

## FEATURES OF TRANSFORMATION OF PETROLEUM POLLUTION OF SOILS BY OWN MICROFLORA AND BY ELEMENTS OF SOIL-PLANT COVER

Sara H. LIFSHITS, Olga N. CHALAYA, Iraida N. ZUEVA,  
Julya S. GLYAZNETSOVA and Olga S. KARELINA

*Institute of Oil and Gas Problems SD RAS, 677891, Yakutsk, October street, 1, Russia,  
ph. (4112) 335833, fax (4112)335737, e-mail: [s.h.lifshits@ipng.ysn.ru](mailto:s.h.lifshits@ipng.ysn.ru)*

The experiment in petroleum pollution of typical for the Central Yakutiya soils by tական crude oil from 0.07 to 1.95% has been made. Dandelion (*Taraxacum ceralophorum* (*Le-deb.*)) was planted on polluted soil samples. After vegetation period (60 days) soil samples are studied by analytical methods of organic geochemistry including chloroform extraction, FT-IR spectrometry, liquid adsorbtion chromatography and chromatography mass-spectrometry (GC-MS).

Separated chloroform extracts (bitumoids) are a complex mixture of organic compounds from native organic matter of recent sediments and petroleum pollution. In the case of polluted soil studying of bitumoids allows to know as level as character of petroleum pollution.

Data on bitumoid composition analyzed by liquid adsorbtion chromatography showed in polluted soils hydrocarbon part of petroleum pollution had been transformed at first.

Results of GC-MS-studying of hydrocarbon fraction bitumoids for control soil sample (**A**) and polluted samples – with growing dandelion (**C**) and without growing it (**B**) are given on the Figure. Studying of individual hydrocarbon distribution in these soil samples allowed to make next conclusions:

Without growing of dandelion (*sample B*) relatively low molecular alkaness  $n\text{-C}_{12}$  –  $n\text{-C}_{18}$  had been destroyed by soil microflora. Composition and distribution of alkanes were closed to added petroleum pollutant.

With growing of dandelion (*sample C*) another picture was observed - normal alkanes  $n\text{-C}_{18}$  –  $n\text{-C}_{25}$  also light homologs of 12-13-methylalkanes had been mainly transformed. Character of n-alkane distribution appeared bimodal with maximum on  $n\text{-C}_{15}$  and  $n\text{-C}_{31}$ . Elements of plant cover are believed to produce effect on bitumoid part of soil altering the composition towards regeneration of natural geochemical background.

As results of geochemical investigations as obtained data on germinating and surviving of dandelion showed that petroleum pollution in soils had been actively transformed up to the petroleum contamination level didn't exceed 0.098% or 1000mg pollutants per 1kg of soil.

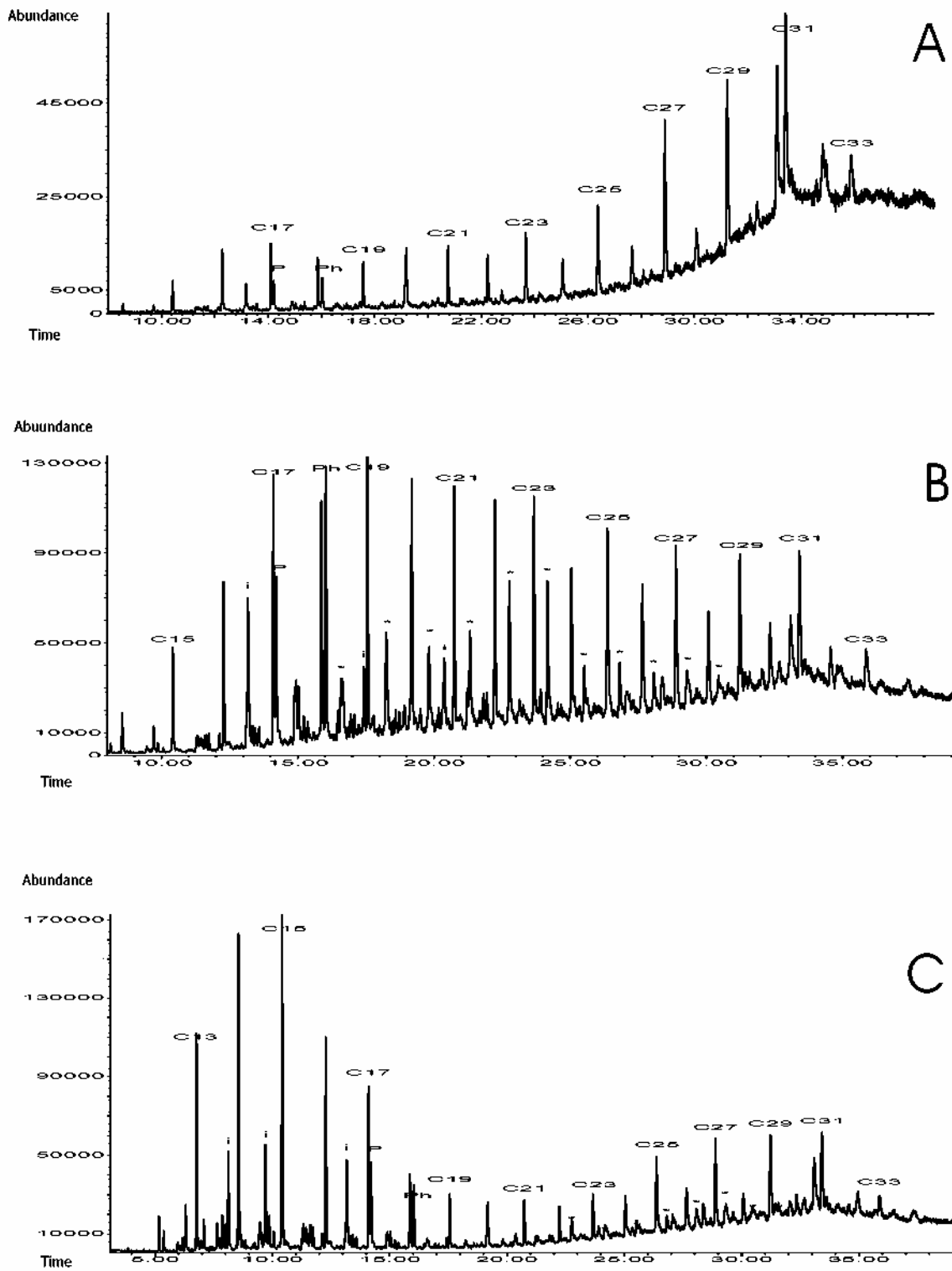


Figure 1. Mass fragmentograms of hydrocarbon fractions of bitumoids of soils:  
 A- control soil sample without petroleum pollutant addition;  
 B and C – soil samples with 0.20 vol.% addition of petroleum pollutant,  
 B- experiment without plant growing, C- experiment with plant growing.  
 i – isoprenoids, \* - 12- and 13-methylalkanes