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Synthetic Green Fluorescent Protein (GFP) Chromophore Analog for Rapid, Selective and Sensitive Detection of Cyanide in Water and in Living Cells

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Research Highlights

- a) THBI is the first turn-on fluorescent chemodosimeter for rapid (in less than 5s) detection of cyanide in water.
- b) THBI is a novel synthetic GFP chromophore analog, synthesized in only three steps (22 % overall yield) with readily available starting materials.
- c) The probe exhibited excellent selectivity and 24-fold fluorescence enhancement towards cyanide over all other anions used (F^- , Cl^- , Br^- , I^- , PF_6^- , ClO_4^- , AcO^- , HSO_4^- , NO_2^- , NO_3^-).
- d) THBI is found to be feasible for naked eye cyanide detection, since it exhibits rapid colour change from colourless to intense yellow in the presence of cyanide.
- e) THBI has a very small detection limit of 0.17 μM (4.5ppb) which is much lower than WHO limit.
- f) THBI can efficiently detect cyanide in water, in live cell and on the solid support, which gives opportunity to develop a commercially viable chemosensor kit for cyanide detection.
- g) The approximate cost per measurement is calculated which is found to be less than 4 INR (0.07\$). Hence this will be a cost effective strategy for detection of cyanide for commercial aspects.

Graphical Abstract

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