The effect of g-C$_3$N$_4$ precursors on photocatalytic activity enhancement of   water-dispersible porous g-C$_3$N$_4$ photocatalysts

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In this study, water-dispersible porous g-C$_3$N$_4$ photocatalysts were prepared from bulk g-C$_3$N$_4$ by a chemical oxidation method and their photocatalytic activity was examined under visible-light irradiation. Bulk g-C$_3$N$_4$ was obtained from different C and N rich precursors such as dicyandiamide, melamine, urea, and thiourea in a muffle furnace at 550°C for 4 hours under air condition. Properties of bulk and porous g-C$_3$N$_4$ materials were characterized by FE-SEM, XRD, FT-IR, BET and UV-vis absorption. Porous g-C$_3$N$_4$ photocatalysts showed a higher photocatalytic degradation rate of methylene blue than bulk g-C$_3$N$_4$. Photocatalytic activities of porous g-C$_3$N$_4$ materials also depended on the precursors of bulk g-C$_3$N$_4$, following the order of apparent rate constants (kapp): dicyandiamide < melamine < urea < thiourea. The improvement of adsorption ability in porous g-C$_3$N$_4$ are responsible for the high photocatalytic activity of porous g-C$_3$N$_4$. Moreover, the existence of sulfur in thiourea caused the different interaction in the preparation, resulting in a high activity.