

## GENESIS OF ALIPHATIC ISOPRENANES IN PETROLEUM

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The regular, irregular and pseudoregular isoprenanes have been found in petroleum all over the world [1]. Among oxygen-containing petroleum isoprenanes the C<sub>20</sub> unsaturated alcohols – phytol and isophytol have been identified. These alcohols are the side chains of chlorophyll molecules and are considered to be the source of C<sub>10</sub>–C<sub>20</sub> regular isoprenanes found in crudes [2]. It is currently supposed that absence of C<sub>12</sub> and C<sub>17</sub> regular isoprenanes in petroleum is caused by low probability of a simultaneous cleavage of two C–C bonds at tertiary carbon atoms in these alcohols but it has not been proved experimentally. Here we suggest that C<sub>15</sub>–C<sub>20</sub> petroleum isoprenane could also be generated from high molecular weight hydrocarbons – regular and irregular isoprenanes as a result of thermal transformations. Moreover we decided to confirm or refute an assumption that the simultaneous cleavage of two C–C bonds at tertiary carbon atoms in phytol and isophytol does not occur.

As an initial objects of investigation the regular isoprenane – C<sub>20</sub> 2,6,10,14-tetramethylhexadecane (phytane), irregular isoprenanes – C<sub>20</sub> 2,6,11,15-tetramethylhexadecane (crocetane), C<sub>30</sub> 2,6,10,15,19,23-hexamethyltetracosane (squalane), C<sub>40</sub> 2,6,10,14,19,23,27,31-octamethyldotricontane (licopane) as well as C<sub>20</sub> alcohols of regular isoprenoid structure – 3,7,11,15-tetramethylhexadecan-2-ol-1 (phytole) and 3,7,11,15-tetramethylhexadecan-3-ol-1 (isophytole) were selected. Selected compounds were subjected to thermolysis in sealed ampoules at 330°C for six hours. Thermolysis of resins, asphaltenes and kerogene as well as insoluble part of prokaryote biomass and precursors of petroleum hydrocarbons under such temperature followed by the study of distribution relationships of hydrocarbons was previously reported [3].

Our investigation showed that no cleavage of methyl-, ethyl- and isopropyl-groups at the ends of phytane, crocetane, squalane and licopane molecules occurred as a result of the thermolysis. Likewise we didn't observe the simultaneous cleavage of two C–C bonds at tertiary carbon atoms in above mentioned compounds. It was also shown that thermolysis of phytole, isophytole and licopane result in the formation the C<sub>10</sub>–C<sub>20</sub> petroleum regular isoprenanes. It is interesting to note that the thermolysis of phytole led to the value of pristane/phytane genetic parameter 2.9 whereas the same for isophytole (it differs from phytole only by the position of a double bond) was significantly less – 0.9. The formation of unsaturated compounds under thermolysis conditions was not observed.

Thus, the value of the genetic index pristane/phytane ratio, which is used for correlation in oil–oil and oil–dispersed rock organic matter systems should be treated with caution.

### References

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