

SARI

Daerah penelitian terletak di Cekungan Akimeugah, Papua. Penelitian dilakukan dengan tujuan mengetahui karakteristik batuan induk dan korelasinya dengan sampel minyak bumi menggunakan data geokimia. Analisis dilakukan terhadap sampel dari sumur Kau-1 dengan kedalaman 9790,60ft hingga 9848,50ft yang tersusun atas litologi batupasir dan batulempung berumur Kapur Awal, serta dari sumur Kau-2 dengan kedalaman 10061ft hingga 10749ft yang tersusun atas litologi batupasir dan batulempung berumur Jura Akhir hingga Kapur Awal pada sumur Kau-2. Metode yang digunakan dalam penelitian ini adalah analisis biomarker menggunakan data Gas Kromatografi dan Spektrometri Massa (GC-MS). Data yang digunakan dalam penelitian terdiri dari; n-alkana, isoprenoid, isotop, sterana, oleanane, gammaserana, senyawa aromatik, dan hopane. Analisis lingkungan pengendapan menggunakan plot $\delta^{13}\text{C}_{\text{Saturated}}$ terhadap $\delta^{13}\text{C}_{\text{Aromatic}}$, nilai Pr/nC_{17} , plot Ph/nC_{18} terhadap Pr/nC_{17} , plot C_{27} , C_{28} , dan C_{29} sterana, plot Pr/Ph terhadap $\text{C}_{27}/\text{C}_{29}$ sterana, plot total hopana/total sterana terhadap Pr/Ph , plot gamaserena/(gamaserena+ C_{30}H) terhadap Pr/Ph , dan nilai C_v menunjukkan bahwa sampel batuan induk sumur Kau-1 dan Kau-2 terendapkan pada lingkungan anoksik-oksik yang berasal dari bahan organik darat, laut, dan alga. Plot Ph/nC_{18} terhadap Pr/nC_{17} menunjukkan bahwa sampel batuan induk dominan tipe III. Data oleanane menunjukkan bahwa batuan induk berumur Kapur Akhir. Tingkat kematangan dianalisis menggunakan plot CPI terhadap Pr/Ph , plot MPI-1 terhadap MPI-2, plot $\text{C}_{29}\alpha\beta\beta/(\alpha\alpha\alpha + \alpha\beta\beta)$ terhadap $\text{C}_{29}\alpha\alpha\text{S}/(\text{S} + \text{R})$, plot Tm/Ts terhadap $\text{C}_{30}\text{morenate}/\text{hopana}$, plot $\text{C}_{29}\alpha\beta\beta/(\alpha\alpha\alpha + \alpha\beta\beta)$ terhadap $\text{C}_{32}\text{Hopane } 22\text{S}/(22\text{S} + 22\text{R})$, plot $\text{C}_{29}\alpha\alpha\text{S}/(\text{S} + \text{R})$ terhadap $\text{C}_{29}\alpha\beta\beta/(\alpha\alpha\alpha + \alpha\beta\beta)$, dan rasio Tm/Ts . Hasil analisis menunjukkan bahwa sampel batuan induk sudah memasuki zona kematangan. Korelasi batuan induk dengan minyak menggunakan plot Ph/nC_{18} dengan Pr/nC_{17} menunjukkan bahwa sampel minyak bumi berkorelasi dengan batuan induk pada sumur sampel batuan induk pada sumur Kau-1 dan Kau-2.

Kata Kunci: Biomarker, Gas Kromatografi, Spektrometri Massa, lingkungan pengendapan

ABSTRAK

The study area is located in the Akimeugah Basin, Papua. This research aims to identify the characteristics of the source rock and its correlation with crude oil samples using geochemical data. Analysis was conducted on samples from well Kau-1 at depths of 9790.60 to 9848.50 ft, consisting of sandstone and shale lithologies from the Early Cretaceous, and from well Kau-2 at depths of 10061 to 10749 ft, composed of sandstone and shale lithologies from the Late Jurassic to Early Cretaceous. The method used in this study is biomarker analysis based on Gas Chromatography–Mass Spectrometry (GC-MS) data. The geochemical data used in this study include n-alkanes, isoprenoids, isotopes, steranes, oleanane, gammacerane, aromatic compounds, and hopanes. The depositional environment analysis was conducted using $\delta^{13}\text{C}_{\text{saturated}}$ versus $\delta^{13}\text{C}_{\text{Aromatic}}$, Pr/nC_{17} , Ph/nC_{18} versus Pr/nC_{17} plots, C_{27} , C_{28} , dan C_{29} sterana plots, Pr/Ph versus $\text{C}_{27}/\text{C}_{29}$ sterana plots, total hopana/total sterana versus Pr/Ph plots, gamaserena/(gamaserena + C_{30}H) versus Pr/Ph plots, and C_v values. The results indicate that the source rock samples from the Kau-1 and Kau-2 wells were deposited in an oxic-anoxic environment, derived from terrestrial, marine, and algal organic matter. The Ph/nC_{18} versus Pr/nC_{17} plot shows that the source rock samples are predominantly Type III kerogen. The presence of oleanane serves as an indicator that the source rock is of Late Cretaceous age. Maturity level analysis was performed using CPI versus Pr/Ph plots, plot MPI-1 versus MPI-2 plots, $\text{C}_{29}\alpha\beta\beta/(\alpha\alpha\alpha + \alpha\beta\beta)$ versus $\text{C}_{29}\alpha\alpha\alpha\text{S}/(\text{S} + \text{R})$ plots, Tm/Ts versus $\text{C}_{30}\text{morenate}/\text{hopana}$ plots, $\text{C}_{29}\alpha\beta\beta/(\alpha\alpha\alpha + \alpha\beta\beta)$ versus $\text{C}_{32}\text{Hopane } 22\text{S}/(22\text{S} + 22\text{R})$ plots, $\text{C}_{29}\alpha\alpha\alpha\text{S}/(\text{S} + \text{R})$ versus $\text{C}_{29}\alpha\beta\beta/(\alpha\alpha\alpha + \alpha\beta\beta)$ plots, and Tm/Ts ratio. The results indicate that the source rock samples have reached the maturity zone. The correlation between the source rock and crude oil was evaluated using Ph/nC_{18} versus Pr/nC_{17} plots shows that the petroleum samples accumulated with the source rock in the source rock sample wells in the Kau-1 and Kau-2 wells.

Keywords: biomarkers, Gas Chromatography and Mass Spectrometry, depositional environment