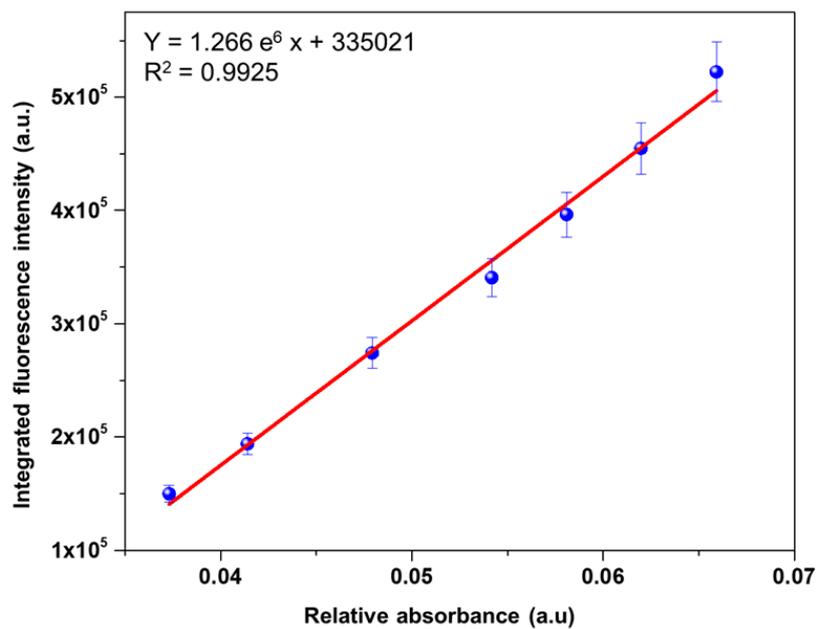


Figure S11. Integrated fluorescence intensity of quinine sulfate vs relative absorbance.

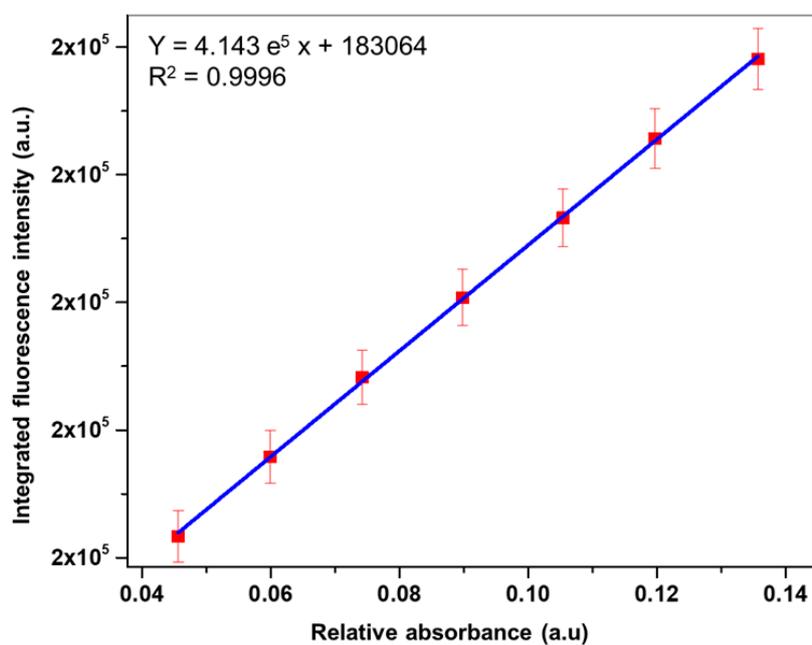


Figure S12. Integrated fluorescence intensity of g-C₃N₄ vs relative absorbance.

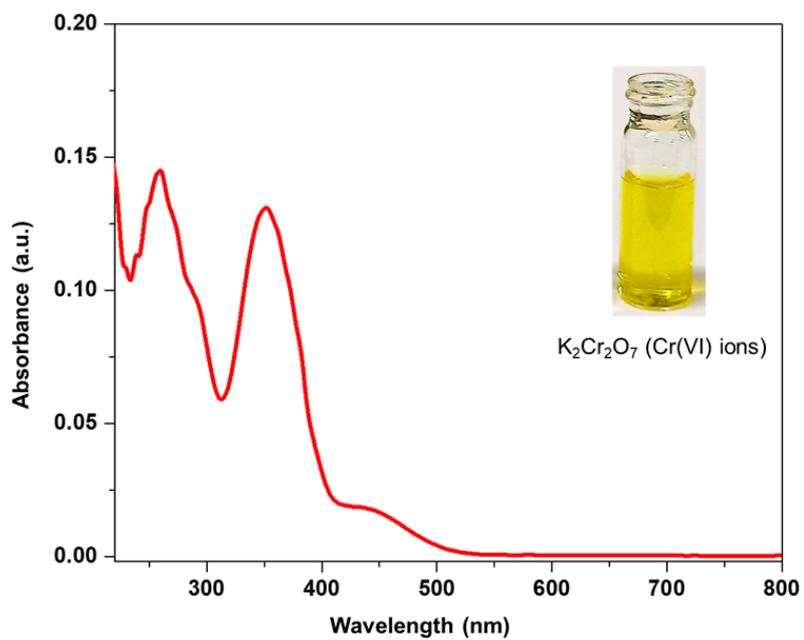


Figure S13. Absorption spectrum of $K_2Cr_2O_7$ (Cr(VI) ions) (inset: photograph).

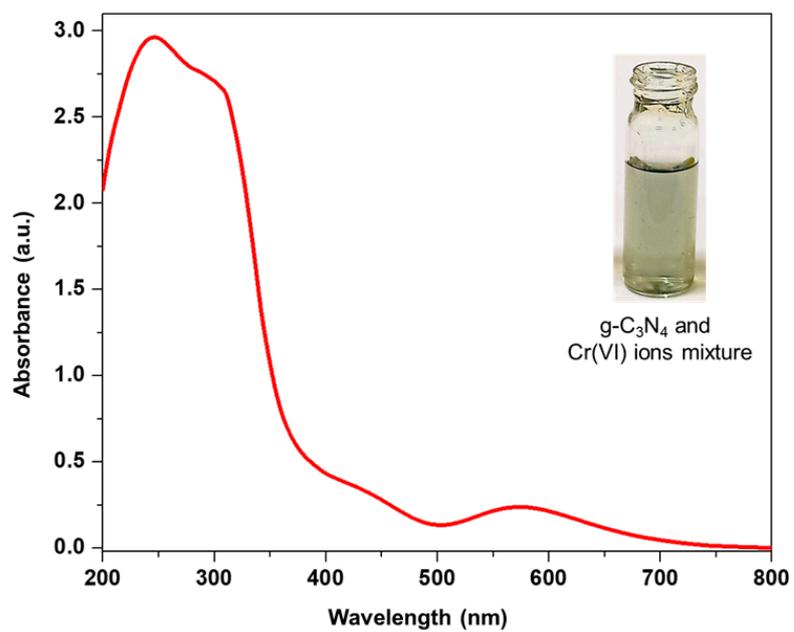


Figure S14. Absorption spectrum of $g-C_3N_4$ in the presence 5.2 μM of Cr(VI) ions mixture (inset: photograph).



Figure S15. Photographs of $K_2Cr_2O_7$ and mixture of $K_2Cr_2O_7$ and ascorbic acid (AA).

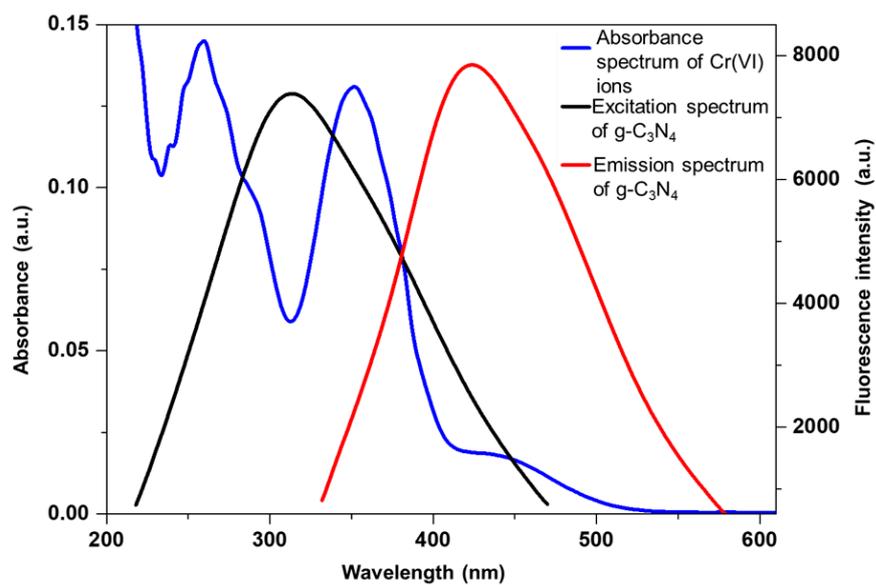


Figure S16. Absorbance spectrum of Cr(VI) ions and excitation and emission spectra of g-C₃N₄.

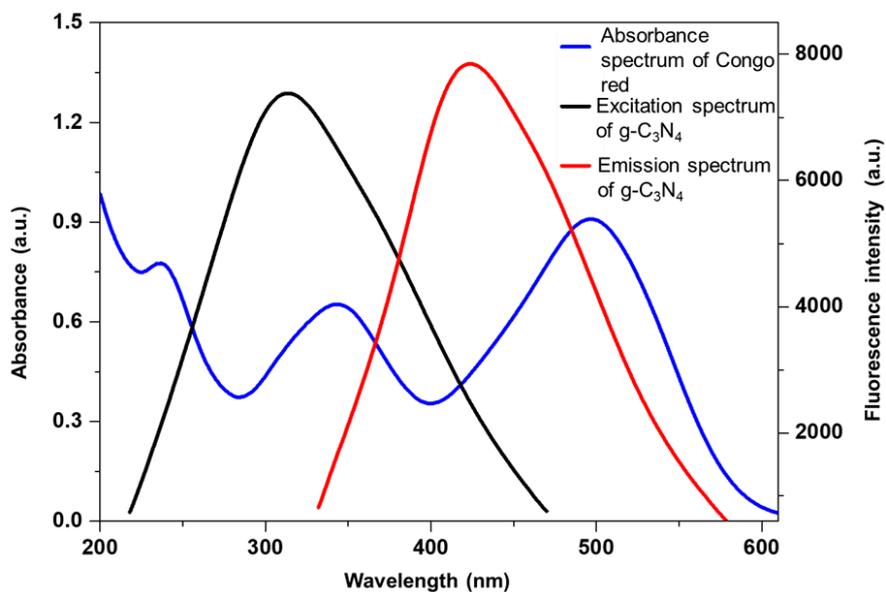


Figure S17. Absorbance spectrum of Congo red (CR) and excitation and emission spectra of $g\text{-C}_3\text{N}_4$.

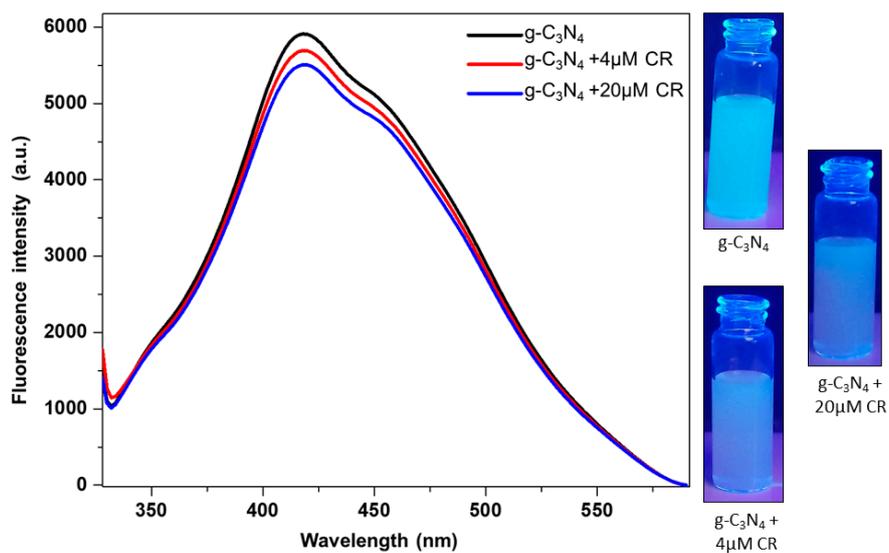


Figure S18. Emission spectra of $g\text{-C}_3\text{N}_4$ in the presence of 4 and 20 μM CR (inset: photograph of $g\text{-C}_3\text{N}_4$ and $g\text{-C}_3\text{N}_4$ in the presence of 4 and 20 μM CR under UV light).

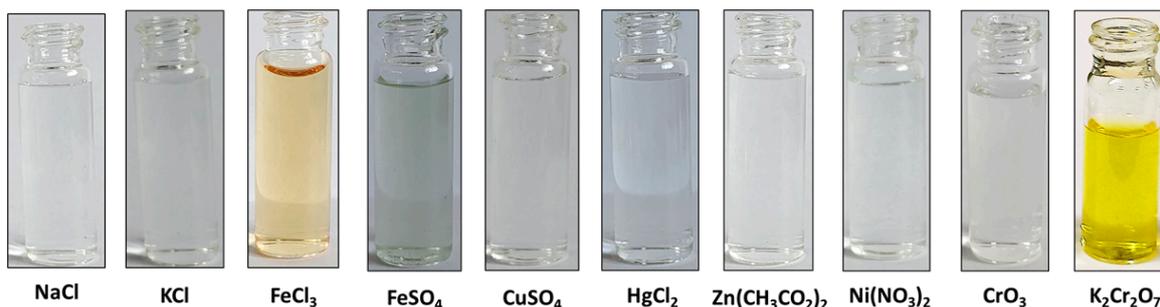


Figure S19. Photographs of a 400 μM solutions of NaCl, KCl, FeCl₃, FeSO₄, CuSO₄, HgCl₂, Zn(CH₃CO₂)₂, Ni(NO₃)₂, CrO₃, and K₂Cr₂O₇ dissolved in a phosphate buffer with a pH of 8.

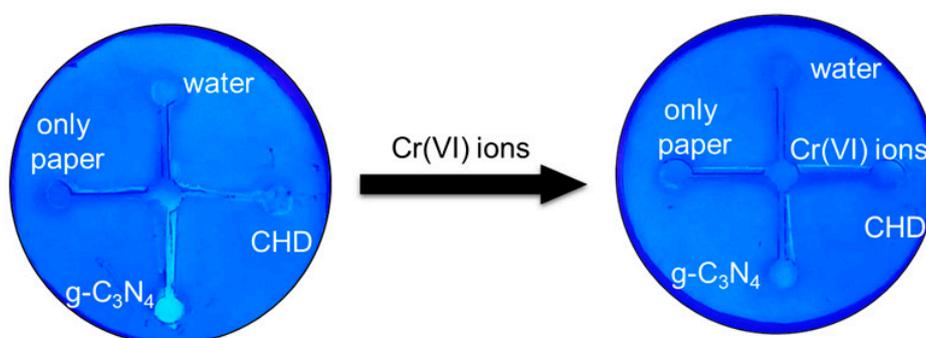


Figure S20. Effect of Cr(VI) ions interaction with paper, water, carbonylhydrazide (CHD), and g-C₃N₄ under UV light.

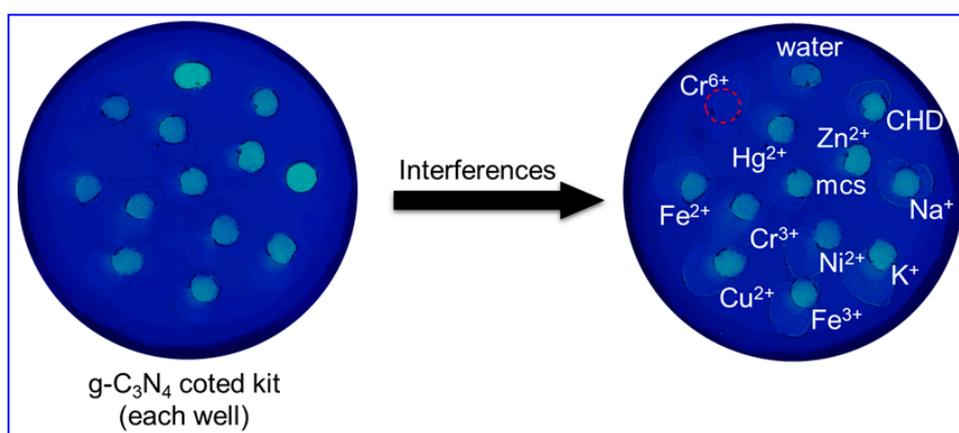


Figure S21. Effect of interferences: g-C₃N₄-coated POCT kit interaction with water, carbonylhydrazide (CHD), Na⁺, K⁺, Fe³⁺, Cu²⁺, Fe²⁺, Cr(VI) ions, Hg²⁺, Zn²⁺, Ni²⁺, Cr³⁺, and mixed cations (mcs).