SINTESIS TURUNAN PIRAZOLINA BERBASIS 2-HIDRAZINBENZOTIAZOL DAN 2-HIDRAZINOPIRIDIN SERTA UJI AKTIVITAS DAN SELEKTIVITASNYA SEBAGAI KEMOSENSOR FLUORESENSI ION LOGAM

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INTISARI

Telah dilakukan sintesis pirazolina A dan B dari kalkon berbasis furan serta uji aktivitas dan selektivitasnya sebagai kemosensor fluoresensi ion logam. Sintesis pirazolina A dan B dilakukan melalui 2 tahap reaksi yaitu reaksi kondensasi Claisen-Schmidt antara 2-asetilfuran dan 3,4-dimetoksibenzaldehida untuk menghasilkan kalkon A. Selanjutnya kalkon A disiklisasi menggunakan 2-hidrazinbenzotiazol dan 2-hidrazinopiridin menghasilkan pirazolina A dan B. Reaksi siklisasi dilakukan dengan metode refluks selama 5 jam dengan adanya katalis basa NaOH dalam etanol. Pirazolina A dan B hasil sintesis dikarakterisasi dengan FTIR, GC-MS, ^{1}H- dan ^{13}C-NMR. Selanjutnya dilakukan uji aktivitas dan selektivitasnya sebagai kemosensor fluoresensi ion logam. Prosedur ini terdiri dari beberapa tahap, yaitu skrining terhadap ion logam, penentuan stoikiometri kompleks pirazolina-ion logam, penentuan LOD dan LOQ, uji interferensi serta penentuan nilai *quantum yield.*

Sintesis pirazolina A dan B menghasilkan padatan berwarna kuning kecoklatan dengan persen hasil berturut-turut sebesar 83 dan 43%. Hasil skrining berbagai ion logam menunjukkan bahwa pirazolina A sensitif tetapi tidak selektif terhadap ion logam Fe^{3+}, sedangkan pirazolina B hanya memberikan sedikit sensitivitasnya terhadap ion logam Al^{3+}, Co^{2+}, dan Zn^{2+} sehingga pirazolina B tidak diuji lebih lanjut. Kompleks pirazolina A-Fe^{3+} terbentuk dengan rasio 1:1 dan memiliki nilai *binding constant* $1{,}44\times10^{3}$ M^{-1}, nilai LOD dan LOQ masing-masing 4,1426 dan 13,8087 µM, serta *quantum yield* sebesar 0,38.

Kata kunci: 2-hidrazinbenzotiazol, 2-hidrazinopiridin, kemosensor fluoresensi, pirazolina

SYNTHESIS OF PYRAZOLINE DERIVATIVES BASED ON 2-HYDRAZINEBENZOTHIAZOLE AND 2-HYDRAZINOPYRIDINE AND THEIR ACTIVITY AND SELECTIVITY TESTS AS METAL ION FLUORESCENCE CHEMOSENSORS

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ABSTRACT

The synthesis of pyrazoline A and B from furan-based chalcones and their activity and selectivity tests as metal ion fluorescence chemosensors have been carried out. The synthesis of pyrazoline A and B was accomplished via two-step reactions, namely the Claisen-Schmidt condensation reaction between 2-acetylfuran and 3,4-dimethoxybenzaldehyde to produce chalcone A. Then, the chalcone A was cyclized using 2-hydrazinbenzothiazole and 2-hydrazinopyridine to give pyrazolines A and B. The cyclization reaction was performed under reflux for 5 hours in the presence of a base catalyst of NaOH in ethanol. The synthesized pyrazolines A and B were characterized by FTIR, GC-MS, ^{1}H-NMR, and ^{13}C-NMR. Then, their activity and selectivity as metal ion fluorescence chemosensors were tested. This procedure includes several steps, such as metal ion screening, determination of pyrazoline-metal ion complex stoichiometry, determination of LOD and LOQ, interference test, and determination of quantum yield value.

The synthesis of pyrazolines A and B produced brownish-yellow solids with percent yields of 83 and 43%, respectively. The results of various metal ion screening showed that pyrazoline A was sensitive but not selective to Fe^{3+} metal ions, while pyrazoline B only gave low sensitivity to Al^{3+}, Co^{2+}, and Zn^{2+} metal ions; therefore, pyrazoline B was not studied further. The pyrazoline A-Fe^{3+} complex formed with a ratio of 1:1 and has a binding constant value of 1.44×10^{3} M^{-1}, LOD and LOQ values of 4.1426 and 13.8087 μM, respectively, and a quantum yield of 0.38.

Keywords: 2-hydrazinbenzothiazole, 2-hydrazinopyridine, fluorescence, chemosensor, pyrazolines