The fascinating electrical properties and solution-based processing capabilities of reduced graphene oxide (RGO) have led to its widespread implementation as a conductive support for nanostructured materials. In particular, RGO has been consistently shown to improve photocatalytic degradation of environmental pollutants when coupled with TiO_2 nanoparticles and irradiated with UV light. However, previous work demonstrating the susceptibility of RGO to $OH^{\bullet}$ attack raises new questions in terms of the stability of RGO in the TiO_2 aqueous system. In this study we have examined this stability in detail and find the RGO is completely mineralized *via* the $OH^{\bullet}$ that evolve from the valence band of TiO_2 under UV excitation. The mechanism through which the degradation proceeds as well as the environmental implications of the findings are discussed.