GENESA DAN PENGOLAHAN AIRTANAH PAYAU SEBAGAI SUMBER AIR BERSIH WARGA DESA SOGAN, KECAMATAN WATES, KABUPATEN KULONPROGO, DAERAH ISTIMEWA YOGYAKARTA

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INTISARI

Sebagian besar penduduk di Indonesia, termasuk masyarakat di daerah penelitian di Desa Sogan, Kecamatan Wates, Kabupaten Kulonprogo, Daerah Istimewa Yogyakarta masih memanfaatkan airtanah sebagai sumber air untuk memenuhi kebutuhannya sehari-hari yang ditunjukkan dengan banyak dijumpai penggunaan sumur bor dan sumur gali. Beberapa sumur pada daerah penelitian dijumpai airtanah payau yang merupakan campuran antara air tawar dengan air asin. Tujuan dari penelitian ini yaitu untuk mengetahui genesa terdapatnya airtanah payau di daerah penelitian, mengetahui kualitas airtanah di daerah penelitian, dan menguji efektivitas kaolin sebagai adsorben dalam pengolahan airtanah payau.

Metode yang digunakan dalam penelitian ini adalah metode survei dan pemetaan lapangan, metode *purposive sampling*, metode analisis laboratorium, metode Diagram Trilinier Piper, dan metode wawancara. Parameter fisik pengujian kualitas air fisik yang diuji yaitu TDS dan DHL. Parameter kimia yang diuji yaitu pH, salinitas, kesadahan sebagai $CaCO_3$, Ca^{2+}, Na^+, Mg^{2+}, K^+, Cl^-, HCO_3^- dan SO_4^{2-}. Metode pengolahan airtanah payau menggunakan Metode Kolom Adsorbsi dengan variasi ukuran butir kaolin dan Metode *Jar Test* dengan variasi waktu pengadukan.

Airtanah payau di daerah penelitian dapat disebabkan oleh perubahan iklim purba pada Kala Plistosen yang menyebabkan daerah penelitian yang dulunya merupakan laguna mengering dan meninggalkan kristal-kristal garam air laut yang bercampur dengan airtanah. Airtanah di daerah penelitian tergolong air payau yang ditunjukkan dengan nilai parameter salinitas sebesar 0,788 ‰ hingga 1,622 ‰. Hasil *plotting* Diagram Piper di daerah penelitian terhadap sampel air yang diujikan menunjukkan bahwa dua dari empat sampel air didominasi anion bikarbonat dan satu dari empat sampel air didominasi anion klorida. Percobaan pengolahan airtanah payau menggunakan kaolin dengan metode kolom adsorbsi untuk Kolom A dengan ukuran butir kaolin 5 mm mampu menurunkan kadar TDS hingga 9,27%, DHL hingga 8,86%, salinitas hingga 7,14%, pH hingga 26,23%, natrium hingga 8,1%, kalsium hingga 18,18%, klorida hingga 27,13%, sulfat hingga 16,85%, dan kesadahan hingga 16,63%. Kolom B dengan ukuran butir kaolin 3 mm mampu menurunkan kadar TDS hingga 6,83%, DHL hingga 7,38%, salinitas hingga 7,14%, pH hingga 24,59%, kalsium hingga 24,02%, klorida hingga 35,96%, sulfat hingga 12,36%, dan kesadahan hingga 15,29%. Percobaan pengolahan airtanah payau menggunakan kaolin dengan metode *jar test* mampu menurunkan kadar TDS hingga 21,68%, DHL hingga 21,23%, dan menetralkan pH hingga 29,51%.

Kata Kunci: Airtanah payau, Adsorbsi, Kaolin

BRACKISH GROUNDWATER GENESIS AND TREATMENT AS FRESH WATER SOURCE FOR CITIZEN IN SOGAN VILLAGE, WATES SUB-DISTRICT, KULONPROGO REGENCY, SPECIAL REGION OF YOGYAKARTA

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ABSTRACT

Most of the citizen in Indonesia, including the citizen in the research area in Sogan Village, Wates Sub-district, Kulonprogo Regency, Special Region of Yogyakarta used groundwater as water source to fulfill their daily needs as indicated by a lot of wells found which being used. Brackish groundwater as result of mixing of fresh water and salt water, found in some wells. Purposes of this research were to know the genesis of brackish groundwater in research area, the water quality in research area, and the efectiveness of kaolin as adsorbent in brackish groundwater treatment using adsorbtion column method and jar test.

This research carried out survey and mapping, purposive sampling, laboratory analysis, Trilinear Piper Diagram, and interview. Physical parameters that being used to determine the quality of groundwater in research area were TDS and Electrical Conductivity, while the chemical parameters were pH, salinity, hardness as $CaCO_3$, Ca^{2+}, Na^{+}, Mg^{2+}, K^{+}, Cl^{-}, HCO_3^{-}, *and* SO_4^{2-}. *Brackish groundwater treatment method carried out Adsorbtion Column Method with variation of kaolin's grain size and Jar Test Method with variation of stirring time.*

Groundwater in research area formed due the paleo-climate change on Pleistocene Epoch that made the research area became a drought lagoon that left the sea salt crystals and mixed with the groundwater. Groundwater in the research area categorized as brackish water as demonstrated by the salinity value from 0,788 ‰ to 1,622 ‰. The result of Piper Diagram's plotting in the research area exhibited that two of four water samples dominated by bicarbonate anion and one of four water samples dominated by chloride anion. Experiment on brackish groundwater that used kaolin with adsorbtion column method revealed that Column A with 5 mm grain size of kaolin reduced the concentration of TDS up to 9,27%, EC up to 8,86%, salinity up to 7,14%, pH up to 26,23%, natrium up to 8,1%, calcium up to 18,18%, chloride up to 27,13%, sulfate up to 16,85%, and hardness up to 16,63%. Column B with 3 mm grain size of kaolin reduced the concentration of TDS up to 6,83%, EC up to 7,38%, salinity up to 7,14%, pH up to 24,59%, calcium up to 24,02%, chloride up to 35,96%, sulfate up to 12,36%, and hardness up to 15,29%. Experiment on brackish groundwater that used kaolin with jar test method reduced the concentration of TDS up to 21,68%, EC up to 21,23%, and neutralize pH up to 29,51%.

Keywords: Brackish groundwater, Adsorbtion, Kaolin