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Efficient and rapid adsorption characteristics of templating modified guar gum and silica nanocomposite towards removal of toxic reactive blue and Congo red dyes

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4 **1 Efficient and rapid adsorption characteristics of templating modified guar gum and silica**  
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6 **2 nanocomposite towards removal of toxic reactive blue and Congo red dyes**

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24 **9 Abstract:**

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26 10 The present study highlights the potentiality of sol-gel synthesized guar gum-graft-*poly*  
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28 11 (acrylamide)/silica (g-GG/SiO<sub>2</sub>) hybrid nanocomposite towards the rapid removal of toxic  
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30 12 reactive blue 4 (RB) and Congo red (CR) dyes from aqueous solution. Various physicochemical  
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32 13 characterizations support the feasibility of the functionalized guar gum matrix as efficient  
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34 14 template for the formation of homogeneous nanoscale silica particles. The composite  
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36 15 demonstrates rapid and superior adsorption efficiency of RB ( $Q_{max}$ : 579.01 mg. g<sup>-1</sup> within 40  
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38 16 min) and CR ( $Q_{max}$ : 233.24 mg. g<sup>-1</sup> within 30 min) dyes from aqueous environment. Here, the pH  
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40 17 driven adsorption process depends strongly on the ionic strength of the salt solution. The  
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42 18 adsorption kinetics data predicts that pseudo second-order (surface adsorption) and intraparticle  
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44 19 diffusion take place simultaneously. The adsorption equilibrium is in good agreement with the  
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46 20 Langmuir isotherm, while the thermodynamics study confirms spontaneous nature of the  
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48 21 adsorption process. Desorption study predicts the excellent regenerative efficacy of  
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51 22 nanocomposite.

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58 **23 Keywords:** Nanocomposite; Adsorption; Congo red; Reactive blue.

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