

Sintesis Metal Organic Framework (MOF) menggunakan logam lantanum dan yttrium dengan ligan asam suksinat sebagai adsorben ion logam kadmium(II) = Synthesis of Metal Organic Framework (MOF) using lanthanum and yttrium metals with succinate acid ligand as adsorbent for cadmium(II) metal ion / Novita Fajrin

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Abstrak

ABSTRAK

Dalam penelitian ini, MOF disintesis sebagai adsorben ion logam kadmium (II) karena kerangka organik logam (MOF) memiliki area pori dan permukaan yang besar serta sifat potensial dan aplikasi seperti pengolahan air yang mengandung ion logam berat. Sintesis MOF dilakukan berdasarkan logam lantanida menggunakan lantanum dan yttrium, dengan mereaksikan logam nitrat (Y (NO₃) 3.6H₂O dan La (NO₃) 3.6H₂O) dengan asam suksinat dan N, N-dimethylformamide (DMF) dan pelarut air menggunakan metode solvothermal. Dua MOF yang disintesis dikarakterisasi menggunakan FTIR, XRD, TGA, BET dan SEM. Hasil dari karakterisasi menyatakan bahwa La-succinate MOF lebih baik daripada MO-succinate Y. Selanjutnya, dua MOF yang disintesis digunakan sebagai adsorben ion logam kadmium (II) dengan berbagai variasi seperti pH, waktu kontak, jumlah adsorben dan konsentrasi adsorbat. Kapasitas adsorpsi yang dihasilkan oleh La-succinate MOF lebih besar dari Y-succinate MOF serta hasil dari isotherm adsorpsi oleh La-succinate dan MOF-succinate Y. La-succinate MOF memiliki R₂ sebesar 0,9946 dengan nilai kapasitas adsorpsi Freundlich sebesar 2.296 mg / g dan MO-succinate Y memiliki R₂ sebesar 0.8812 dengan nilai kapasitas adsorpsi Freundlich sebesar 1.543 mg / g.

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ABSTRACT

In this research, MOF was synthesized as cadmium (II) metal ion adsorbent because the organic metal framework (MOF) has a large pore and surface area as well as potential properties and applications such as water treatment containing heavy metal ions. MOF synthesis was carried out based on lanthanide metal using lanthanum and yttrium, by reacting metal nitrate (Y (NO₃) 3.6H₂O and La (NO₃) 3.6H₂O) with succinic acid and N, N-dimethylformamide (DMF) and water solvents using the solvothermal method. Two MOF synthesized were characterized using FTIR, XRD, TGA, BET and SEM. The results of the characterization stated that La-succinate MOF was better than MO-succinate Y. Furthermore, two MOF synthesized were used as adsorbent of cadmium (II) metal ions with various variations such as pH, contact time, amount of adsorbent and adsorbate concentration. The adsorption capacity produced by La-succinate MOF is greater than Y-succinate MOF and the results of adsorption isotherms by La-succinate and MOF-succinate Y. La-succinate MOF has an R₂ of 0.9946 with a Freundlich adsorption capacity value of 2,296 mg / g and MO-succinate Y has R₂ of 0.8812 with a Freundlich adsorption capacity value of 1,543 mg / g.