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## Synthetic Communications >

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Articles

# A rapid synthesis of quinoxalines by using Al<sub>2</sub>O<sub>3</sub>–ZrO<sub>2</sub> as heterogeneous catalyst

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## Abstract

In this study, we present a highly efficient and environmentally benign protocol for synthesizing biologically important quinoxaline derivatives. The synthesis involves the reaction of 1,2-diamines with substituted phenacyl bromides or benzil, taking place at room temperature in *N,N*-dimethylformamide (DMF) solvent. The reaction is facilitated by a bifunctional heterogeneous catalyst composed of Al<sub>2</sub>O<sub>3</sub>–ZrO<sub>2</sub> binary metal oxide. Our method offers numerous advantages, including excellent product yield, renewable catalytic conditions, minimal catalyst usage, safer chemistry, short reaction time, and a simple work-up procedure. To determine the chemical structure of the synthesized derivatives, we employed characterization techniques such as nuclear magnetic resonance (NMR) and high-resolution mass spectrometry (HRMS). Additionally, the Al<sub>2</sub>O<sub>3</sub>–ZrO<sub>2</sub> catalyst was characterized using X-ray diffraction (XRD),

scanning electron microscopy with energy-dispersive X-ray analysis (SEM-EDAX), and thermogravimetric analysis (TGA).

## Graphical Abstract

**Q Keywords:** Al<sub>2</sub>O<sub>3</sub>-ZrO<sub>2</sub> cyclocondensation quinoxaline recyclable

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## Disclosure statement

No potential conflict of interest was reported by the author(s).

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