Toxic organic compounds in sea water taken from the Sahil area

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Abstract: Organic toxic compounds such as PAHs, phenolic compounds are a global environmental concern. The article investigates the chemical composition of sea water from the Sahil area of the Caspian Sea. In water sample a total 26 organic toxic substances: 15 polycyclic aromatic hydrocarbons (PAHs),11 phenolic compounds were analyzed. The chemical analyses of phenolic compounds were carried out in the extremely sensitive devices such as GC-MSD gas chromatograph 6890N with a highly efficient mass-selective detector-Agilent 5975 In the Khazar Ecological Laboratory performed quantitative analysis of organic compounds in sea water sample.

Keywords: PAH, phenolic compounds, sea water, analysis, methods.

The Caspian Sea is notable for its sensitive ecosystem. In the last decade, anthropogenic and biochemical impacts have almost devastated the ecosystem. In particular, it should be noted that the situation in the north-eastern part of the Caspian Sea has reached crisis level. As we distinguish, oil and oil products enter water bodies in different conducts: during oil transportation, during drilling accidents, contamination with produced water, during oil extraction and other processes [1,2].At the present moment the principal scientific and technical delinquent is the environmental fortification. It should be distinguished that the environment is sufficiently polluted with both industrial surplus and household waste. The mixing of organic and mineral wastes into the water and soil environment is due to the increase in municipal and industrial wastewater [3]. Even when walking in the National Park, we come across these pollutants. Anthropogenic pollution - accidental spills of oil into the Caspian Sea during oil transportation, runoff, industrial waste, etc. It is believed that the main source of pollution in the Caspian Sea is the development of industry [4-6].

Polycyclic aromatic hydrocarbons (PAHs), phenol and its derivatives are the most common substances in industrial effluents. Polycyclic aromatic hydrocarbons, also phenols and their compounds are found not only in sea water, wastewater, but also in natural waters. The permissible amount of organic compounds in sea water bodies should not exceed 0.01g /l. Today, the most global environmental problem is the presence of organic substances in water [7-9].

Experimental part:

The quantitative analysis of polycyclic aromatic hydrocarbons (PAHs) and also of phenol and its derivatives were carried out in a system including an Agilent 6890N gas chromatograph which has an interface with an Agilent 5975 high-performance mass-selective detector manufactured by Agilent Technologies (USA). The chromatograph was equipped with a splitless injector and a ZB-5 capillary column (USA). Column ZB-5 has the following specifications: 5%-biphenyl 95%-dimethylpolysiloxane copolymer length-60 m inner diameter 0.25 mm film thickness 0.25 μm. Helium (99.999% purity) with a flow rate of 1.5 ml/min was used as a

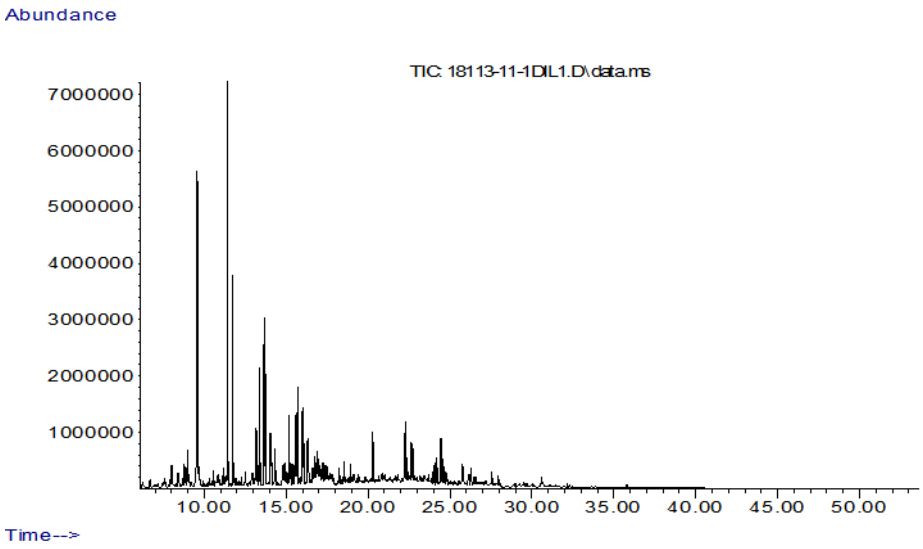
carrier gas. The temperature rise was programmed from 40°C to 310°C. The extracts were introduced using an automatic sampler in a volume of 1 µl. Quantitative analysis was performed against a seven-point calibration against standard reference solutions. A mixture of deuterated polycyclic aromatic hydrocarbons: naphthalene-d8, phenanthrene-d10 (Cambridge Isotope Laboratories, Inc., Andover, USA) was used as an internal standard for calculating the obtained results of chromatographic analysis [10].

Table 1. Results of analysis of water sample from Sahil area (for phenolic compounds)

Phenolic compounds, µq/l	Sahil	permissible amount
phenol	0.20	0.01
o-kresol	0.02	0.01
2-nitrophenol	<0.04	0.01
2,4-dimethylphenol	0.02	0.01
2,4-dichlorophenol	<0.02	0.01
2,6-dichlorophenol	0.02	0.01
4-chloro-3-methylphenol	<0.04	0.01
2,4,5-trichlorophenol	<0.04	<0.01
2,4,6-trichlorophenol	<0.04	<0.01
2,3,4,6-tetrachlorophenol	<0.04	<0.01
pentachlorophenol	<0.04	<0.01

Purification of phenolic compounds from industrial enterprises is a very difficult process. Agilent 5975C GC /MS gas chromatographic mass spectroscopy was used to analyze water sample taken from the Sahil area.

Figure 1. The chromatography of sea water taken from the Sahil area

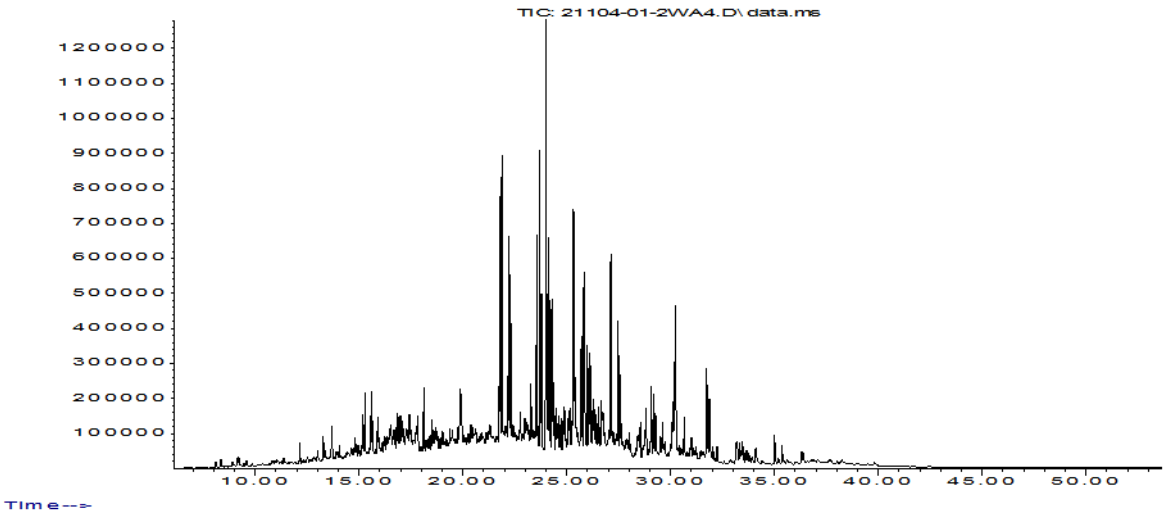


In Figure 1 is presented a gas chromatographic mass spectroscopy of a water sample taken from Sahil.
Polycyclic aromatic hydrocarbons (PAHs) were also analyzed in water sample taken from Sahil areas. In some cases phenolic compounds exceeded the permissible limit.

Table 2. PAHs in water samples taken from the Sahil area (for PAHs)

PAHs (μq/l)	Sahil	C pess.
Naphthalene	0.03	0.01
Achenthylene	<0.01	0.01
Acenaften	0.01	0.01
Fluoren	0.04	0.01
Fenantren	0.09	0.01
Anthracene	0.01	0.01
Fluoranten	0.01	0.01
Piren	0.01	0.01
Benz (a) anthracene	<0.01	0.01
Chrezen	0.02	0.01
Benz (b + j + k) fluorantene	0.01	0.01
Benz (a) pyrene	0.01	0.01
Inden (1,2,3-cd) pyrene	<0.01	0.01
Benz (ghi) perilen	<0.01	0.01
Dibenz (ah) antracen	<0.01	0.01

Naphthalene belongs to a class of high-risk substances and is considered the most hazardous among polycyclic aromatic hydrocarbons. The permitted concentration of naphthalene in the analyzed water sample is 0.01 μq/l . However, as can be seen from the table, this norm exceeds the norm. Of course, this is due to the nearby industrial facilities. For this reason, it can be noted that sea water has a round shape. This is harmful to the flora and fauna of the sea.
Figure 2. The chromatography of sea water taken from the Sahil area



Amount of PAHs and phenolic organic compounds in water sample from Sahil is often higher than normal.
Table 3 shows the physical and chemical characteristics of the sea water sample.

Table 3. Physical-chemical parameters of the sea water sample taken from the Sahil area

Area	Tem., oC	pH	Salinity , %	Electrical conductivity, mS/cm
Sahil	26,2	7,7	10,2	17,2

It should be noted that currently in our country serious work is underway to maximize the purification of wastewater discharged into the Caspian Sea using nanotechnological methods but the use of these methods in industry requires a certain amount of time.

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