Extended Abstract: Organic Geochemistry Studies Aliphatic Fraction Bontang Coal, East Kalimantan

Titik Andriani
Author
andriani.titik@gmail.com

R. Y. Perry Burhan
Supervisor
pburhan@chem.its.ac.id

ABSTRACT- Analysis of coal deposits Bontang, East Kalimantan has been done with the aim to determine the compound biomarker and the origin of the formation of organic matter of coal. Coal was extract using a solvent mixture of dichloromethane - methanol (93:7). Biomarker coal that be identified in Bontang, East Kalimantan distributed in the form of aliphatic fraction of n-alkanes (C_{19}-C_{29}), cadinane, pristane, phytane, neohop-13(18)-ene, and olean-12-ene. The existence of these compounds showed that the organic material component of coal derived from higher plants. The content of the high hopana indicate that the process of coal formation occurs due to bacterial activity.

Keywords : Coal, GC-MS, Biomarker.

INTRODUCTION

Coal is an organic sedimentary rock formed from decaying plant remains and collected in a location with plenty of water conditions **[1]**. One of the sources of energy whose existence is very much is coal, so it can be used as alternative energy sources such as petroleum solid fuel for power plants and others. The abundance of coal in Indonesia spread evenly from both western Indonesia and eastern Indonesia. The formation of coal deposits are found in Indonesia generally occur in the Tertiary.

Kutai Basin covering various areas in East Kalimantan, one of which is Bontang. The geology of coal resources in Bontang is a type of coal that formed in the Kutai Basin. A presence coal resource in the region requires learning about the characteristics of the coal through biomarka studies.

Currently data search in Kutai Basin coal characteristics carried out. One example, discovered the compound n-alkanes (C_{16}-C_{35}), branched alkanes acyclic isoprenoid (Pristane and fitan), and several other compounds in low rank coal Samarinda **[1]**. Bontang coal characteristics data for very limited so that the article will discuss organic compounds contained in the coal aliphatic fraction Bontang, East Kalimantan and will provide information about the origin of the coal formation.

EXPERIMENTAL

I. Methods

The Miocene coal was collected from Bontang, East Kalimantan. Sample was crushed into fine powder (120 mesh). Bitumen extraction was performed on 50 g of the powdered sample using Soxhlet apparatus with azeotropic mixture of dichloromethane (DCM) and methanol (CH_3OH) (93:7) for 72 h. Extracts organic matters (EOM) was separated by column liquid chromatography into neutral fraction using diethyl ether, acid fraction using formic acid 2% in diethyl ether, and polar fraction using mixture of chloroform:CH_3OH:H_2O (60:25:4).

Neutral fraction separated by thin layer chromatography (TLC) with DCM into hydrocarbon, ketone, and alcohol fractions. Furthermore, the hydrocarbon fraction is fractionated using TLC plate with solvent n-hexane to obtain the aliphatic and aromatic fractions.

II. Characterizations

Alifatic fractions have been analyzed by gas chromatography – mass spectrometry (GC-MS) agilent 122-5561 equipped with DB-5 fused capillary silica column (60 m×0.25 mm), using helium as carrier gas. The oven temperature program were 70°C (1 min hold) to 150°C at 10°C/min, then 150-290°C at 2°C/min and 290-315°C at 5°C/min (6 min hold). Mass spectrometry operated 70 eV ionization voltage and 230°C interface temperature. Proton conductivity, methanol permeability, and ion exchange capacity using classical titration.

RESULTS AND DISCUSSION

I. The result of GC-MS analysis of Coal.

Aliphatic fraction of brown coal analyzed by gas chromatography combined with mass spectrometry (GC-MS). Based on the analysis of mass spectra can be known classes of compounds contained in fractions biomarker coal aliphatic Bontang, East Kalimantan.

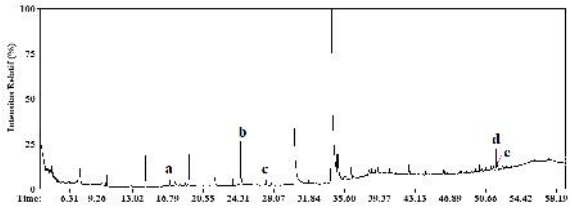

FIGURE 1 CHROMATOGRAM ALIPHATIC FRACTION OF COAL EXTRACT BONTANG, EAST KALIMANTAN.

In Figure 1, shown aliphatic coal fraction Bontang, East Kalimantan biomarker identified compounds, among others, (**a**. cadinane; **b.** Pristane; **c.** Phytane; **d.** Neohop-13(18)-ene; **e.** Olean-12-ene).

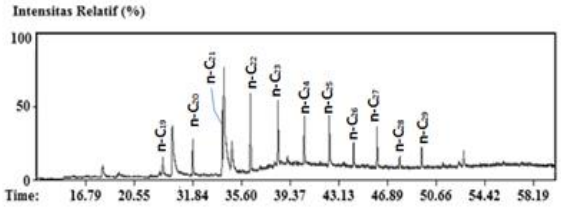

FIGURE 2 FRAGMENTOGRAM M/Z 57-ALKANES HYDROCARBON COMPOUND COAL BONTANG, EAST KALIMANTAN.

On Figure 2, shows that the compound biomarker n-alkanes identified fragment ion m/z 57. The series of compounds n-alkanes C_{19}-C_{29} identification results provide information that the organic material component of coal derived from higher plants. The existence of series of long-chain n-alkanes and maximum like, n-C_{27}, n-C_{29} and n-C_{31} and the dominance of the odd number of carbon atoms usually generated from a wax cuticular of woody plants land, which indicates that organic material derived from higher plants **[2]**. The dominance of n-alkane carbon coal odd indicates Bontang, East Kalimantan has a low ranking **[3]**. Pristane compound and phytane the aliphatic fraction identified by the base peak m/z 57. Compounds pristane and phytane in general is a derivative of the side chain of chlorophyll in the organism fitil on phototropic although there were derived from other sources such as arkae bacteria **[4]**, which give meaning to that Bontang coal contributed by plants that have chlorophyll.

The cadinane compound indicates that the input source of organic material from higher plants derived from essential oils or resins *Dipterocarpaceae* family resin and *Cornaceae* (*Angiosperm*) **[5]**. The neohop-13(18)-ena gives an indication of the presence of compounds that organic material derived from bacterial activity **[3]**. Olean-12-ene compound is a group of compounds derived from precursor β-Amyrin **[6]**.

CONCLUSSION

In conclusion, the study of organic geochemistry of coal that can be identified in Bontang, East Kalimantan distributed in the form of aliphatic fraction of n-alkanes (C_{19}-C_{29}), cadinane, pristane, phytan, neohop-13(18)-ene, and olean-12-ene. The existence of these compounds showed that the organic material component of coal derived from higher plants and is dominated by n-alkane carbon chain indicates odd coal Bontang, East Kalimantan has a low maturity level. Compounds neohop-13(18)-ene, which indicates the formation of coal caused by the activity of bacteria. The content of diterpenoid high enough it concluded that organic material derived from higher plants.

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