

KARAKTERISASI *SLOW-RELEASE* ASAM FULVAT, ASAM HUMAT, DAN LOGAM Fe, Cu, Ca, Mn DAN SIFAT *SWELLING* DALAM SUPRAMOLEKUL HIDROGEL BERHUMUS TERBUAT DARI LIMBAH BULU AYAM

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INTISARI

Karakterisasi *slow-release* asam fulvat, asam humat, dan logam Fe, Cu, Ca, Mn dan sifat *swelling* dalam supramolekul hidrogel berhumus terbuat dari limbah bulu ayam telah dilakukan. Penelitian ini bertujuan untuk mempelajari humus sintesis berbentuk supramolekul hidrogel, menentukan sifat *swelling* supramolekul hidrogel berhumus dari limbah bulu ayam dengan kondisi pH optimum, dan menentukan *slow-release* asam humat, asam fulvat, dan logam Fe, Cu, Ca, Mn yang terlepas dari supramolekul hidrogel berhumus. Supramolekul hidrogel berhumus CV HUMUS diuji dengan *swelling* pada variasi pH 2, 5, 6, 7, dan 8. Padatan sampel dan filtrat supramolekul hidrogel berhumus dengan variasi pH dikarakterisasi dengan FTIR. Kadar logam-logam dianalisis dengan spektrofotometer serapan atom dan kadar asam humat dan asam fulvat dianalisis dengan spektrofotometer UV-Vis.

Hasil analisis menunjukkan bahwa supramolekul hidrogel berhumus memiliki kesatuan supramolekul serta gugus fungsi asam humat dan asam fulvat yang sesuai dengan *International Humic Substances Society* (IHSS). Supramolekul hidrogel berhumus mengandung gugus fungsi -OH -NH dan ikatan hidrogen dengan karbonil, karbon alifatik, aromatik, karbonil amida, metil atau interaksi karboksil, dan karbohidrat. Uji sifat *swelling* menunjukkan ikatan hidrogen dalam supramolekul hidrogel berhumus mempengaruhi sifat *swelling* dengan *swelling* tertinggi terjadi pada variasi pH 7. Supramolekul hidrogel berhumus bersifat *slow-release* terhadap logam-logam (Fe, Ca, Cu, Mn), asam fulvat, dan asam humat.

Kata kunci: hidrogel; humus; logam; supramolekul; *swelling*.

**CHARACTERIZATION OF SLOW-RELEASE OF FULVIC ACID,
HUMIC ACID, AND Fe, Cu, Ca, Mn METALS AND SWELLING
PROPERTIES IN HYDROGEL HUMUS SUPRAMOLECULAR MADE
FROM CHICKEN FEATHER WASTE**

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ABSTRACT

Characterization of slow-release of fulvic acid, humic acid, and Fe, Cu, Ca, Mn metals and swelling properties in hydrogel humus supramolecular made from chicken feather waste has been conducted. The research was aimed to study synthetic humus in form of a supramolecular hydrogel, determine hydrogel humus supramolecular swelling properties from chicken feather waste at the optimum pH, and determine humic acid, fulvic acid, and Fe, Cu, Ca, and Mn metals slow-release from hydrogel humus supramolecular. Hydrogel humus supramolecular of CV HUMUS was swelled at the pH variation of 2, 5, 6, 7, and 8. Solid sample dan humic supramolecular hydrogel filtrates at different pH were characterized by FTIR. Humic acid and fulvic acid content were analyzed by UV-Vis spectrophotometer and metals were analyzed by atomic absorption spectrophotometer.

The results showed that the humus supramolecular hydrogel had supramolecular aggregation and also indicated humic acid and fulvic acid functional groups in accordance with *International Humic Substances Society* (IHSS). The humus supramolecular hydrogel contained -OH -NH and hydrogen bonding with carbonyl, aliphatic carbon, aromatic, amide carbonyl, methyl or carboxyl interaction, and carbohydrate functional groups. The swelling properties test indicated that hydrogen bonding in humus supramolecular hydrogel influenced swelling properties with the highest swelling result at pH 7. The humus supramolecular hydrogel was capable of slow-released metals (Fe, Ca, Cu, Mn), fulvic acid, and humic acid.

Keywords: humus; hydrogel; metals; supramolecular; swelling.