

INTISARI

Desa Geyer merupakan daerah yang tersusun oleh Formasi Kerek, Formasi Kalibeng, dan Anggota Klitik yang tersusun oleh sedimen karbonatan. Litologi berpengaruh terhadap keberadaan air tanah namun juga berpengaruh terhadap karakteristik fisika dan kimia air tanahnya. Penelitian ini bertujuan mengetahui kondisi geologi, keberadaan air tanah, sifat fisika-kimia air tanah, dan keterkaitan kondisi litologi dengan karakteristik fisika dan kimia air tanahnya. Observasi lapangan geologi dan hidrogeologi serta metode analisis XRD (*X-Ray Diffraction*) dan petrografi digunakan untuk mengetahui jenis mineral pada batuan, analisis IC (*Ion Chromatography*), ICP OES (*Inductively Coupled Plasma Optical Emission Spectrometry*), dan titrasi digunakan untuk mengetahui konsentrasi ion mayor dan minor pada air tanah. Daerah penelitian terbagi menjadi 3 satuan litologi yaitu napal sisipan batugamping, napal, dan batulempung karbonatan, serta memiliki morfologi berupa lembah diantara perbukitan. Keberadaan air tanah didaerah penelitian berasal dari akuifer bebas dengan arah pola aliran air tanah menuju sungai dan lembah, serta sungai mendapat suplai air oleh air tanah (*gaining stream*). Karakteristik fisika-kimia air tanah memiliki pH basa (7,86 -9,3), TDS termasuk kategori *freshwater* (158-933 mg/L), DHL termasuk kategori tawar - sedikit asin (321-1919 $\mu\text{S/cm}$), suhu (27,9°C- 36°C), dan kesadahan sangat keras (360 -1350 mg/L). Pada satuan napal memiliki suhu yang lebih tinggi, sedangkan pada satuan napal sisipan batugamping memiliki TDS, DHL, pH, dan kesadahan lebih tinggi. Konsentrasi kimia air tanah satuan litologi napal secara umum memiliki tipe kimia air alkali tanah dengan kandungan alkali yang lebih banyak dengan kandungan bikarbonat dan sulfat yang dominan, sementara pada satuan litologi napal sisipan batugamping memiliki tipe air tanah alkali tanah yang dominan dengan anion dominan sulfat, bikarbonat, dan klorida. Hal tersebut dipengaruhi oleh interaksi batuan dan air tanah, dengan proses yang dominan berupa pelapukan batuan seperti pelapukan silikat (albit, montmorilonit, biotit, palygorskit), pelapukan mineral sulfat dan sulfida (anhidrit dan marcasit), pelapukan karbonat (kalsit), dan pertukaran ion.

Kata kunci : Karakteristik fisika-kimia, air tanah, akuifer bebas, interaksi batuan dan air tanah

ABSTRACT

The Geyer Village area is composed of the Kerek Formation, Kalibeng Formation, and Klitik Member, which consist of carbonate sediments. The lithology influences the presence of groundwater and affects its physical and chemical characteristics. This study aims to determine the geological conditions, the presence of groundwater, the physical-chemical properties of groundwater, and the correlation between lithological conditions and groundwater characteristics. Geological and hydrogeological field observations, along with XRD (X-Ray Diffraction) and petrographic analysis methods, were used to identify the mineral types in the rocks. Ion Chromatography (IC), Inductively Coupled Plasma Optical Emission Spectrometry (ICP OES), and titration were employed to determine the concentrations of major and minor ions in the groundwater. The study area is divided into three lithological units: marl intercalated with limestone, marl, and carbonaceous claystone, featuring a valley morphology between hills. The groundwater in the study area originates from an unconfined aquifer, with the groundwater flow pattern directed towards rivers and valleys. The rivers are gaining streams, receiving water from the groundwater. The physical-chemical characteristics of groundwater in the study area have an alkaline pH (7.86-9.3), Total Dissolved Solids (TDS) classified as freshwater (158-933 mg/L), Electrical Conductivity (EC) categorized as bland-slightly saline (321-1919 $\mu\text{S}/\text{cm}$), temperature (27.9°C-36°C), and very hard hardness (360-1350 mg/L). The marl unit has higher temperature, while the marl intercalated with limestone unit has higher TDS, EC, pH, and hardness. The chemical concentrations of groundwater in the marl lithological unit generally show an alkaline earth water type with higher alkaline content, predominantly containing bicarbonate and sulfate. In contrast, the marl intercalated with limestone lithological unit exhibits a dominant alkaline earth water type with sulfate, bicarbonate, and chloride as the dominant anions. These characteristics are influenced by rock and groundwater interactions, with the dominant processes being rock weathering, such as silicate weathering (albite, montmorillonite, biotite, palygorskite), sulfate and sulfide mineral weathering (anhydrite and marcasite), carbonate weathering (calcite), and ion exchange.

Keywords: Physical-chemical characteristics, groundwater, unconfined aquifer, rock and groundwater interaction