

# **g-C<sub>3</sub>N<sub>4</sub> Nano Catalyst for the reduction of thermal decomposition temperature of energetic materials**

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## **Abstract:**

Performance of energetic materials, such as propellants & pyrotechnics, is assessed by their decomposition temperature, auto-ignition temperature, and combustion efficiency. The combustion by-products should be non-toxic and environmentally friendly. To overcome the above problems, several nano metal oxide catalysts have been developed to tailor the thermal decomposition temperature. Due to various drawbacks with the use of metallic catalysts, such as high cost, tedious preparation, and toxicity, there is a need to develop non-metallic catalysts. Hence, a non-metallic, cost-effective, and efficient nano catalyst, g-C<sub>3</sub>N<sub>4</sub>, was synthesized and utilized with oxidizer (KNO<sub>3</sub>) in different ratios of 1:1 and 1:3. The thermal decomposition temperature of bare KNO<sub>3</sub> and g-C<sub>3</sub>N<sub>4</sub> remains in a range 500-900°C and 600-700°C respectively. The synthesized samples were analysed by XRD, FTIR, TEM, FESEM, and TGA analysis. The catalytic behaviour of g-C<sub>3</sub>N<sub>4</sub> on KNO<sub>3</sub> was studied using TGA-DTA Analysis. The thermal decomposition pattern showed that as the g-C<sub>3</sub>N<sub>4</sub> increases from 50 to 75 %, the thermal decomposition temperature of oxidizer KNO<sub>3</sub> decreases from 500 to 300 °C. The results demonstrated that g-C<sub>3</sub>N<sub>4</sub> is a promising non-metallic catalyst with potential to enhance the performance and efficiency of energetic materials and hence be utilized as a burn rate enhancer.