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Title: Microwave-assisted synthesis of reduced graphene oxide/titania nanocomposites as an adsorbent for methylene blue adsorption

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1 **Microwave-assisted synthesis of reduced graphene oxide/titania nanocomposites**
2 **as an adsorbent for methylene blue adsorption**

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9 **Abstract**

10 In this study microwave-assisted reduction (MrGO) and direct reduction of graphene
11 oxide (rGO) by Ti powders were established, and the effect of the reaction conditions
12 on the reduction were discussed. The results showed that GO can be effectively
13 reduced by both methods, however, microwave assistance can greatly shorten the
14 reduction time. The produced Ti ions from the reaction of Ti powder with GO were
15 transferred to TiO₂ by hydrolysis and formed MrGO/TiO₂ and rGO/TiO₂. They were
16 used as adsorbents for the removal of methylene blue (MB). MrGO/TiO₂ showed a
17 higher adsorption capacity (q_{\max} , 845.6 mg/g) than rGO/TiO₂ (q_{\max} , 467.6 mg/g).
18 Investigation on the adsorption MB onto MrGO/TiO₂ was conducted and
19 demonstrated that adsorption kinetics followed the pseudo second-order kinetics
20 model and the adsorption isotherm was well described by the Langmuir isotherm
21 model. The recycling of MrGO/TiO₂ was achieved by photocatalytic degradation of
22 MB catalyzed by MrGO/TiO₂ itself.

23 **1. Introduction**

24 Nowadays, a variety of dyes are used in industries, such as textile, paper, printing,

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