A.I.Konovalov

Formation of the Nano-sized Moleculare Ensambles in High Diluted Aqueous Solutions. Effect of Ultra-low Concentrations and Electromagnetic Fields.

A.E.Arbuzov Institute of Organic and Physical Chemistry of RAS, Kazan

The VIIth Annual Conference on The Physics, Chemistry and Biology of Water»

October 18-21, 2012,
West Dover, Vermont, USA

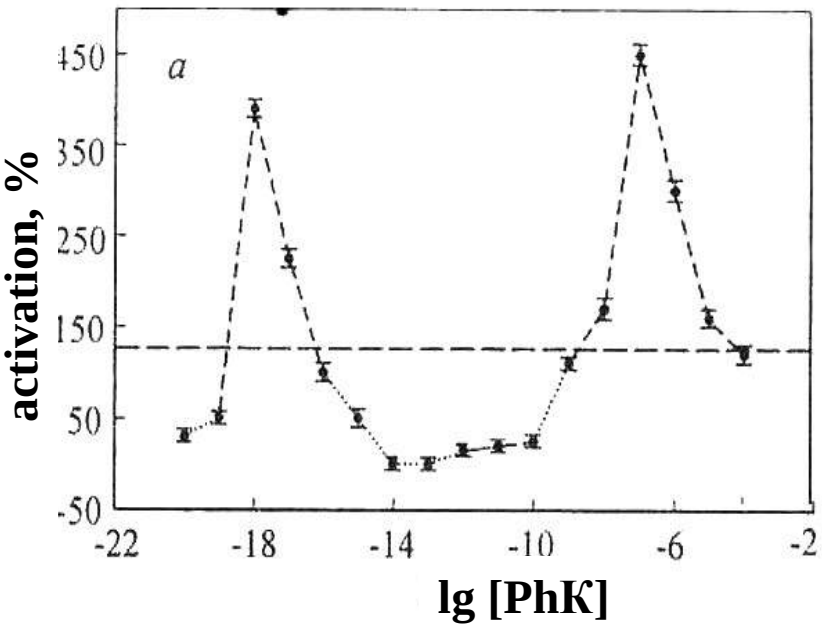
А.И.Коновалов

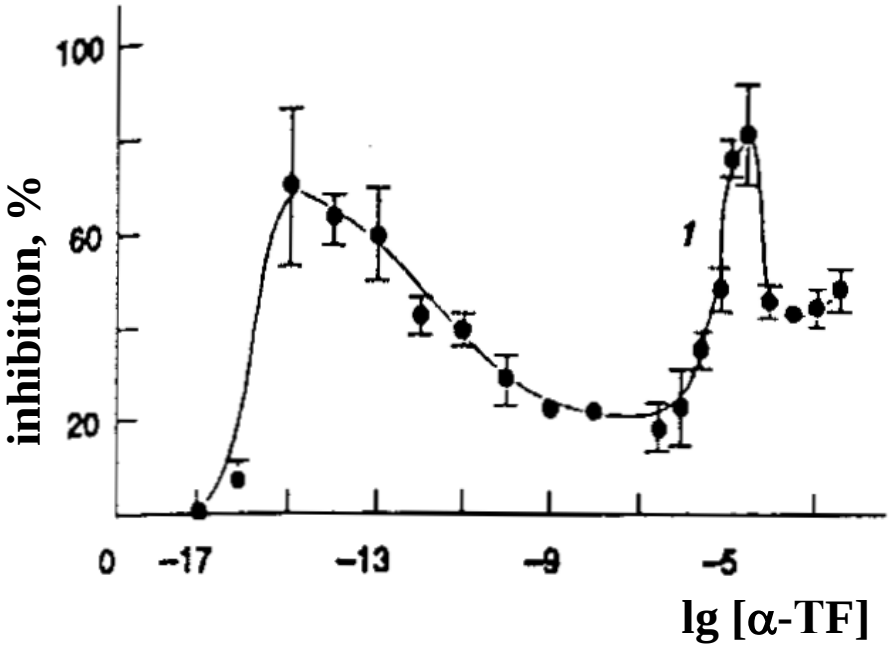
Образование наноразмерных структур (наноассоциатов) в высокоразбавленных водных растворах. Эффект ультранизких концентраций и электромагнитных полей.

Научный совет РАН по физической химии

Москва, 2012

Nonlinear "concentration-bioeffect" dependence





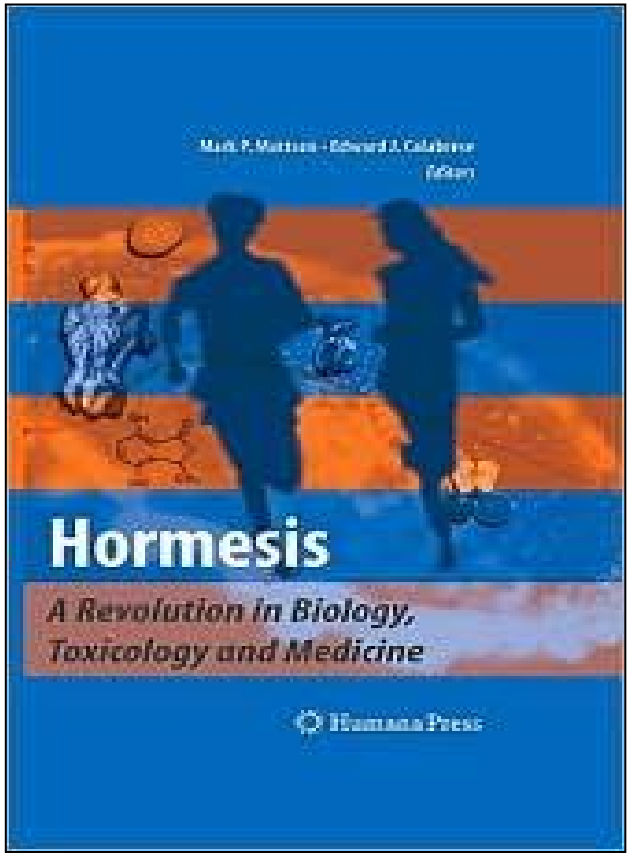
PhK – potassium phenosan

Mal'tseva E.L. et al. Biological membranes,1998,15, 2, 191-198.

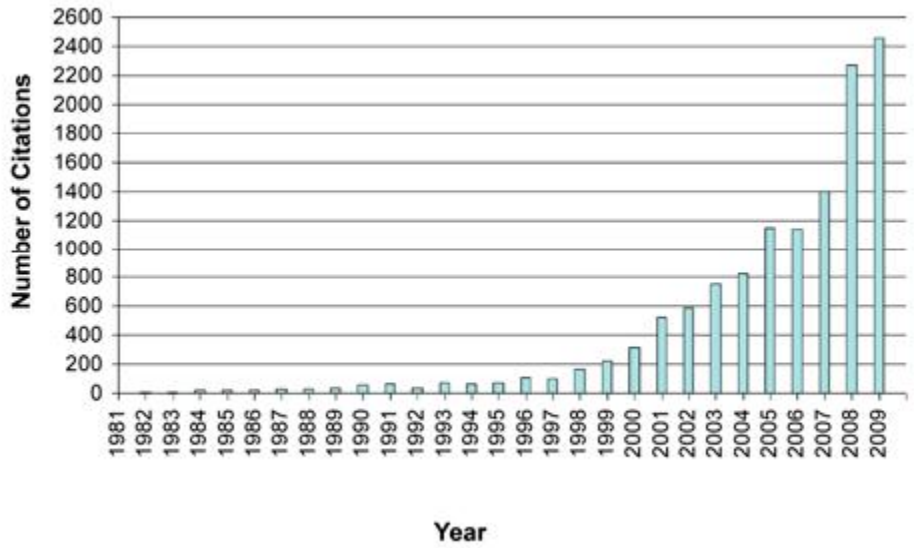
α-TF - α-tocopherol

N. P. Palmina et al. Biochemistry, 1994, 59, 2, 193-200.

The degree of the activation or the inhibition of proteinkinase C serve as a bioeffect

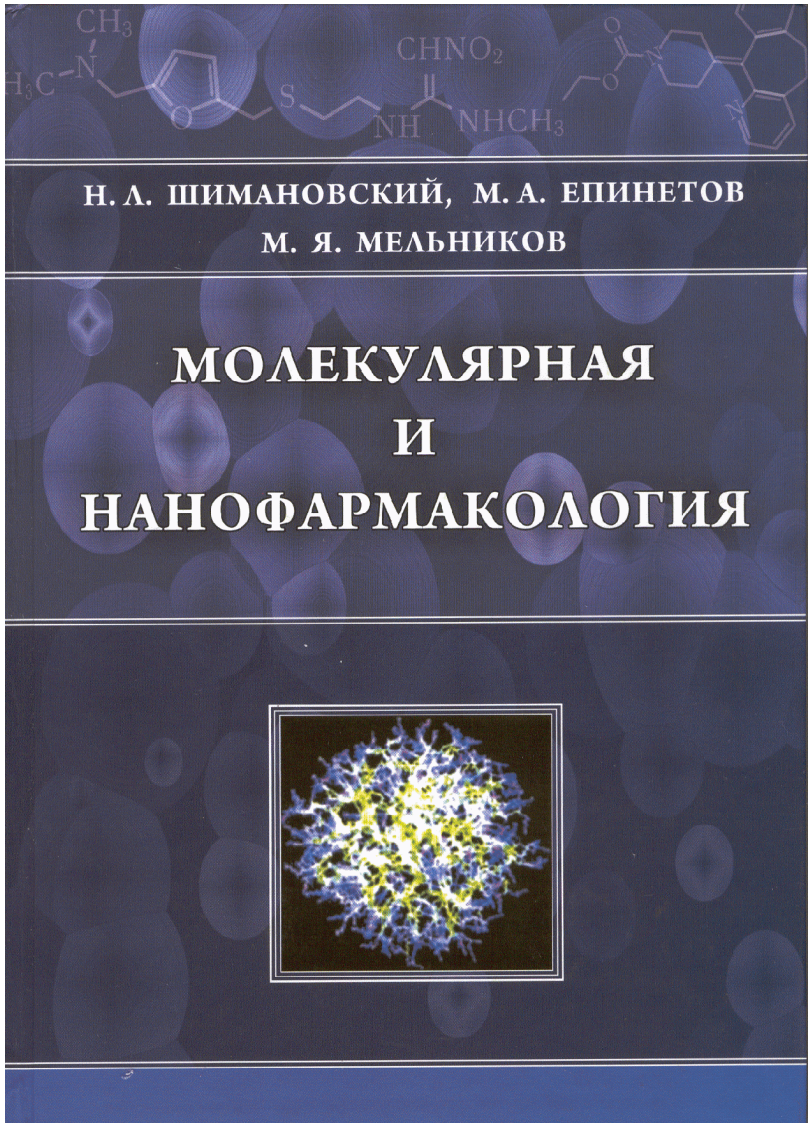


Hormesis: A Revolution in Biology, Toxicology and Medicine, Springer Verlag, New York, 2009



BELLE Newsletter.-Vol.16.-No.1, April, 2010

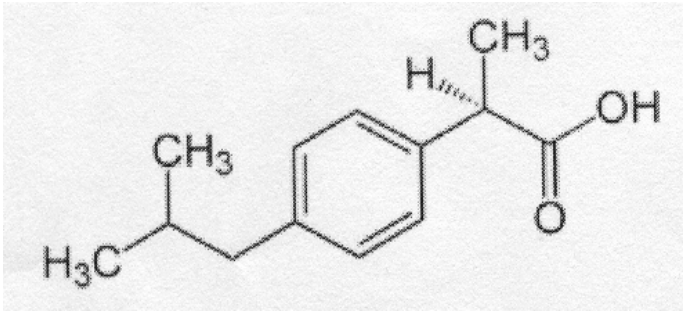
More than 8 thousands examples



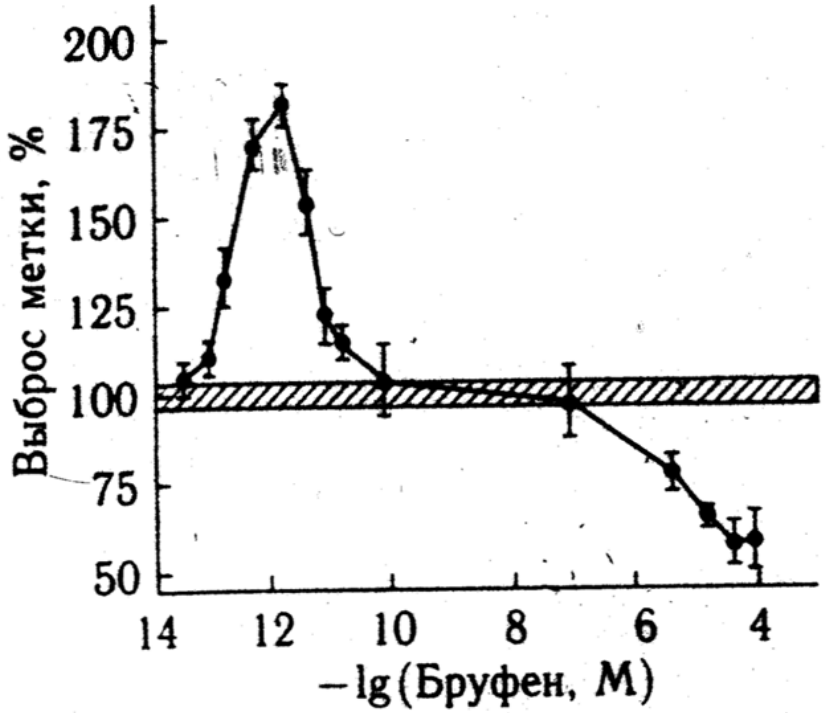
«В настоящее время следует считать доказанным, что лекарственные вещества могут быть активными в сверхнизких дозах, причем эти эффекты по своей направленности могут отличаться от тех, которые обычно имеют место при действии лекарственных веществ в терапевтических дозах.»

М.: ФИЗМАТЛИТ, 2010.- 624с.

Ибупрофен - противовоспалительное, анальгезирующее, жаропонижающее лекарственное средство



10^{-14} - 10^{-10} М - стимулирующее воздействие
10^{-10} - 10^{-7} М - не влияет
10^{-7} - 10^{-4} М - ингибирующее воздействие



Влияние бруфена в широком диапазоне концентраций на высвобождение [^{3}H]-метаболитов арахидоновой кислоты перитониальными макрофагами мыши. За 100 % - отсутствие бруфена

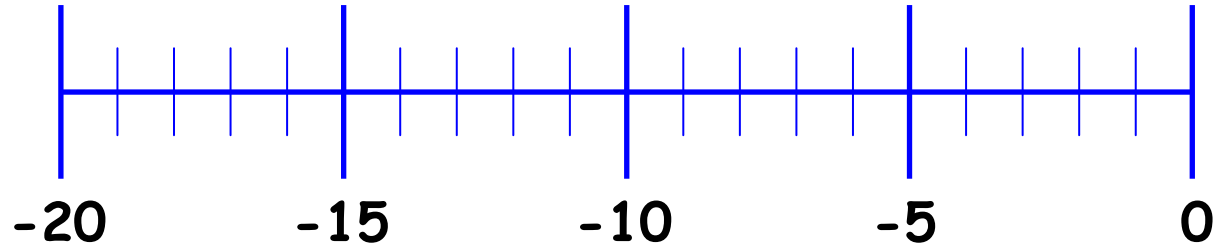
Шимановский Н.Л., Епинетов М.А., Мельников М.Я. Молекулярная и нанофармакология. - М.: ФИЗМАТЛИТ, 2010. - 624с.

Facts exist more than hundred years.

Nevertheless many scientists up to now do not believe in this phenomenon.

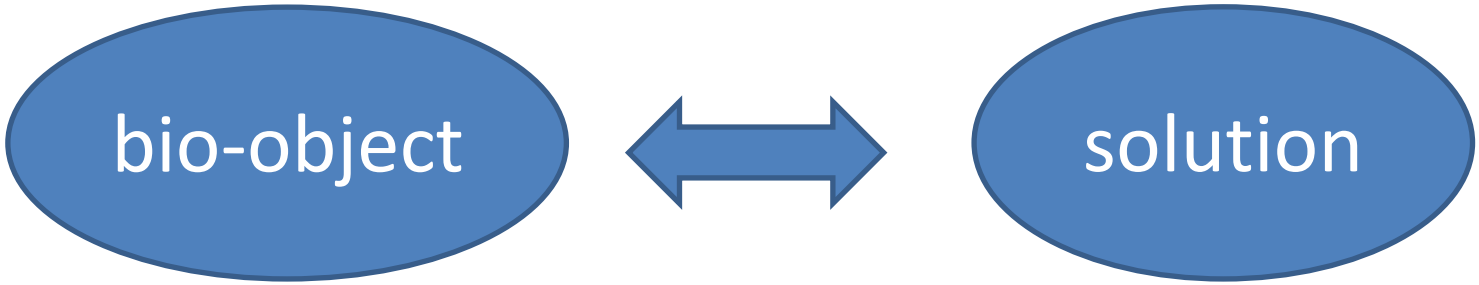
Main reason of such unbelief:

There was not satisfactory physicochemical explanation of phenomenon.



lg C (C mol/L)

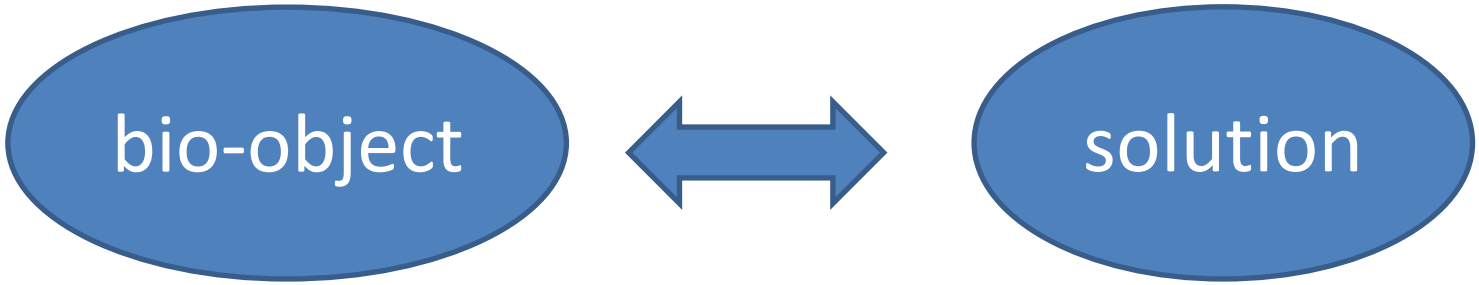
$6 \cdot 10^{3}$	$6 \cdot 10^{8}$	$6 \cdot 10^{13}$	$6 \cdot 10^{18}$	$6 \cdot 10^{23}$	number of molecules in a liter
6	$6 \cdot 10^{5}$	$6 \cdot 10^{10}$	$6 \cdot 10^{15}$	$6 \cdot 10^{20}$	number of molecules in a milliliter



Almost all scientists who worked in field of bio-effects by ultra-low concentrations laid responsibility for the phenomenon on bio-objects.

Bio-objects are able to react on little quantities (separate molecules) of solutes containing in solution.

By what way? It does not known. There are only assumption.



The underlying idea of our investigation was that solutions are responsible for phenomenon.

Solutions can have different states (structures) by different concentrations of solutes (degree of dilution); bio-objects react on these states of solutions.

We undertook for the first time the large-scale systematic complex investigation of aqueous solutions of different chemical nature substances in great interval of concentration by different physicochemical methods.

60 COMPOUNDS WERE STUDIED BY SEVERAL METHODS IN 10^{-2} – 10^{-20} M CONCENTRATION INTERVAL.

Objects of research

1 group of BAC	Bioeffect
Ichfan C-10	Antioxidant
Phenozan potassium salt	antioxidant
α-Tocopherol	antioxidant,vitamin
Melafen	plant growth regulator
Salicylic acid	plant growth regulator
Guanibifos	plant growth regulator
Acetylcholine Iodide	neuromediator
Aminobenzoic acid	vitamin
Silver nitrate	antiseptic
Phenazepam	anxiolytic
Estrone	hormone
Testosterone	hormone

Three groups of biologically active substances are chosen as objects of research:

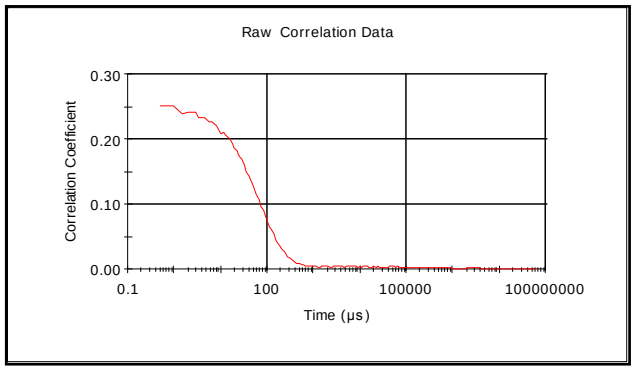
The first group includes biologically active substances for which the bioeffects of solutions in low concentration are known.

Objects of research (continuation)

2 group BAC	bioeffect	The second group includes biologically active substances for which there are no data on the bioeffects in a range of low concentrations.
CTAB	antiseptic	
Mebicar	anxiolytic	

3 group BAC	bioeffect	The third group includes new substances and mixed systems. On the whole – more than 60 compounds
Amphiphilic calixarenes		
Amphiphilic phosphacoumarine	?	
Pyridine–pyrrole macrocycle		
CTAB/ sulfonatocalix[n]arenes		
Amphiphilic phosphacoumarin/ Pyridine–pyrrole macrocycle		

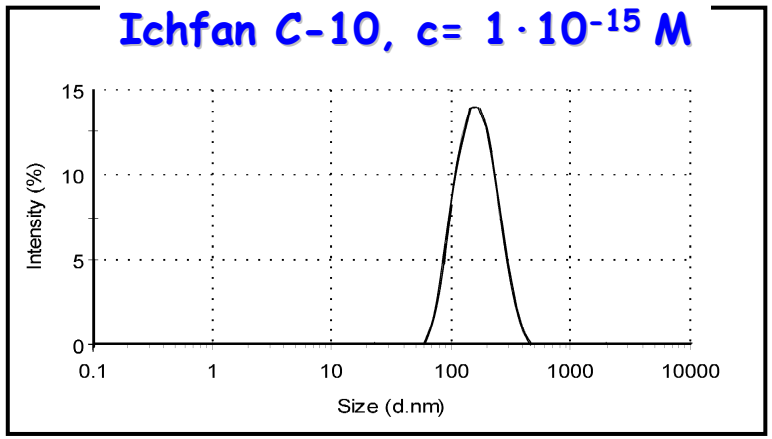
The size (effective hydrodynamic diameter D) and the electrokinetic potential (ζ-potential, i.e. the electric potential of a kinetically mobile species at the slip boundary in a constant electric field) were studied by dynamic light scattering (DLS) and electrophoresis technique on a Zetasizer Nano ZS high sensitivity analyzer (Malvern Instruments, UK).

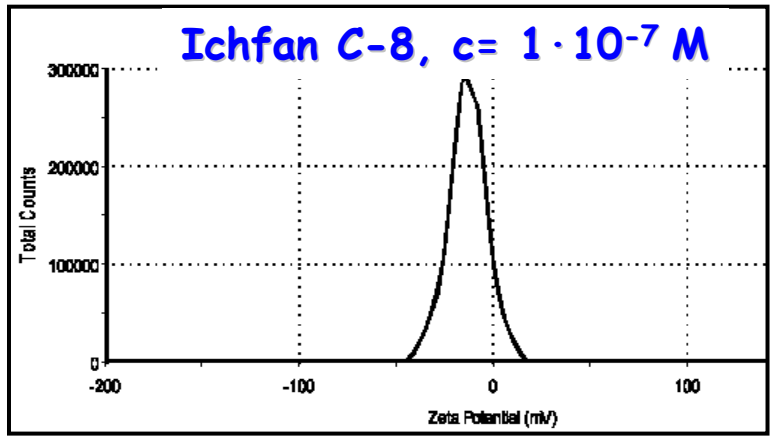


concentration	Count rate (Kcps)
10^{-3} - 10^{-6}	100-400
10^{-7} - 10^{-13}	50-70
10^{-14} - 10^{-17}	50-95

Count rate in water 30 Kcps

Size and ζ-potential distributions of the particles formed in solutions in low concentration are presented in the figures. The distributions are unimodal. The polydispersion of the studied systems lies in the range from 0.1 to 0.4 which allows to define the average diameter of nanoparticles in a solution.





Methods and Instruments

I. Dynamic Ligth Scattering (D,nm)

Zetasizer Nano ZS high sensitivity analyzer.

- He-Ne laser, 632.8 nm
- size range 0,6nm - 6µm

Malvern Instruments, UK

II. Electrophoresis (ζ-potencial, mV)

Zetasizer Nano ZS

- unique cuvette

III. Conductometry

Precision conductometer inoLab Cond Level 1 (EcoInstrument)

- relative measurement error of 0.5%
- A cell of 0.1 cm^{-1}
- Cell constant C = 0.472 cm^{-1}

IV. Surface Tension

Precision Tensiometer Sigma 702ET (KSV Instruments)

- -resolution of 0.001 mN / m
- -platinum-iridium ring (r=9,545 mm)
- -radius of the wire (r=0.185 mm)

V. Optical activity

Polarimeter Perkin Elmer 341

-measurrement error 0.001^{O}

- $-\alpha^{30}_{D}$, l=0.56 dm

VI. Hypoelectromagnetic conditions

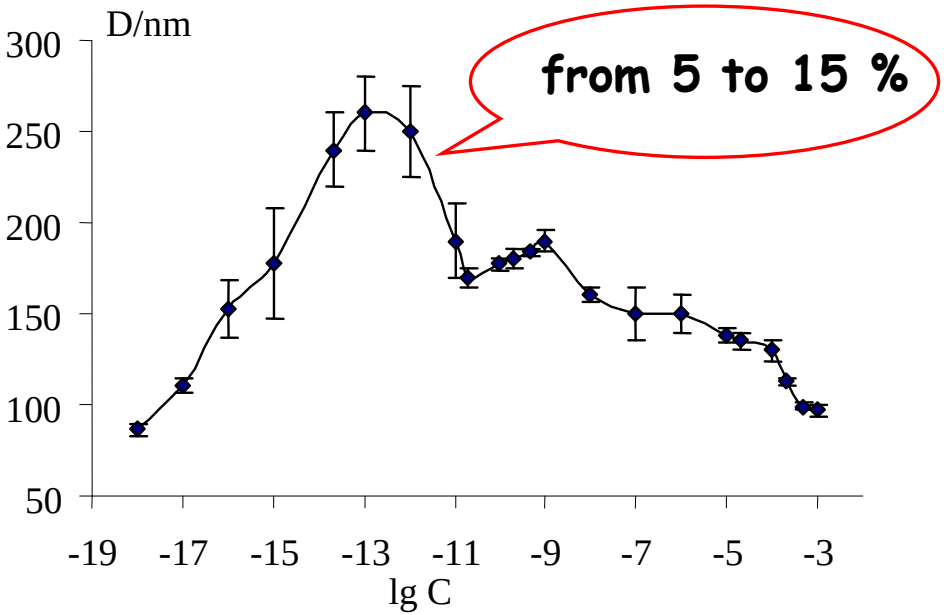
Permalloy container

-magnetic induction (B) of geomagnetic field of Earth in Kazan is 53·103 nTl, in container - 10-20 nTl

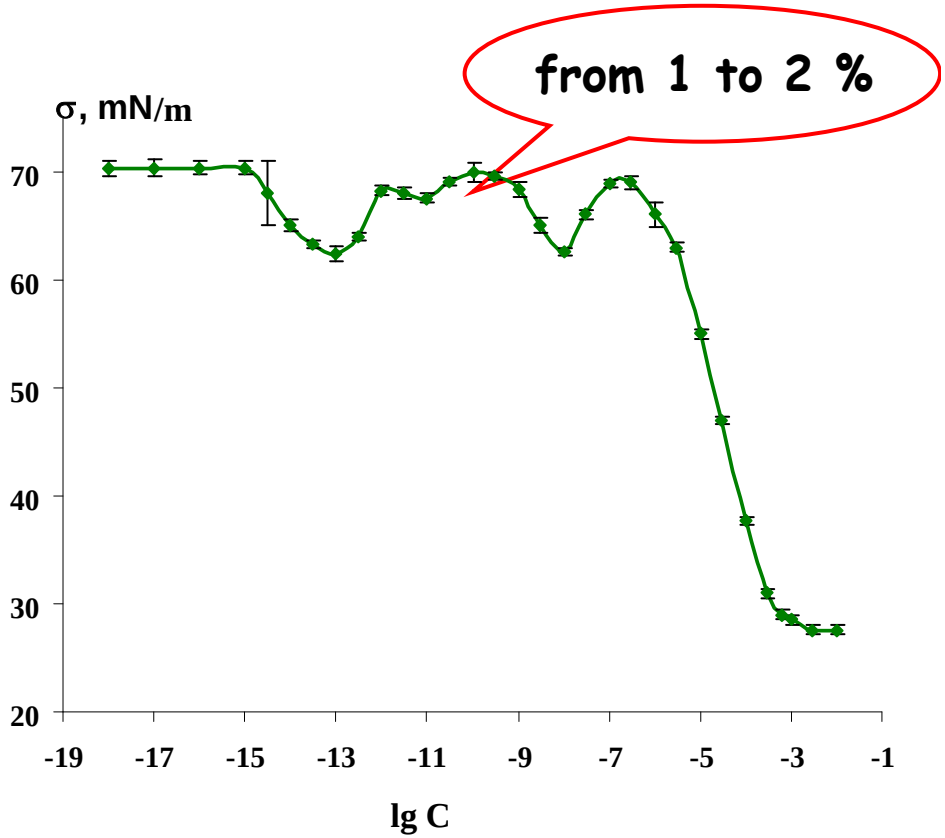
The technique of the preparation of the solutions

1. The preparation of solutions was carried out by successive serial dilutions.
2. The freshly prepared doubly distilled water was used. It was examined on the absence of nano-sized entities and specific electrical conductivity (no more then 2.5 μS/cm) .
3. The samples of solutions were shaken drastically.
4. The measurements were made in 18-24 hours after preparation of solutions.
5. All experiments were carried out both in plastic and glass vessels at a constant temperature (25°C).
6. The dust removal from the samples of solutions was applied.
7. In the blank experiments that simulated the procedure of the successive dilution no nano-sized entities were detected.

The values of standard deviations and measurement errors



χ , ζ → From 4 to 20%



Reproducibility!

PHYSICOCHEMICAL PROPERTIES OF SOLUTIONS

Two types of compounds

1) – changes of properties of solutions by dilution correspond to the conception of infinite diluted solutions («classic behavior»), (25%)

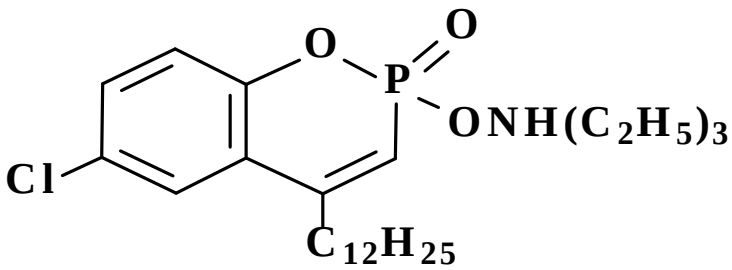
2) - changes of properties of solutions by dilution do not correspond to the conception of infinite diluted solutions («non-classic behavior»), (75%)

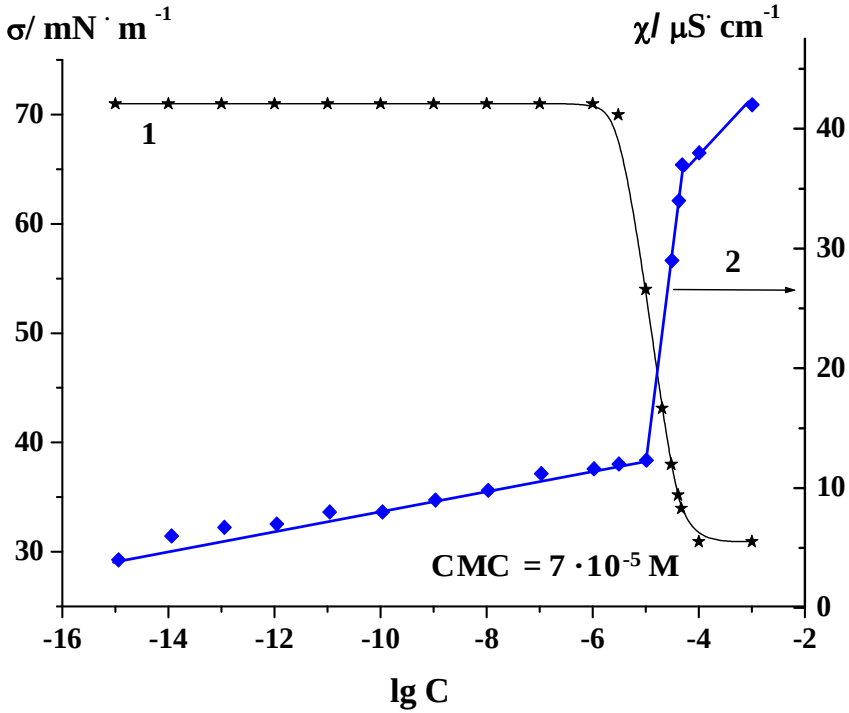
The correspondence to the conception of infinite diluted solutions means

The properties of solutions —**dilution**→ **The properties of solvents**

(water)

AMPHIPHILIC PHOSPHACUMARINE (APC)



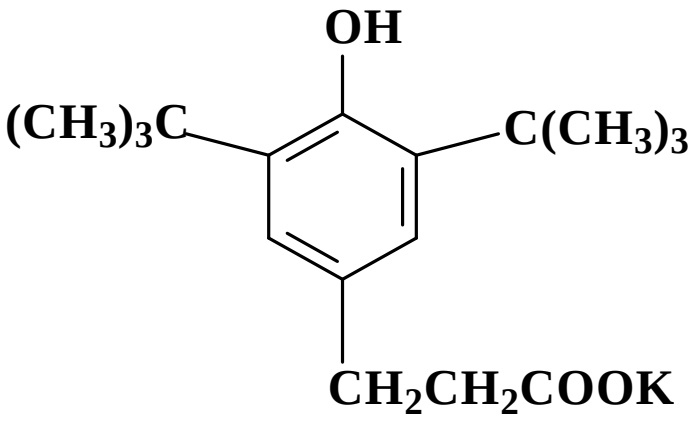


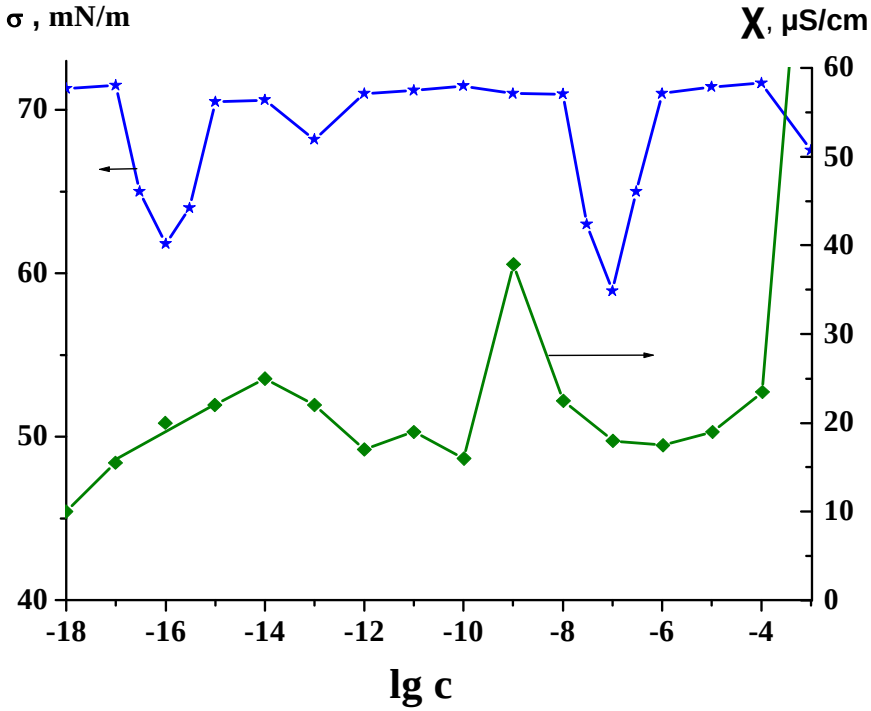
«classic behavior»

Compounds with «classic behavior»

1	6-chloro-4-dodecylbenzo[e]-1,2-oxaphosphinin-2-oxyde sodium salts	6	6-chloro-4-dodecylbenzo[e]-1,2-oxaphosphinin-2-oxyde triethylammonium salts
2	Isoniazid	7-10	4 Phosphonium surfactants
3	Stevioside	11-13	3 derivatives of hemin
4	A mixture of isoniazid / stevioside		
5	Neonol		

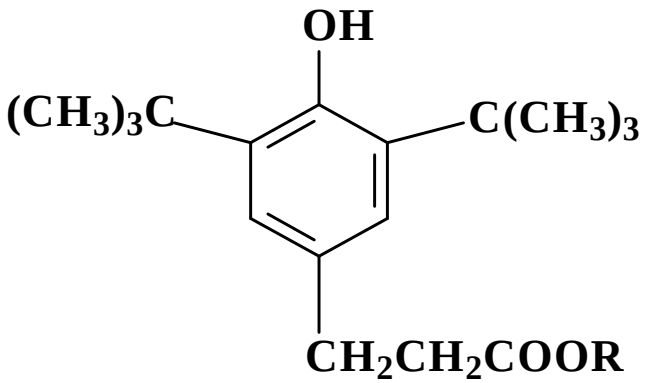
Phenozan potassium salt



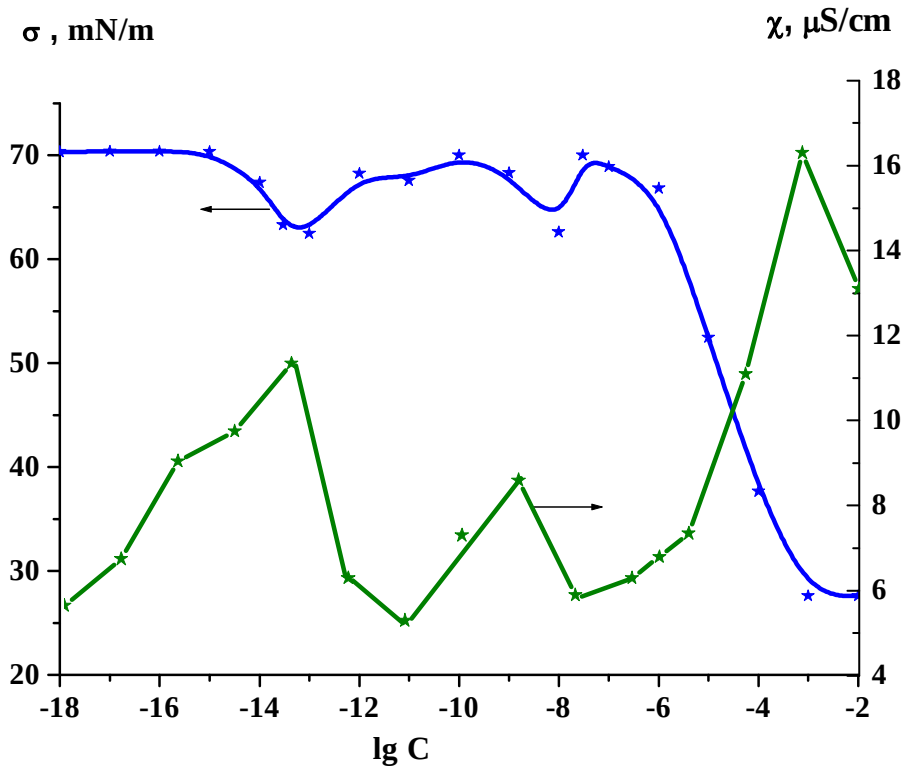


«non-classic behavior»

Ichphan C-10

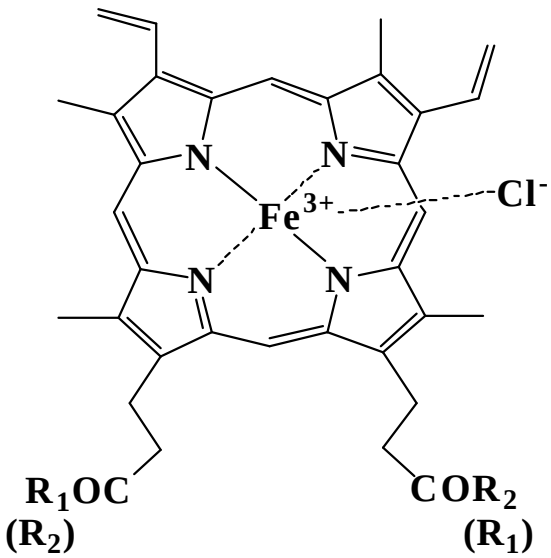


$R=CH_2CH_2N^+(CH_3)_2C_{10}H_{21}Br^-$

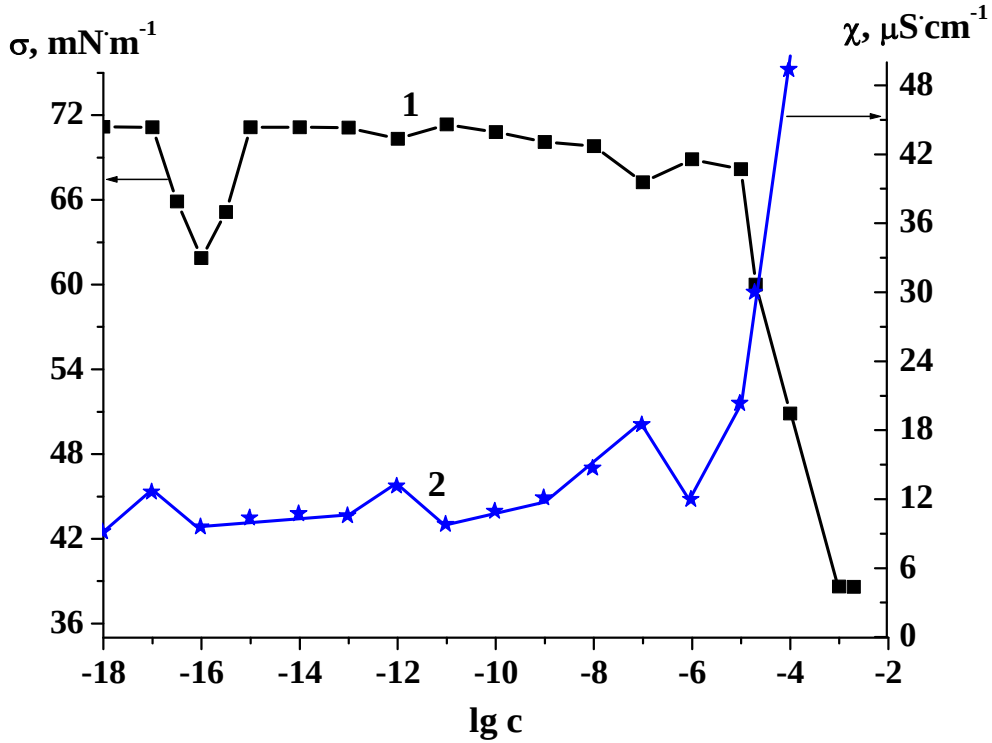


«non-classic behavior»

Hemin

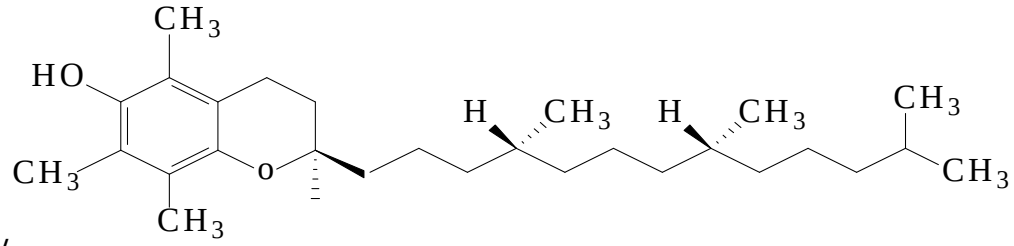


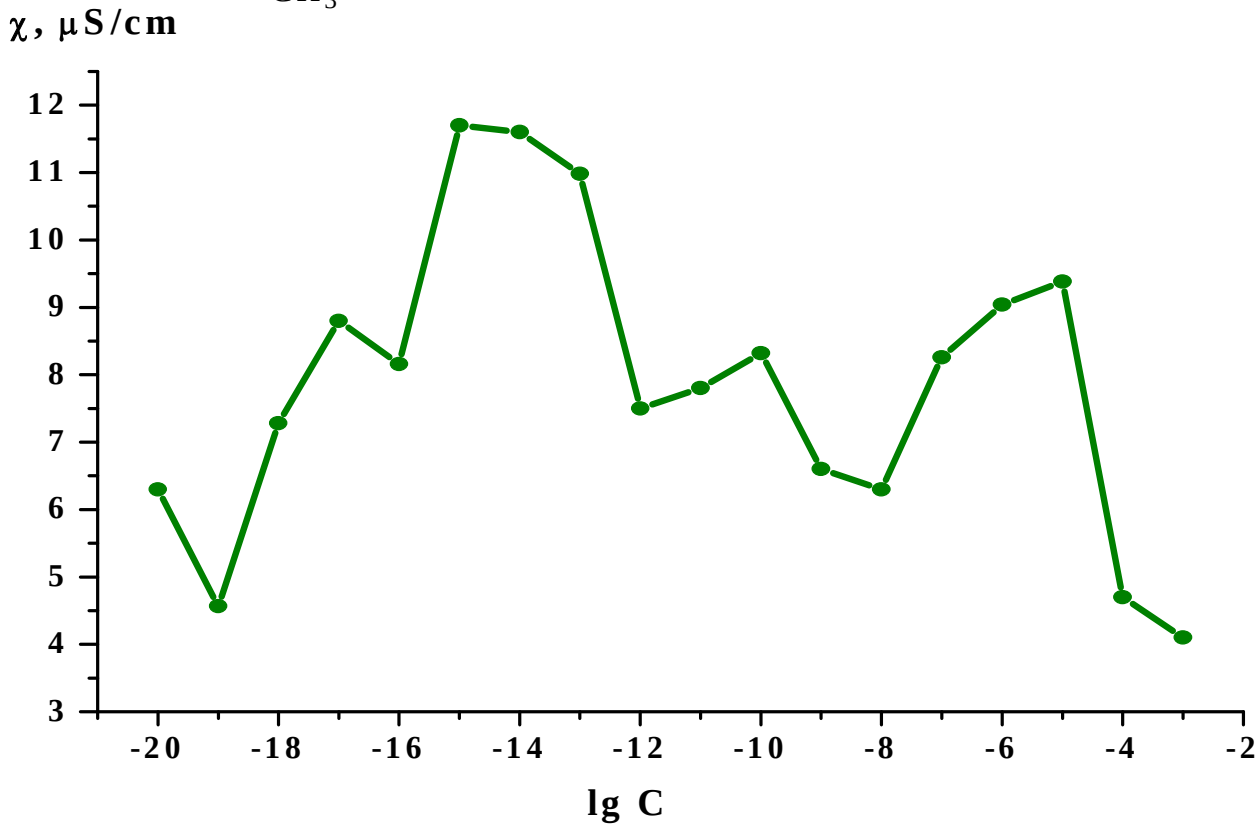
$R_1=R_2=$ ArgOMe



«non-classic behavior»

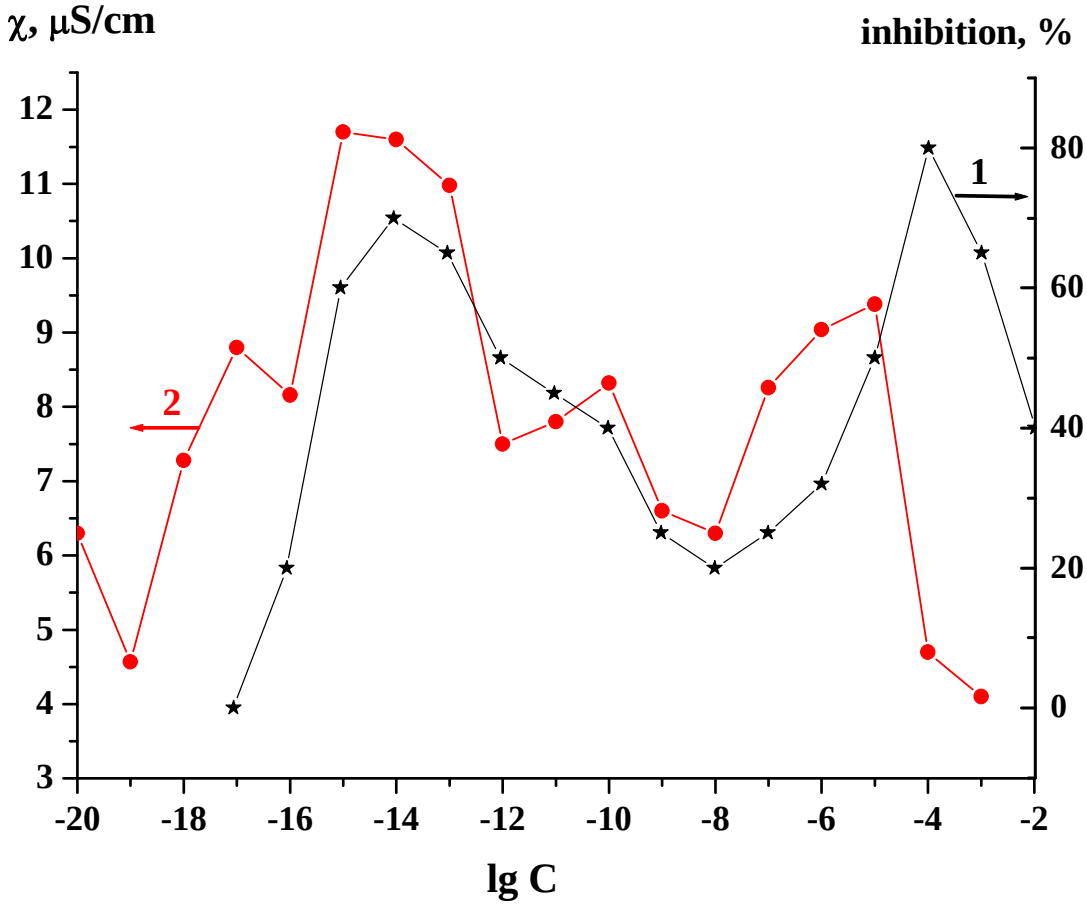
α-TOCOPHEROL – natural antioxidant

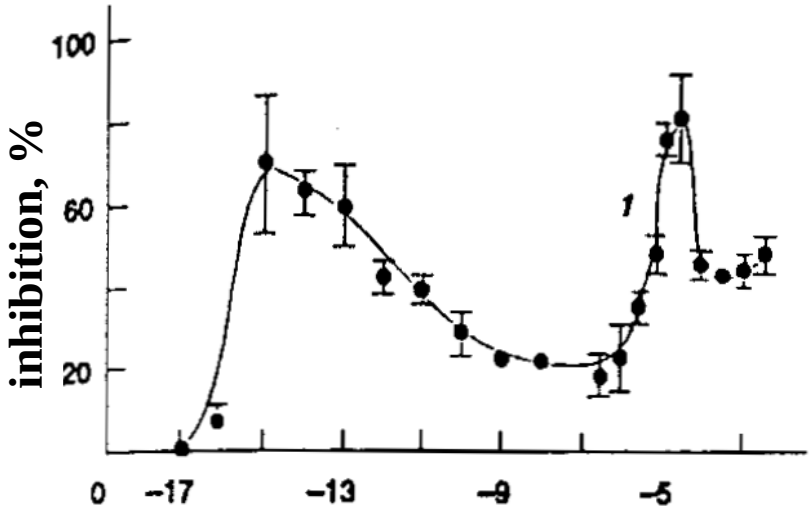




«non-classic behavior»

The degree of the inhibition of proteinkinase C (1) and specific electrical conductivity (2) of α-TOCOPHEROL solutions vs. its concentration.





N. P. Palmina et al. Biochemistry, 1994, 59, 2, 193-200.

The bio-effects in high diluted solutions also result «non-classic behavior»

BOTH PHYSICOCHEMICAL AND BIOLOGICAL PROPERTIES OF HIGH DILUTED AQUEOUS SOLUTIONS HAVE COMMON REASONS, WHICH LEAD TO «non-classic behavior»

WHAT ARE REASONS OF «non-classic behavior»?

THE ANSWER WAS OBTAINED BY
DLS and ζ-POTENCIAL INVESTIGATIONS

IN HIGH DILUTED AQUEOUS SOLUTIONS WITH «NON-CLASSIC BEHAVIOR»
NANO-SIZED ENTITIES,
WHICH WE CALLED «NANOASSOCIATES»,
ARE FORMED

I. Dynamic Ligth Scattering (D,nm)

Zetasizer Nano ZS high sensitivity analyzer.

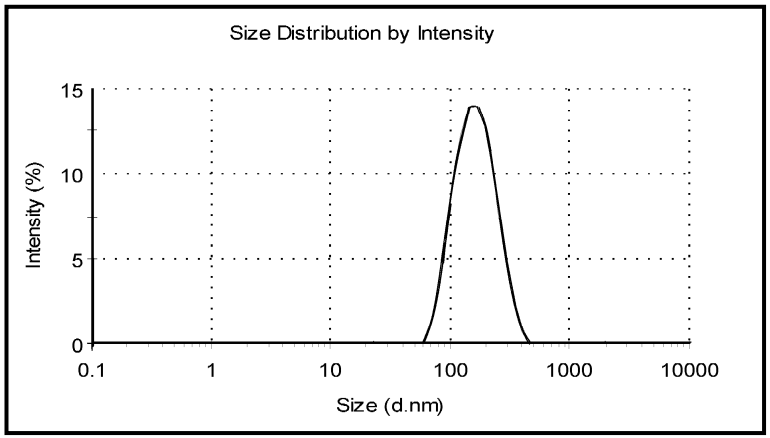
- He-Ne laser, 632.8 nm
- size range 0,6nm - 6µm

Malvern Instruments, UK

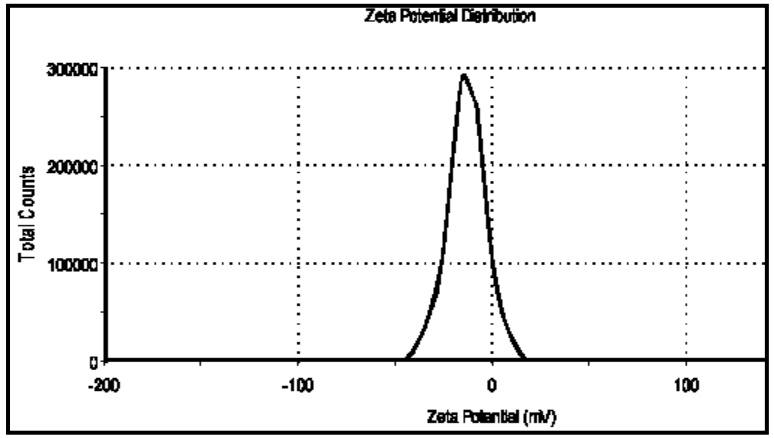
II. Electrophoresis (ζ-potencial, mV)

Zetasizer Nano ZS

- unique cuvette

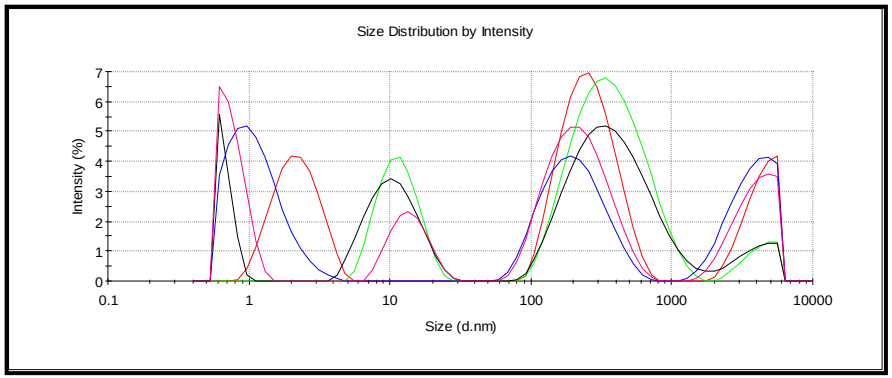


D,nm

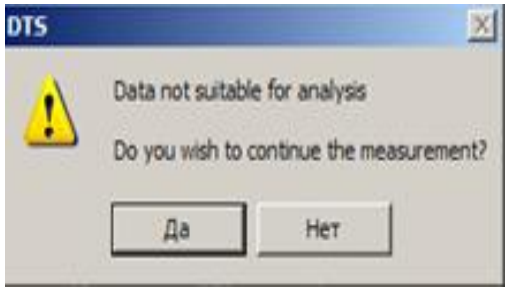


ζ, mV

Data not suitable for analysis

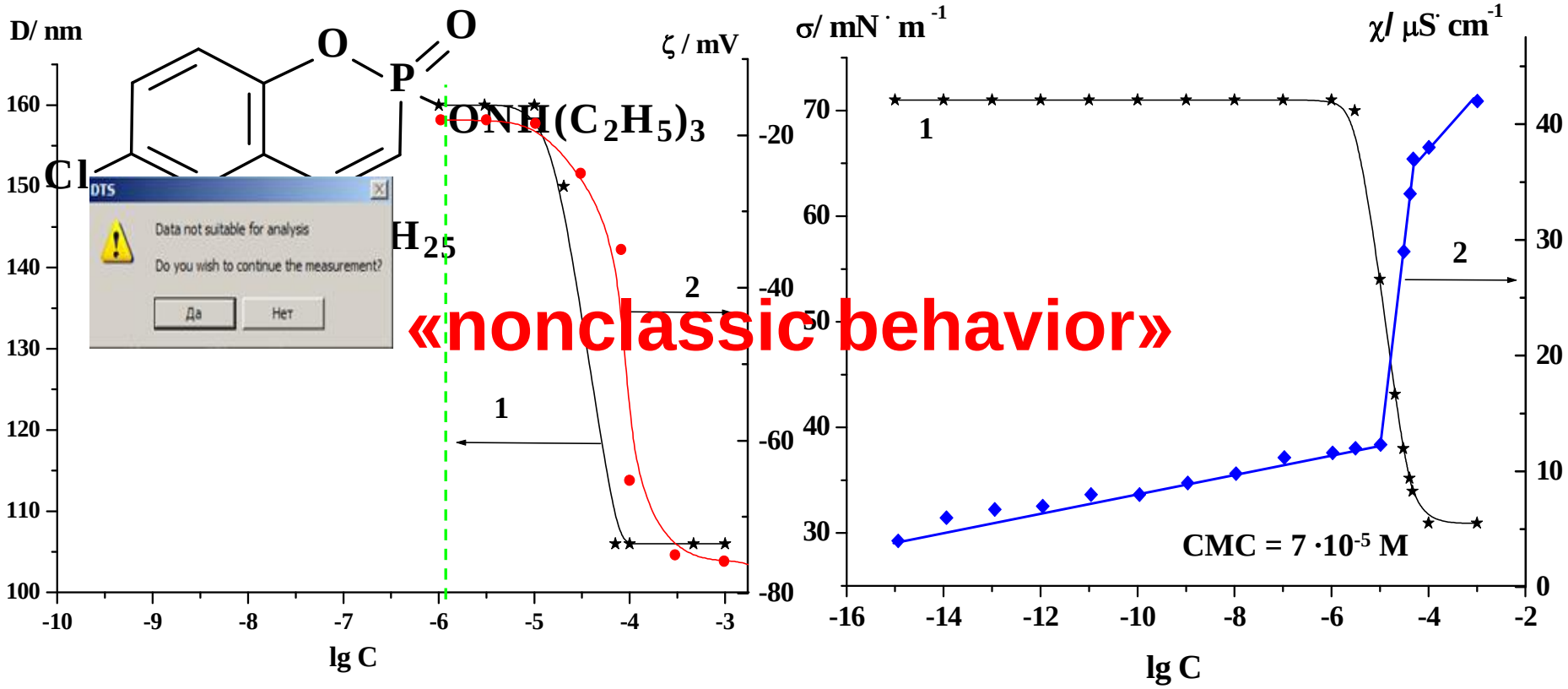


Uncertain result



Nanoentities are not observed

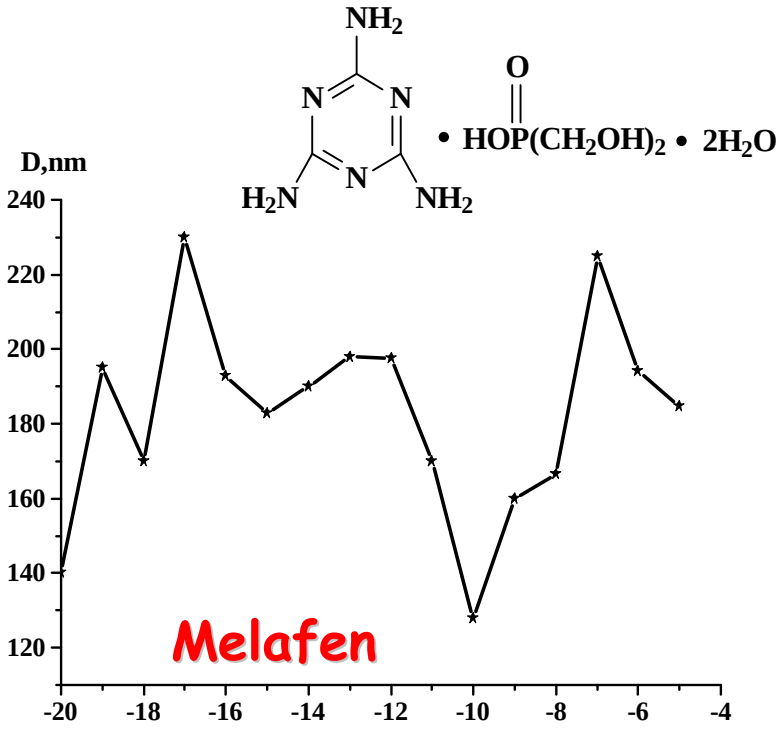
AMPHIPHILIC PHOSPHACUMARINE (APC)

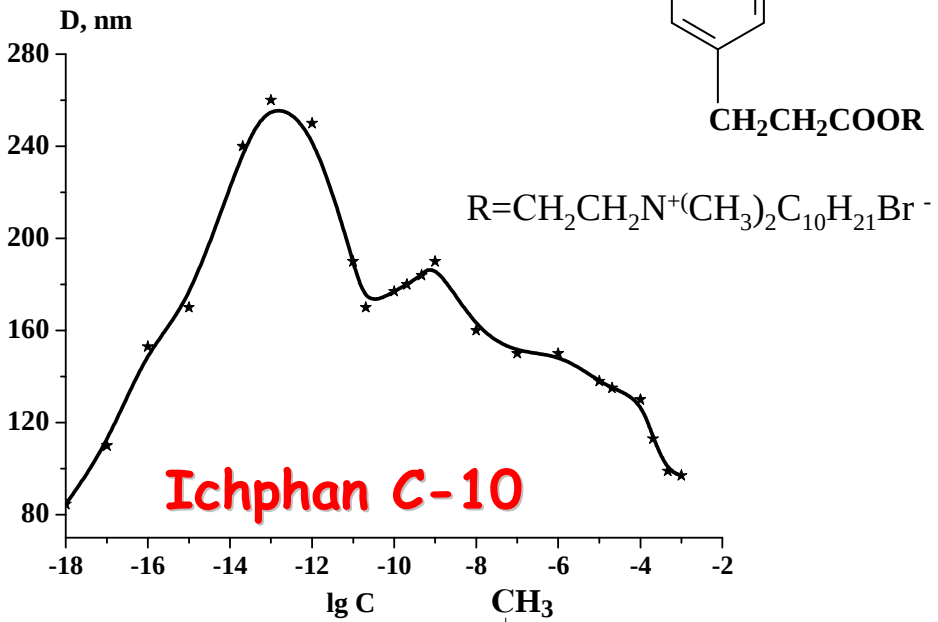


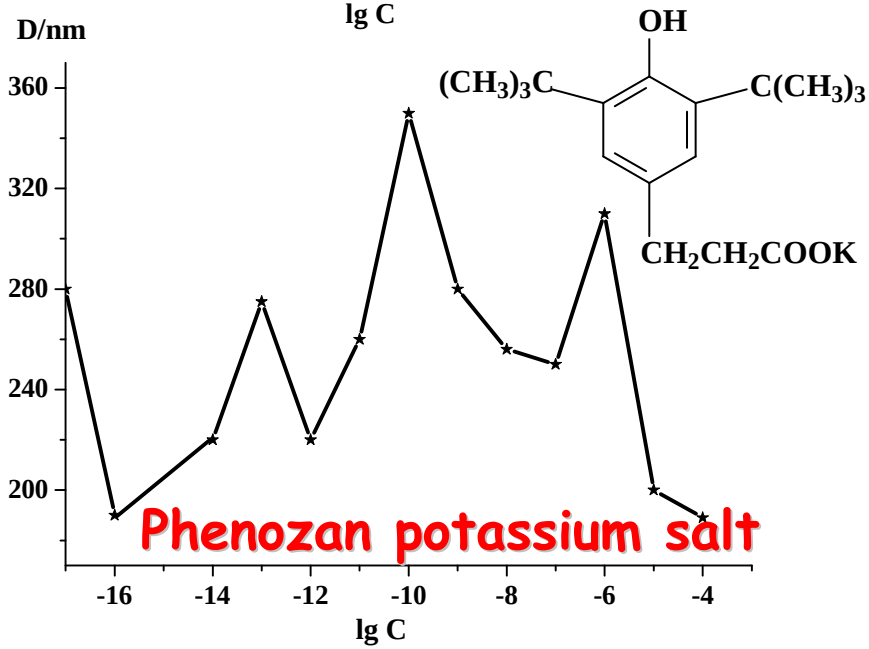
«nonclassic behavior»

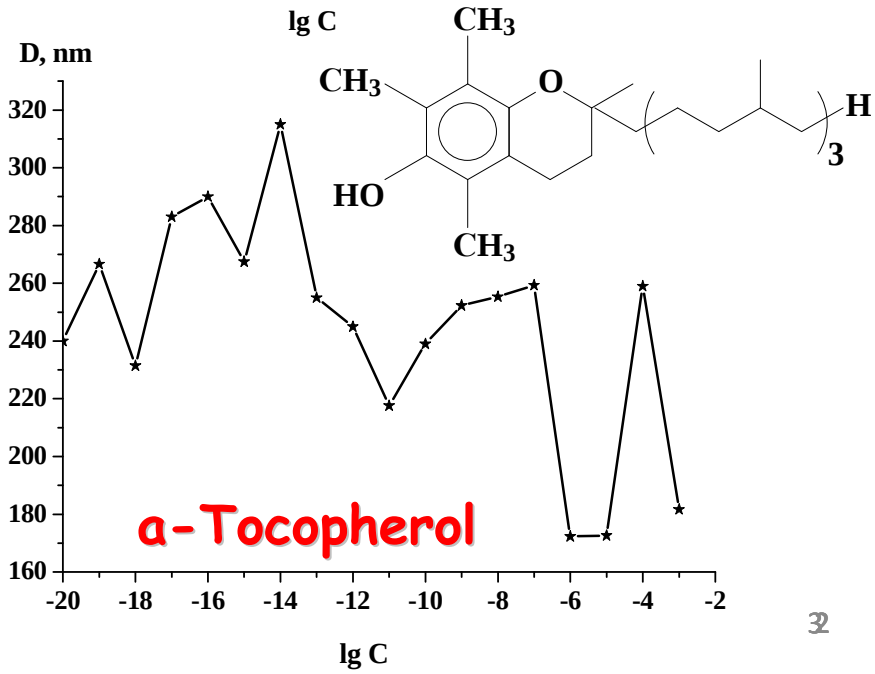
«classic behavior»

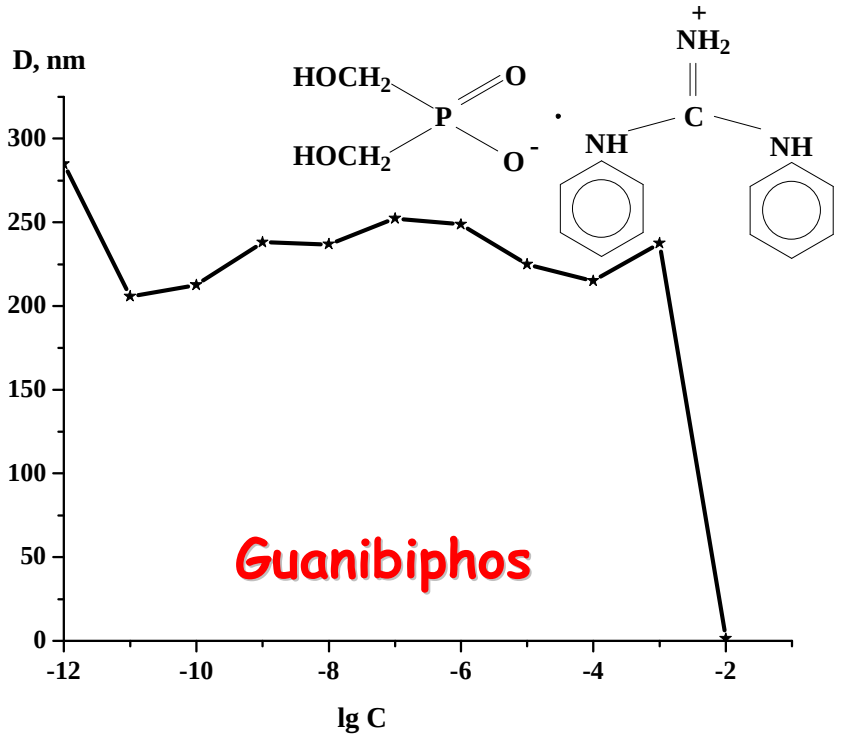
D,nm

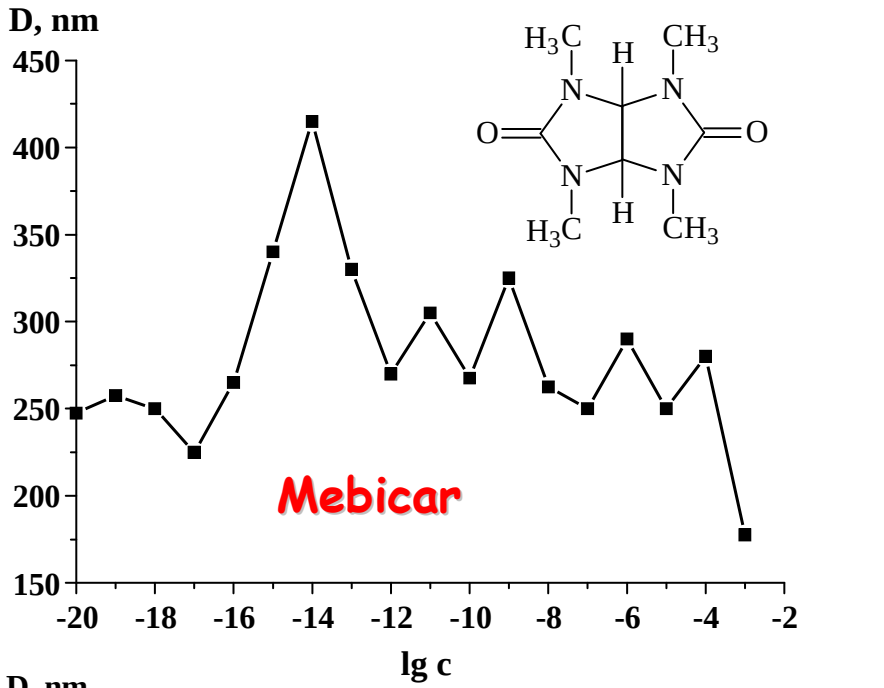

D,nm
lg C
Melafen

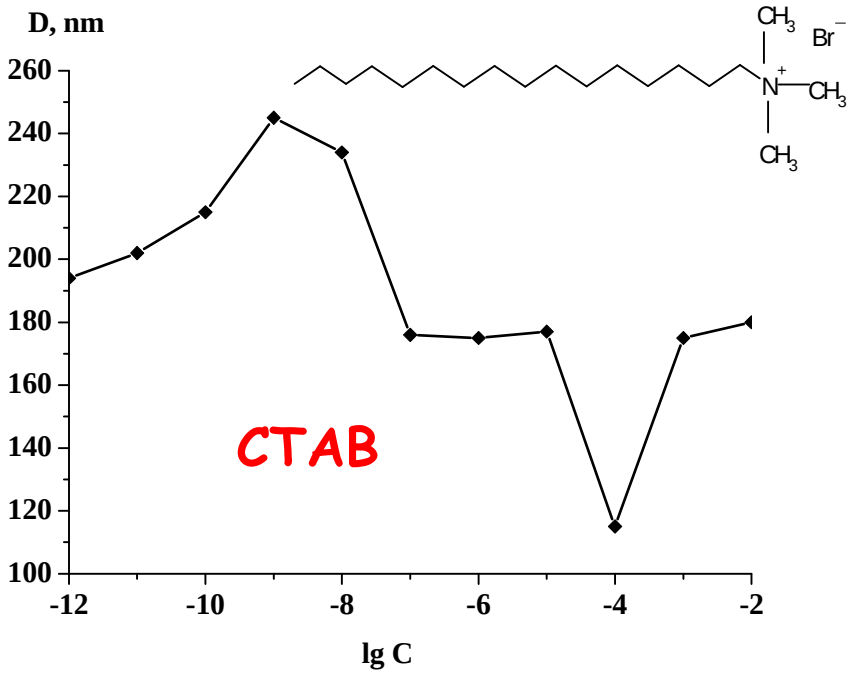

D, nm
lg C
Ichphan C-10
R=CH2CH2N+(CH3)2C10H21Br -

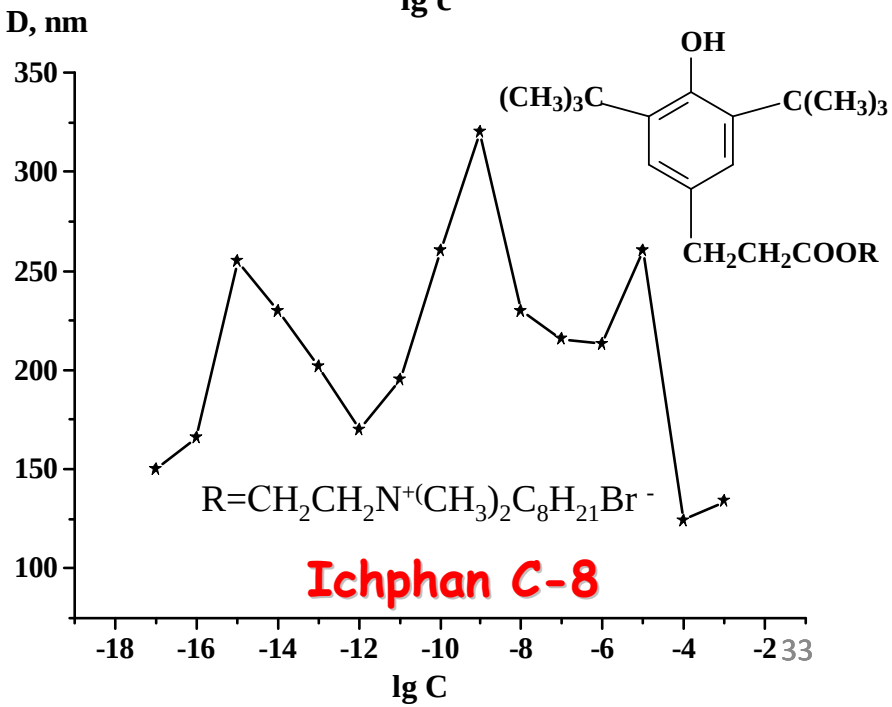

D/nm
lg C
Phenozan potassium salt

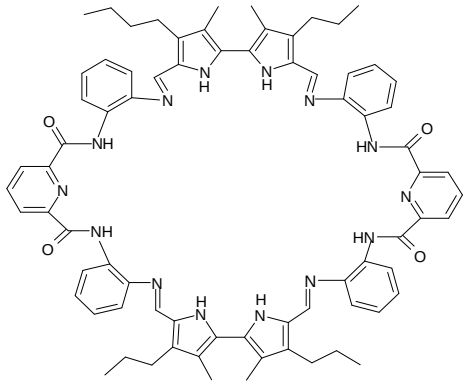

D, nm
lg C
a-Tocopherol


D, nm
300
250
200
150
100
50
0
-12
-10
-8
-6
-4
-2
lg C
HOCH2
HOCH2
P
O
O -
NH2
+
C
NH
NH
Guanibiphos

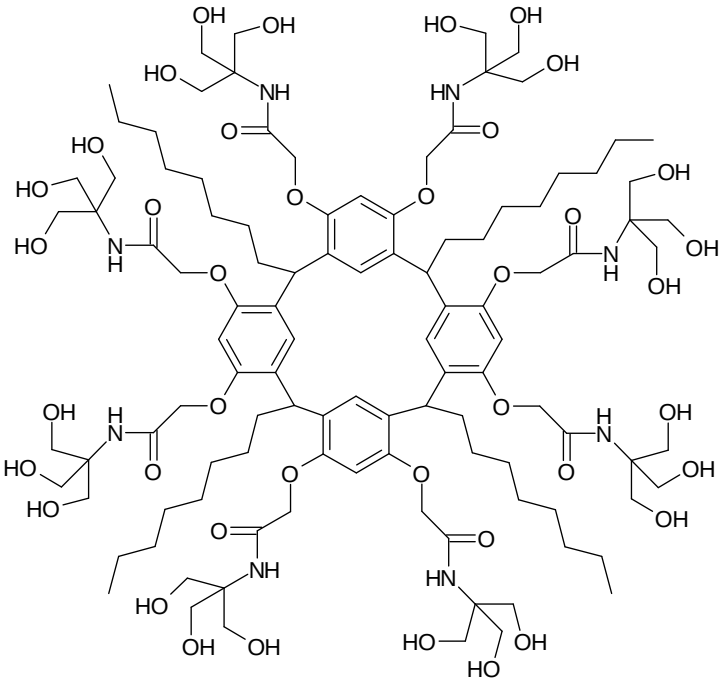

D, nm
450
400
350
300
250
200
150
-20
-18
-16
-14
-12
-10
-8
-6
-4
-2
lg c
H3C
H
CH3
N
N
O
O
N
N
H3C
H
CH3
Mebicar


D, nm
260
240
220
200
180
160
140
120
100
-12
-10
-8
-6
-4
-2
lg C
CH3
Br −
N+
CH3
CH3
CTAB

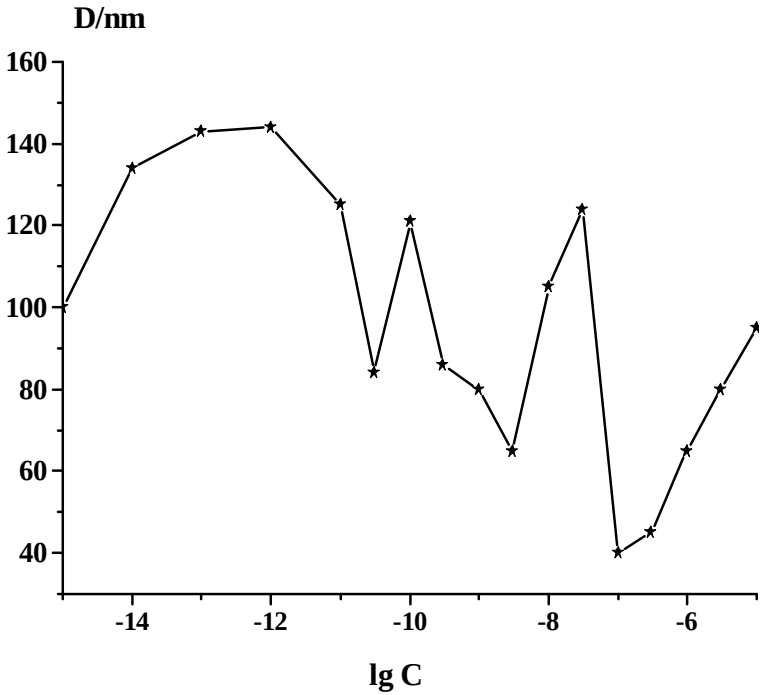

D, nm
350
300
250
200
150
100
-18
-16
-14
-12
-10
-8
-6
-4
-2
lg C
OH
(CH3)3C
C(CH3)3
CH2CH2COOR
R=CH2CH2N+(CH3)2C8H21Br -
Ichphan C-8

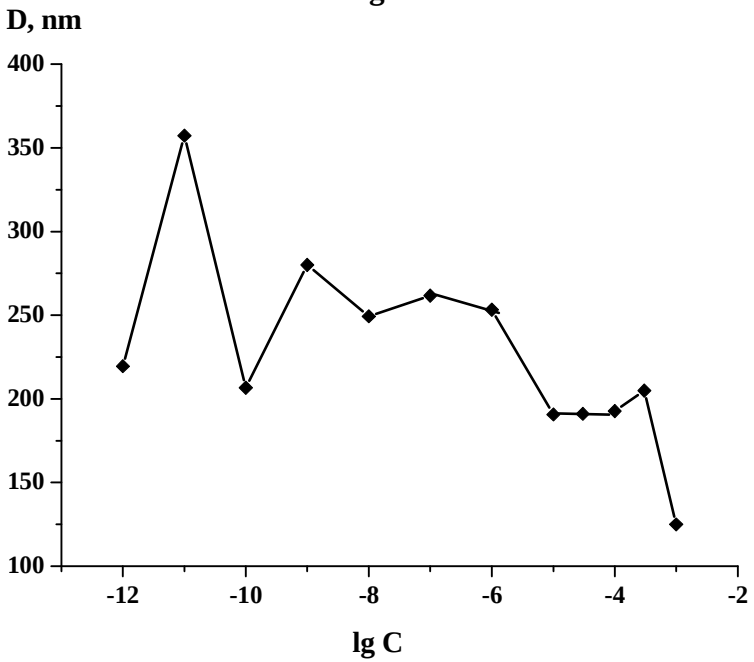


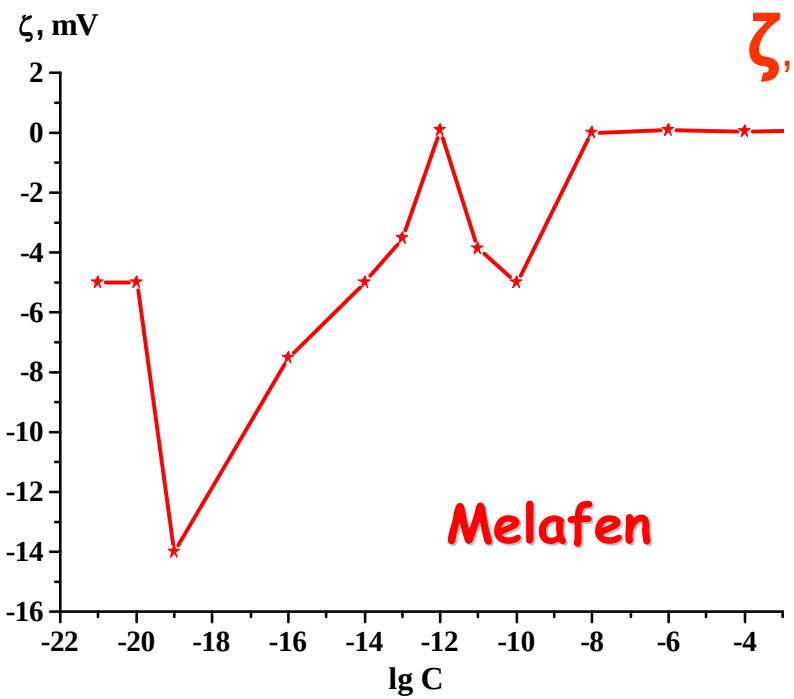
Pyridine-pyrrole macrocycle



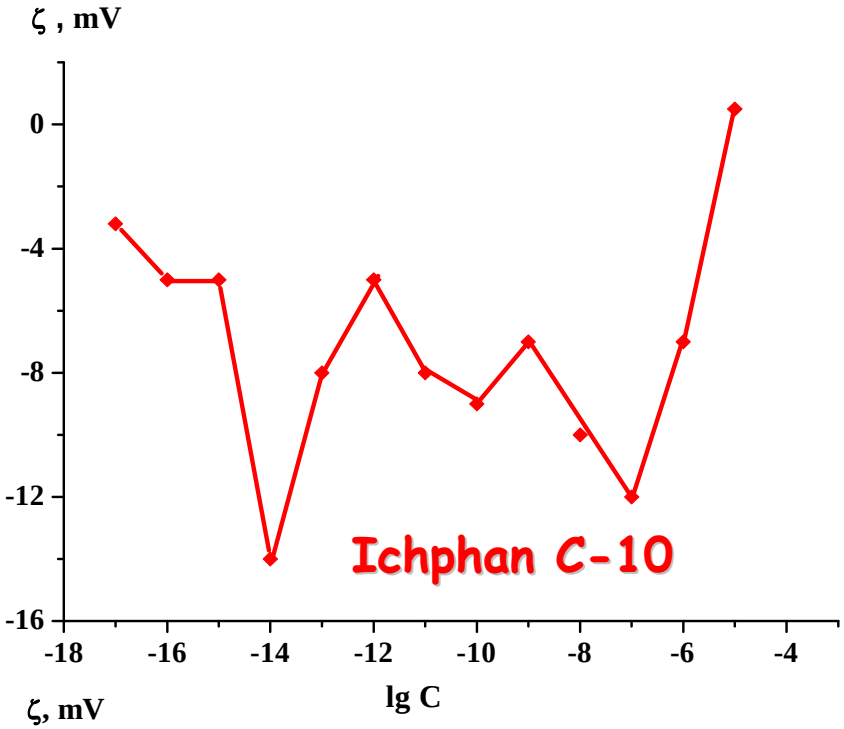
Amphiphilic calixarenes

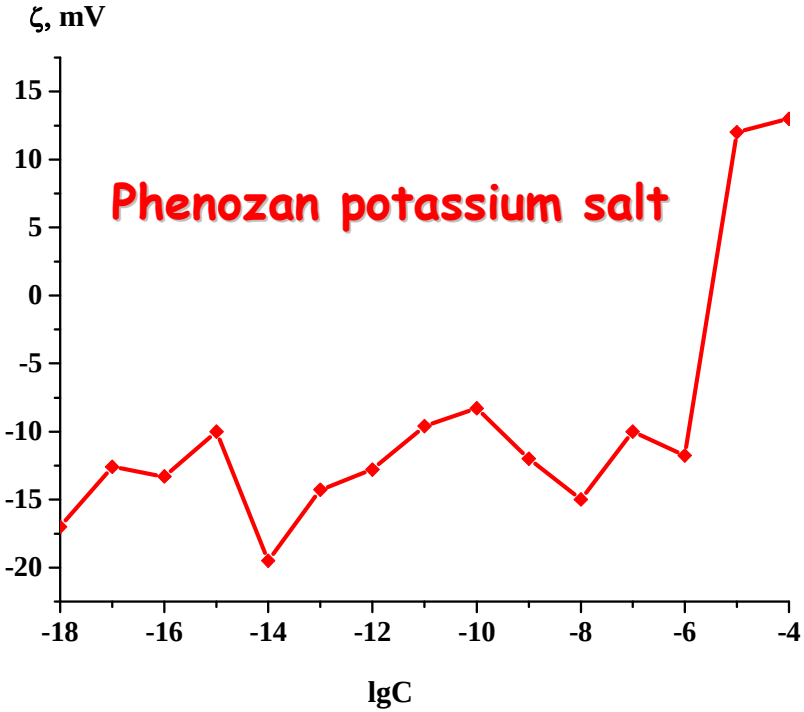


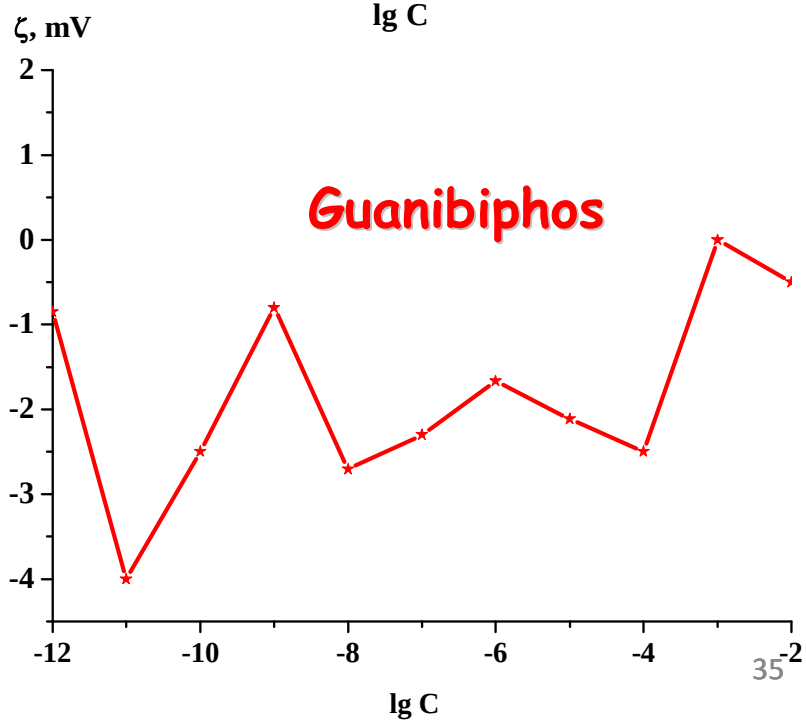



ζ, mV
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-22
-20
-18
-16
-14
-12
-10
-8
-6
-4
lg C
Melafen

ζ, mV


ζ , mV
0
-4
-8
-12
-16
-18
-16
-14
-12
-10
-8
-6
-4
lg C
Ichphan C-10

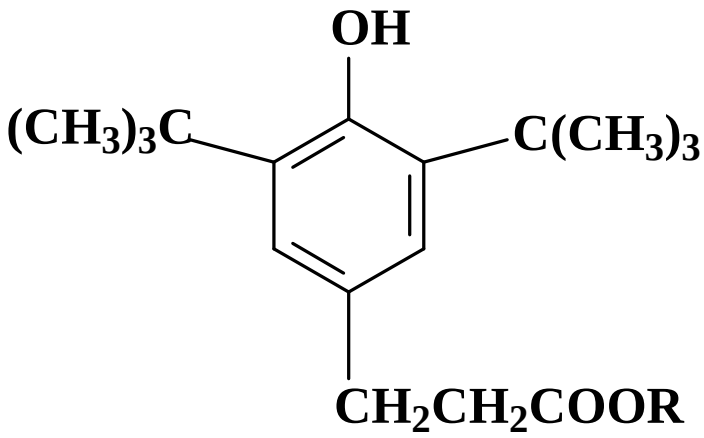

ζ, mV
15
10
5
0
-5
-10
-15
-20
-18
-16
-14
-12
-10
-8
-6
-4
lgC
Phenozan potassium salt


ζ, mV
2
1
0
-1
-2
-3
-4
-12
-10
-8
-6
-4
-2
lg C
Guanibiphos

D,nm ζ, mV **- nanoassociates parameters**

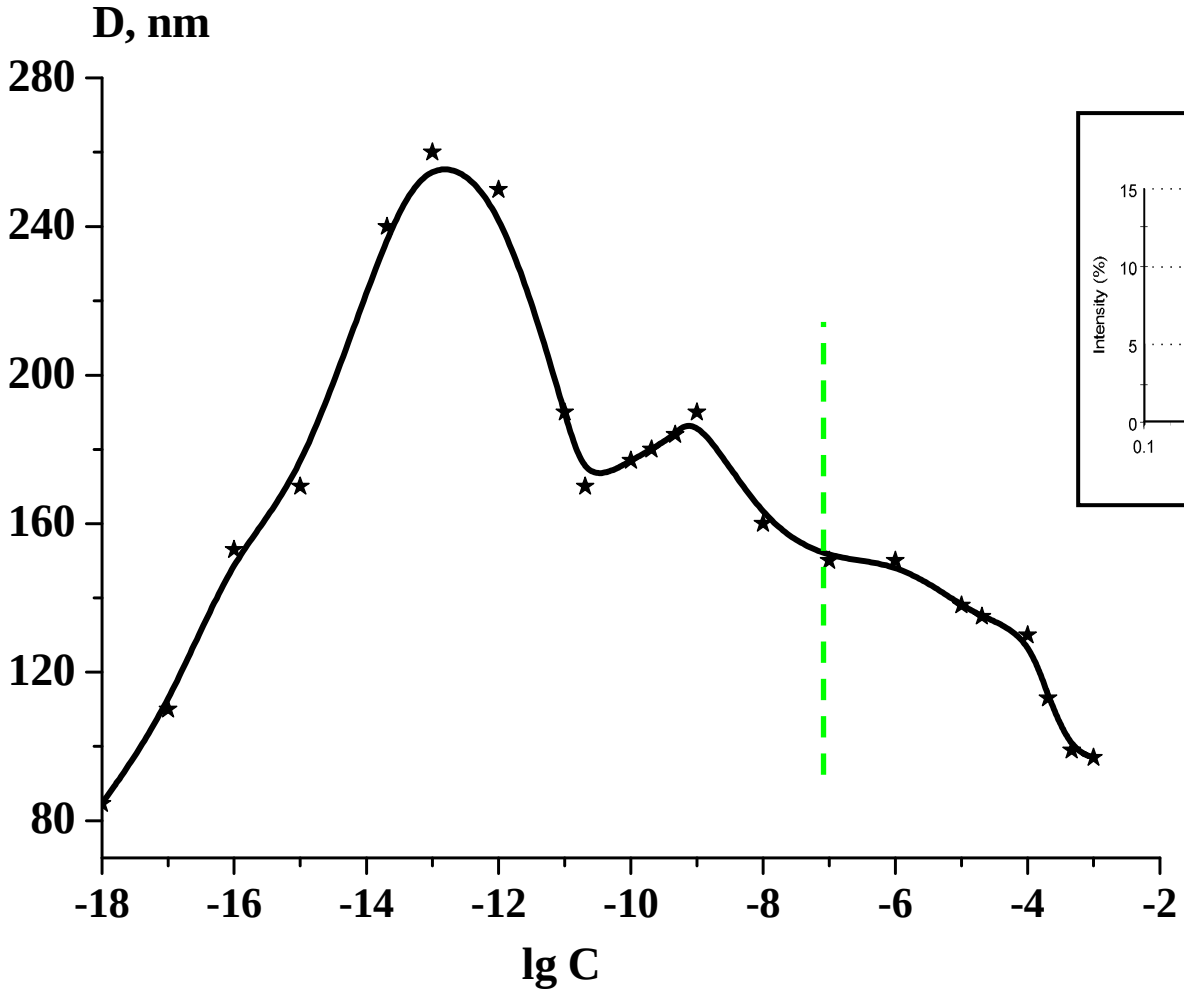
χ, μS/cm σ, mN/m - physicochemical properties of solutions

ICHPHAN C-10 - cationic surfactant, was synthesized as the hybrid product with antioxidant and anticholinesterate activity at the N.M. Emanual Institute of Biochemical Physics of Russian Academy of Sciences

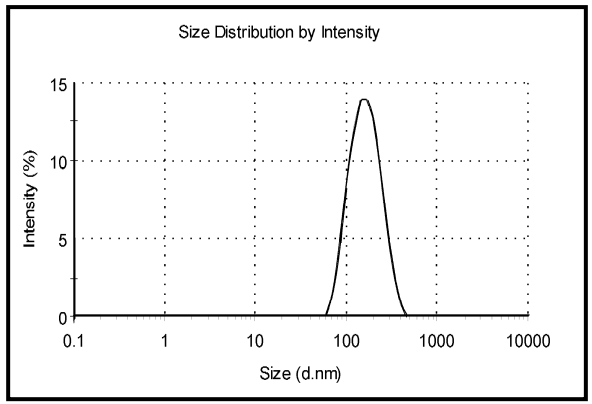


$R=CH_2CH_2N^{+(}CH_3)_2C_{10}H_{21}Br^-$

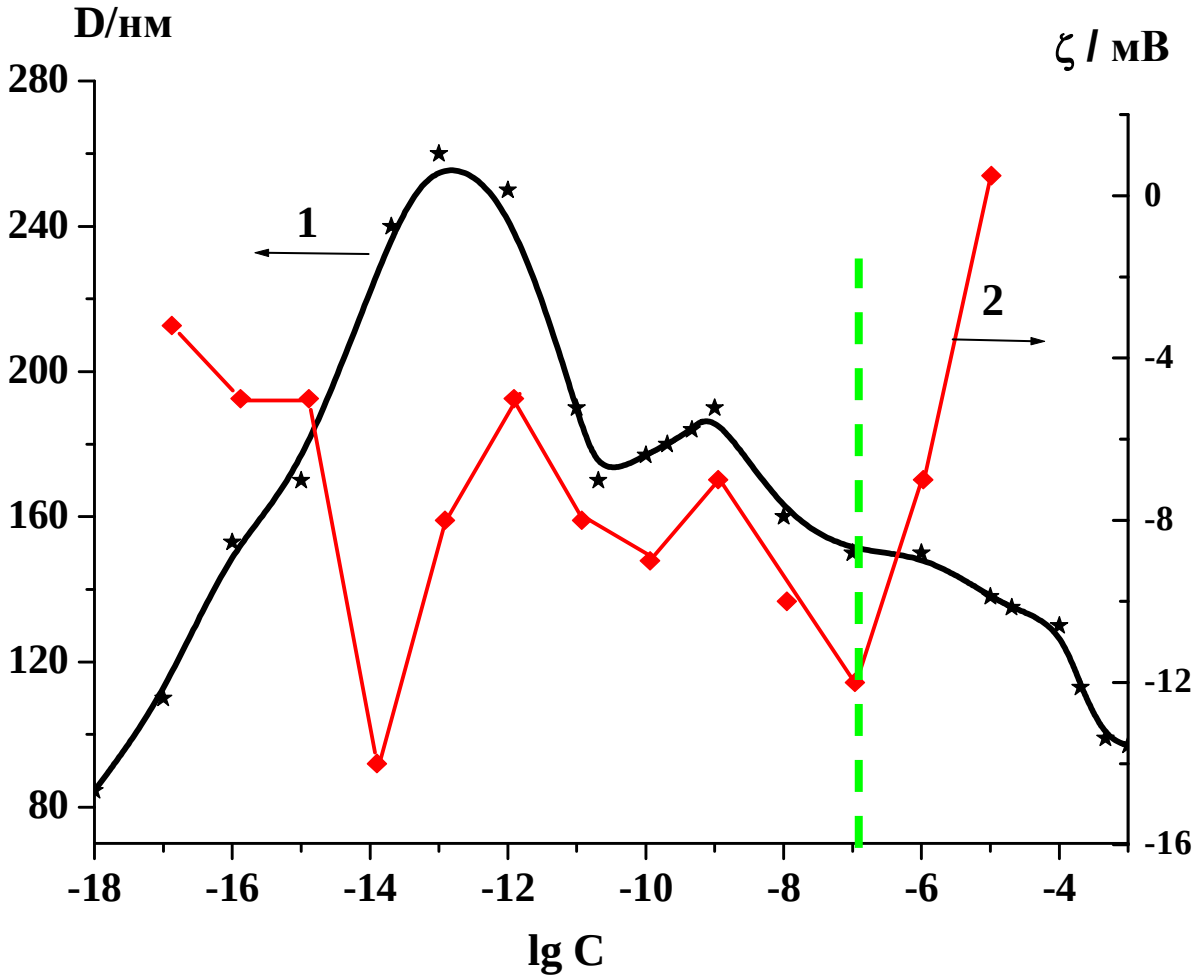
Change of nanoassociates sizes by delution of ICHPHAN C-10 solution



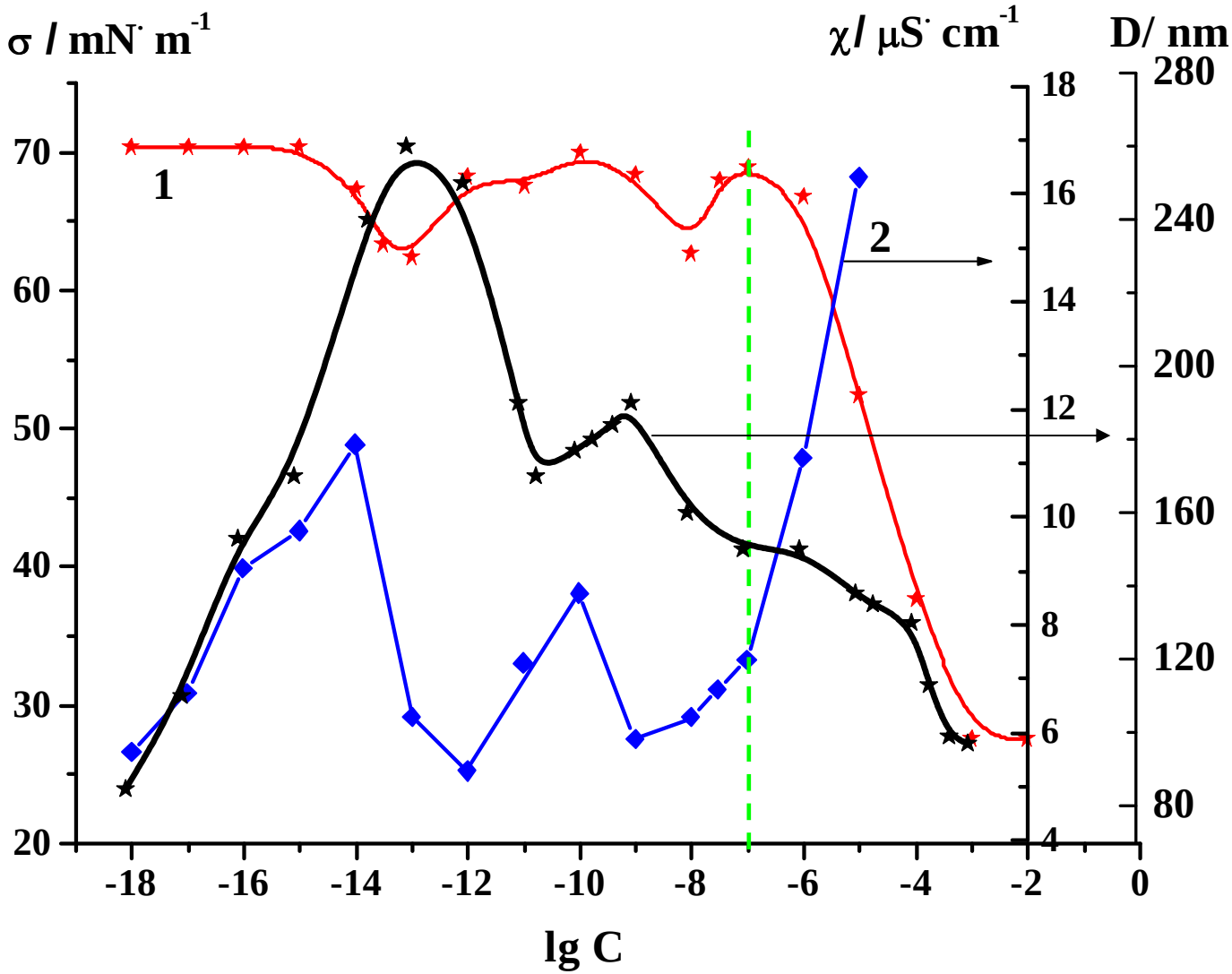
$C = 1 \cdot 10^{-15}$ M



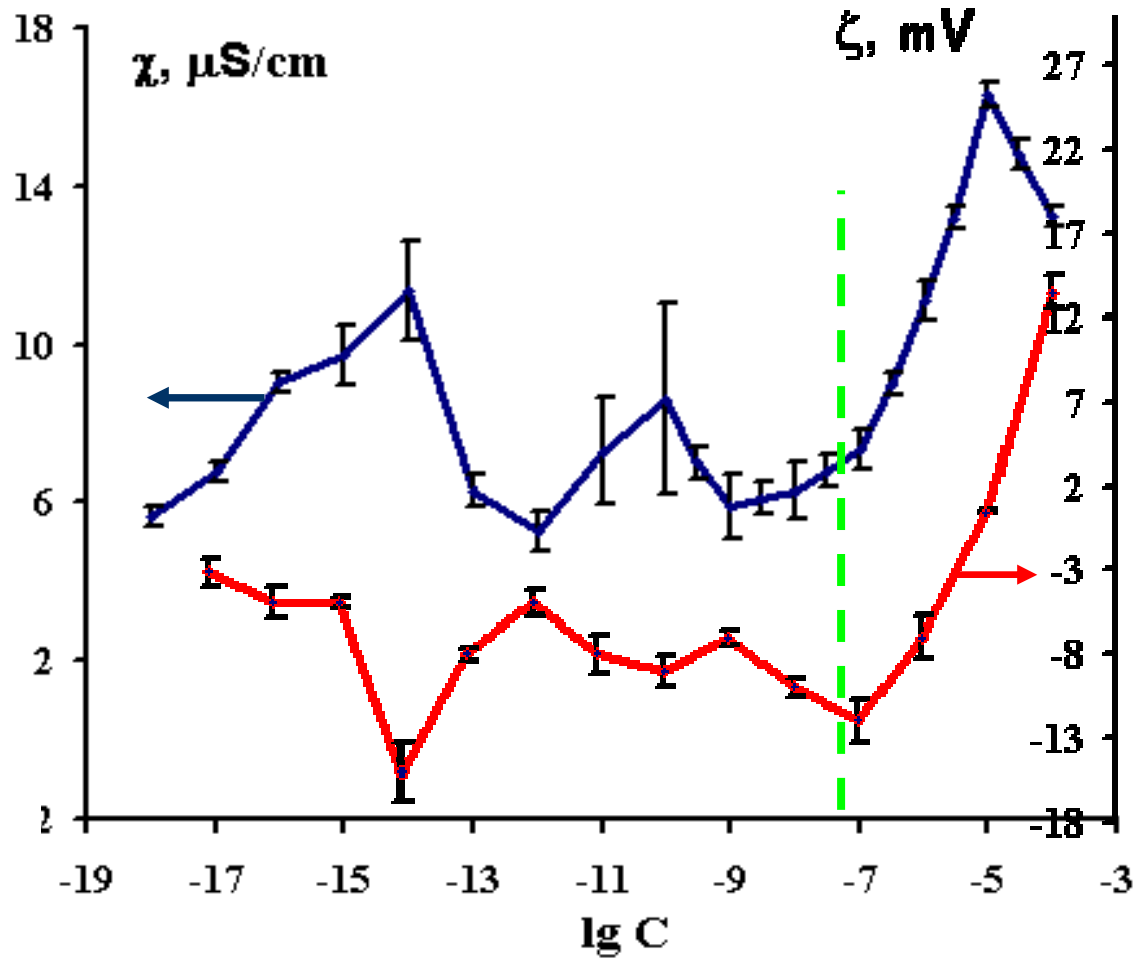
The interrelation between parameters of nanoassociates



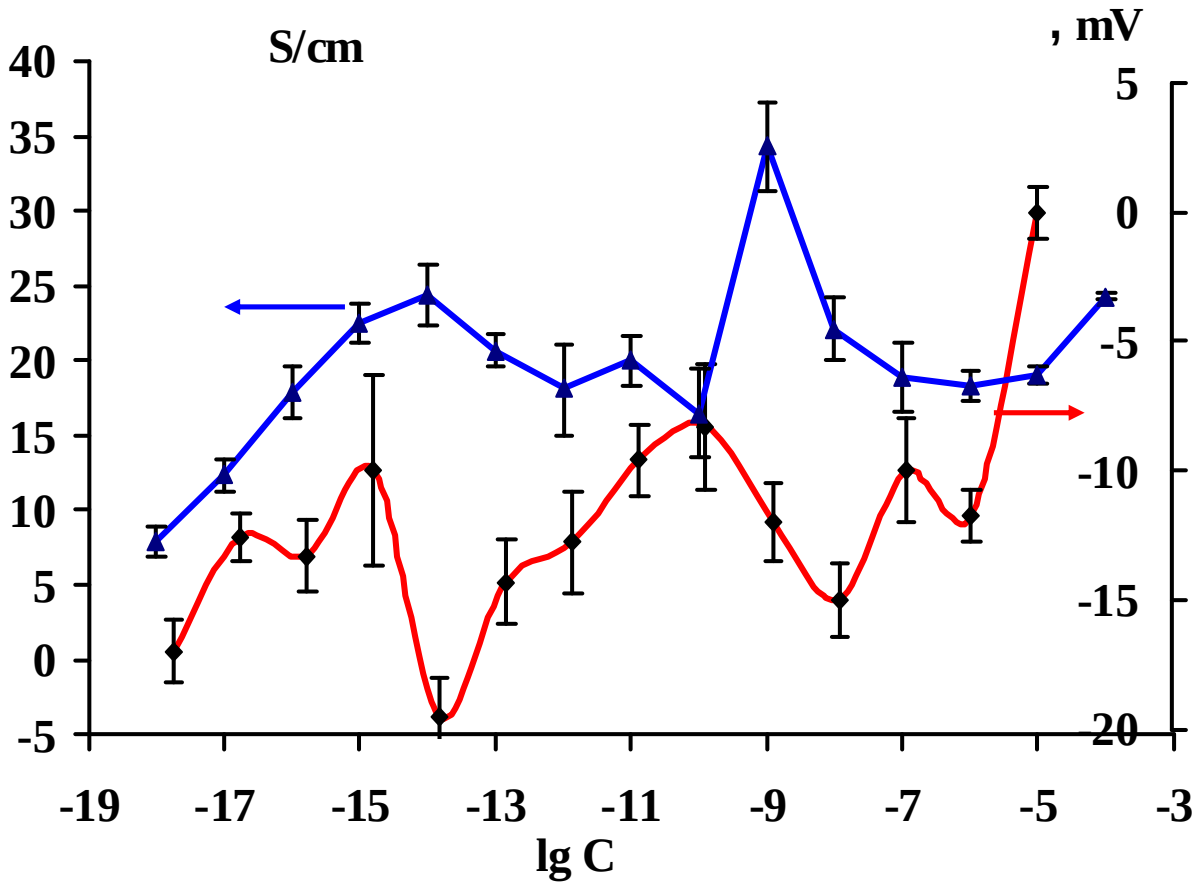
Changes of nanoassociates parameters and physicochemical properties of ICHPHAN C-10 solutions



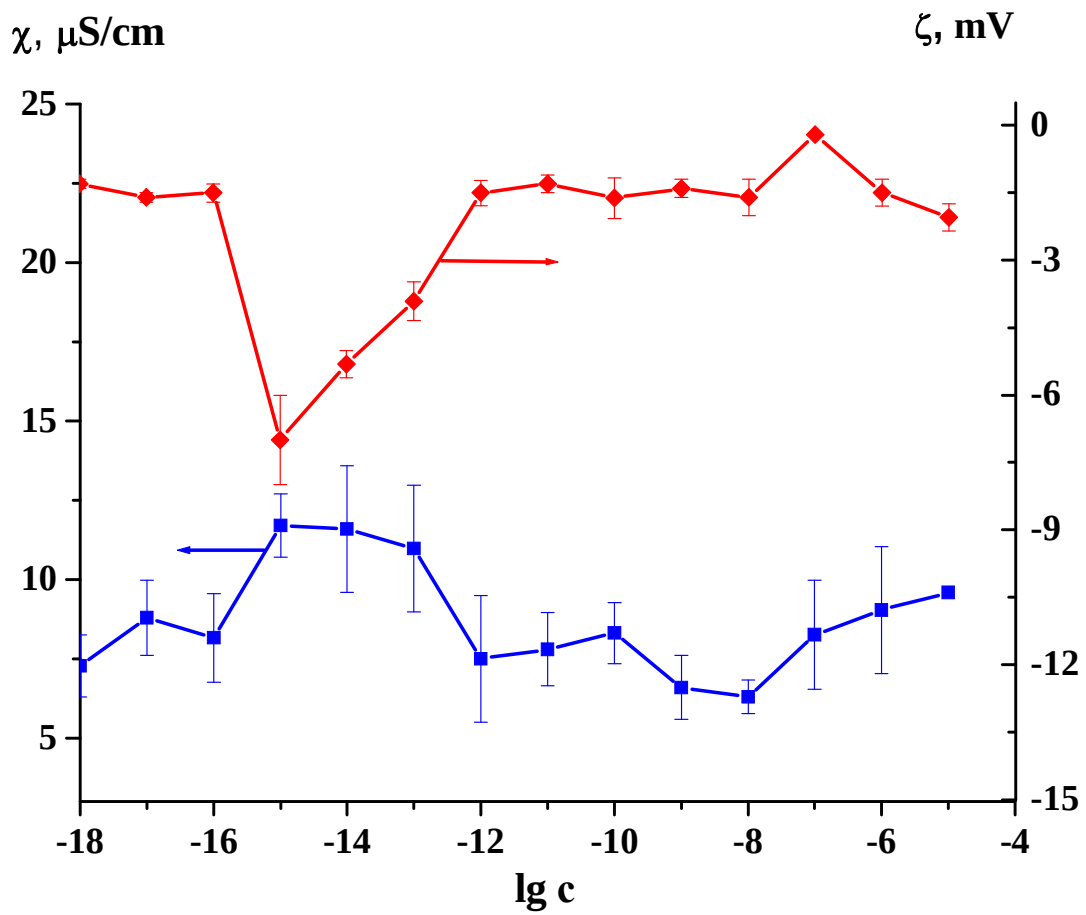
ICHFAN C-10: ζ potencial of nanoassociates and electrical conductivity of solutions



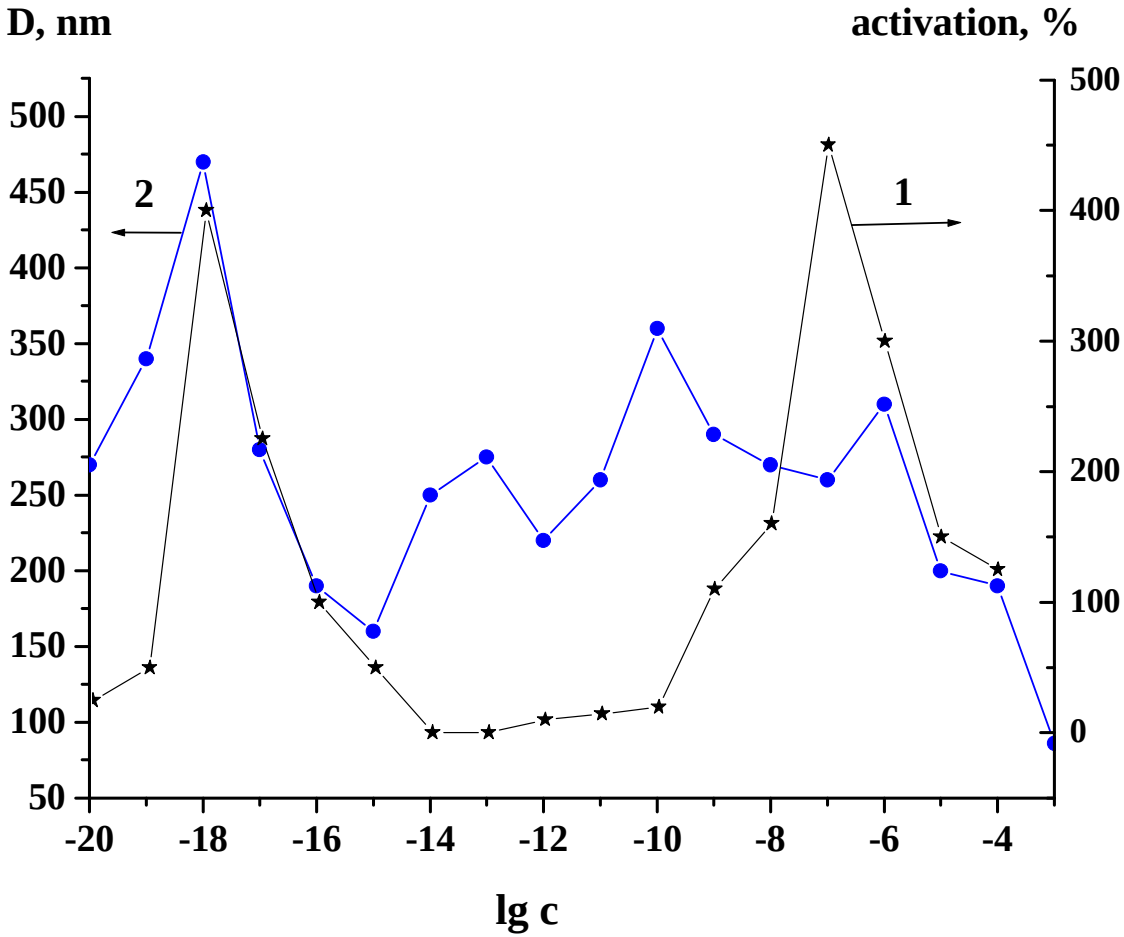
PHENOZAN POTASSIUM SALT : ζ-potencial of nanoassociates and electrical conductivity of solutions

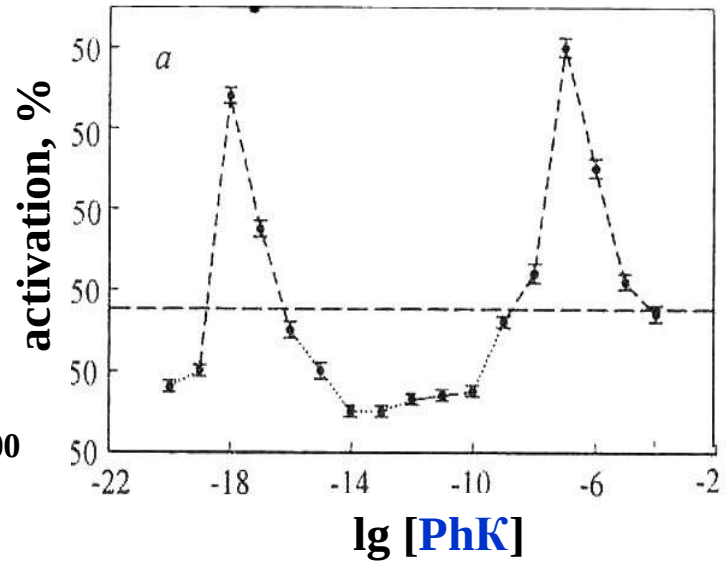


α-TOCOPHEROL: ζ-potencial of nanoassociates and electrical conductivity of solutions



The degree of the activation of proteinkinase C (1) and hydrodynamic diameter of nanoassociates (2) of POTASSIUM PHENOSAN solutions vs. its concentration.





Mal'tseva E.L. et al. Biological membranes, 1998, 15, 2, 191-198.

It was established that in the solutions with «non-classic behavior» «nanoassociates» are formed

and the formation of «nanoassociates» is the reason of «non-classic behavior».

No nanoassociates in solution - «classic behavior»

There are nanoassociates - «non-classic behavior»

A definite molecular structure is necessary for the formation of nanoassociates

Electromagnetic fields are necessary

for the formation of nanoassociates in aqueous solutions in low concentrations

The initial solutions of each concentration were divided into two series, which were kept for 18 hours before measurement:

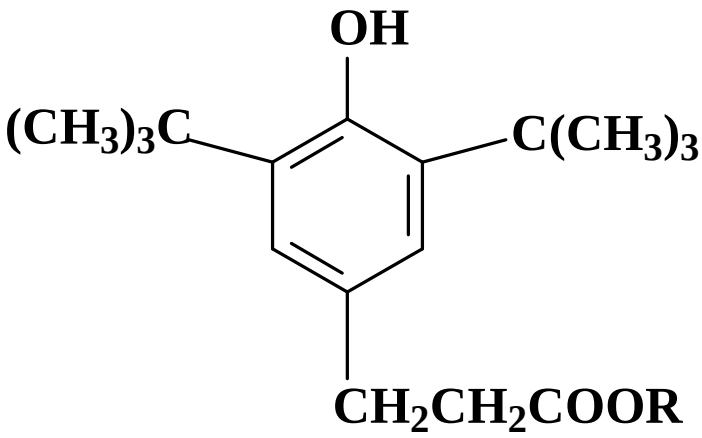
1. **The first one on a laboratory table (usual conditions)**
2. **The second one in a container (hypoelectromagnetic conditions).**

laboratory table

permalloy container

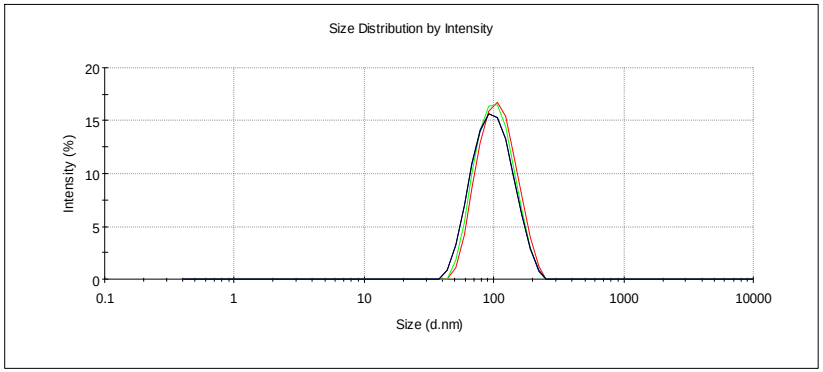
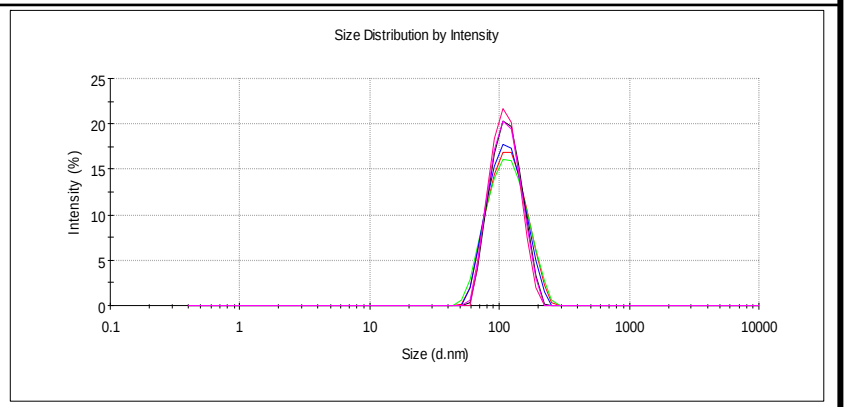
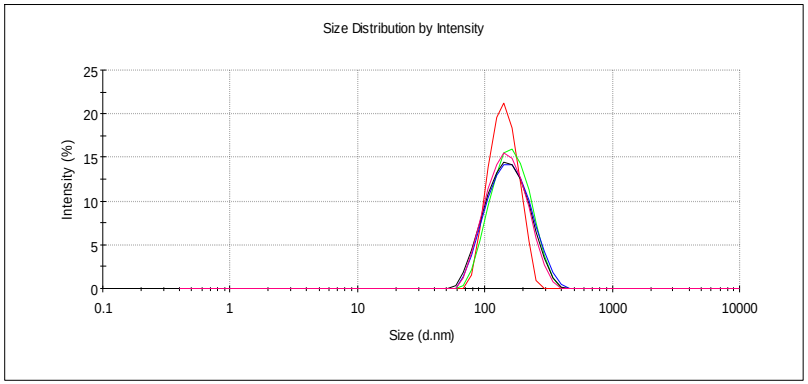
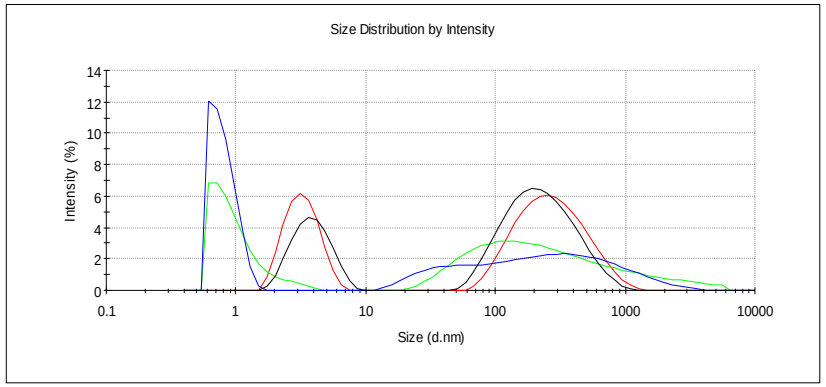
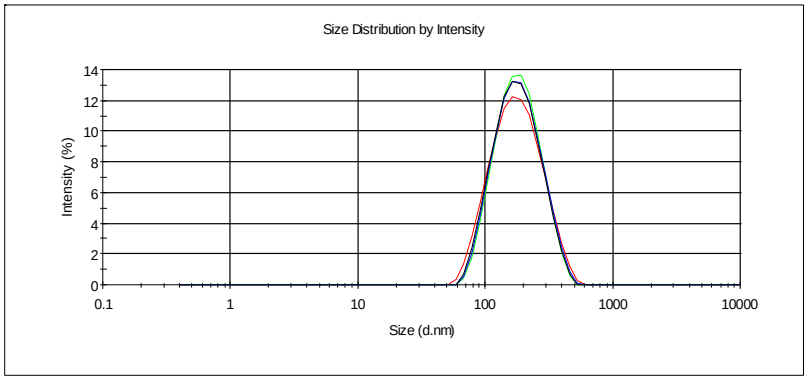
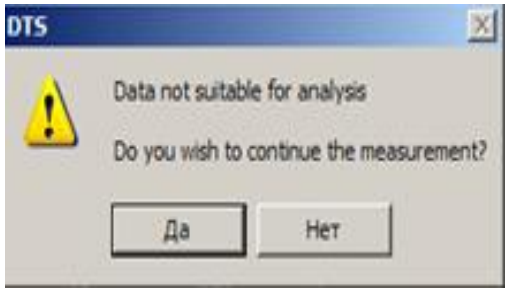
magnetic induction (B) of geomagnetic field of Earth in Kazan is $53 \cdot 10^3$ nTl, in container - 10-20 nTl

ICHPHAN C-10

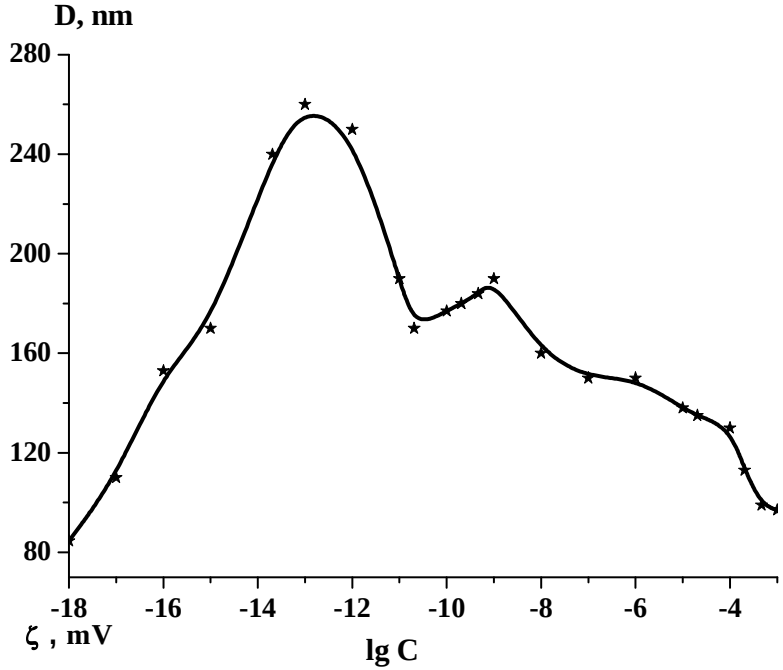


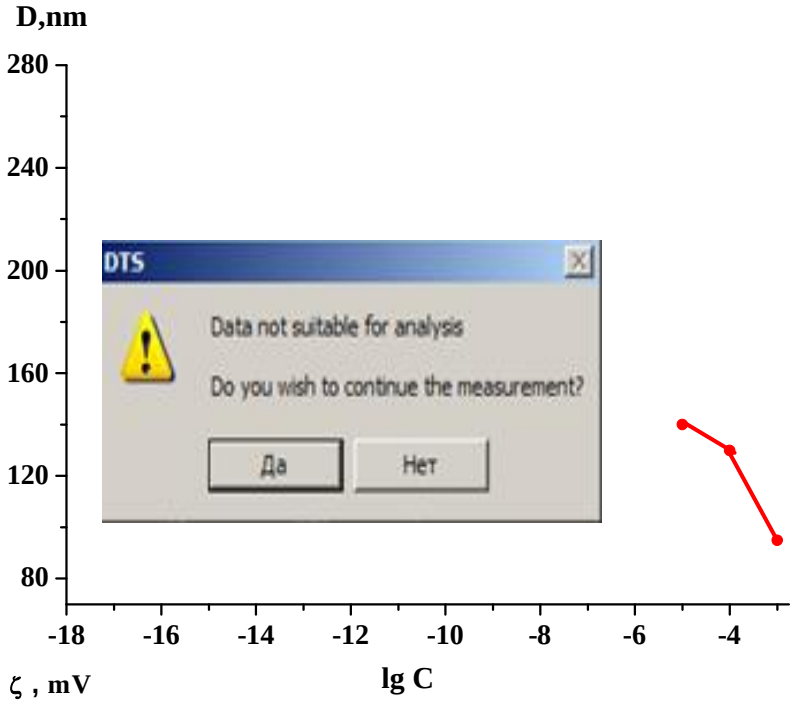
R=$CH_2CH_2N^{+(}CH_3)_2C_{10}H_{21}Br^-$

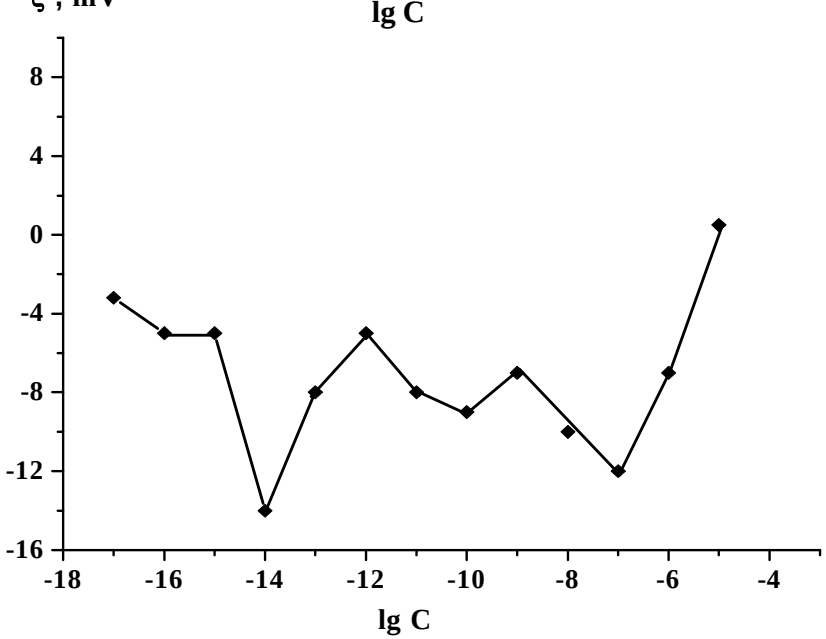
Laboratory table — ICHPHAN C-10 — Permalloy container

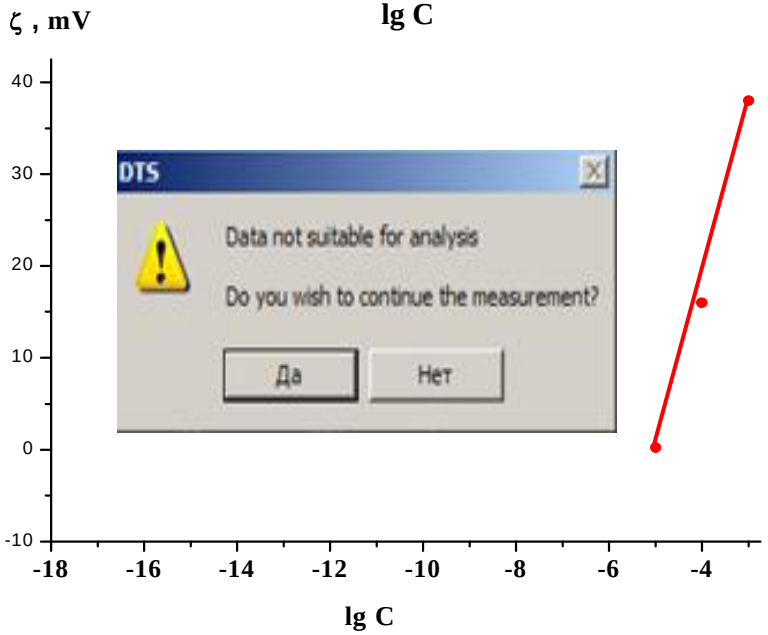
Laboratory table		Permalloy container
	10^{-4}	
	10^{-6}	
	10^{-10}	

Laboratory table ICHPHAN C-10 Permalloy container

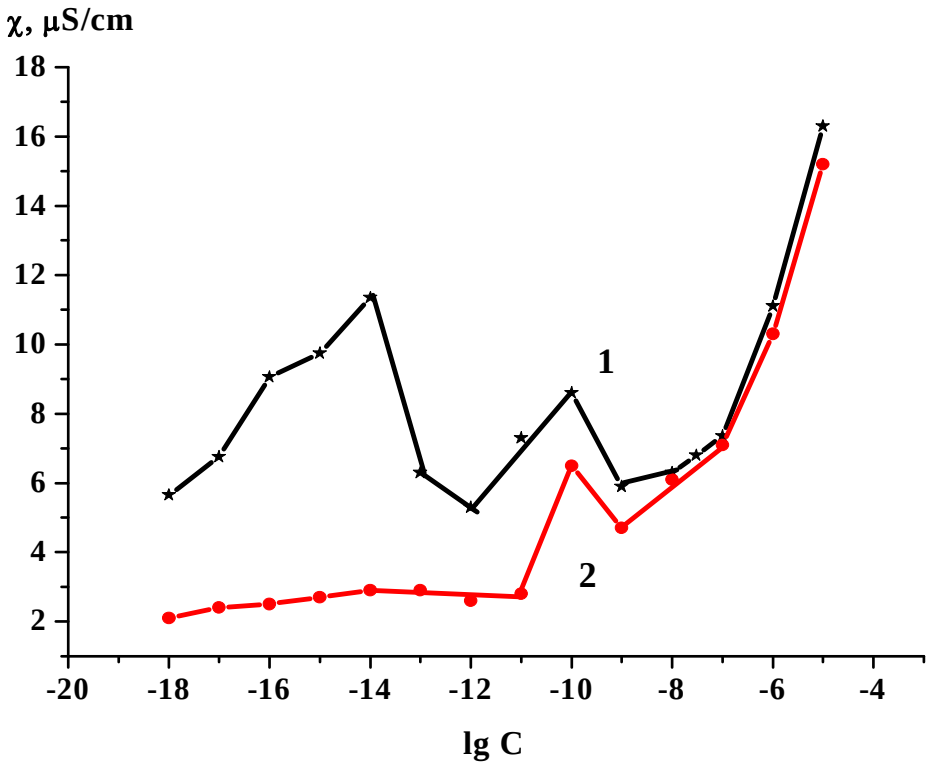


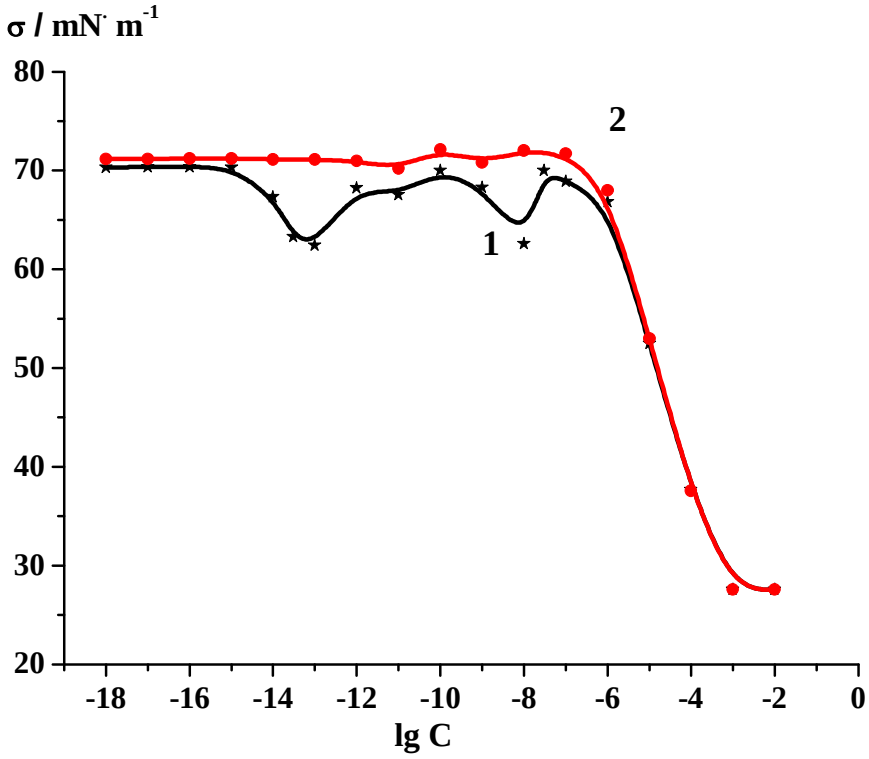






Influence of em fields on physicochemical properties of ICHPHAN C-10 solutions

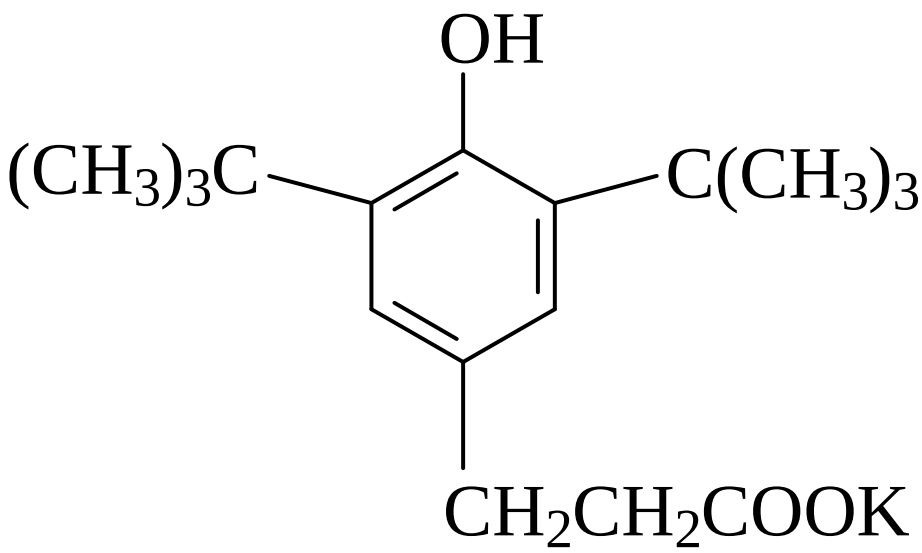




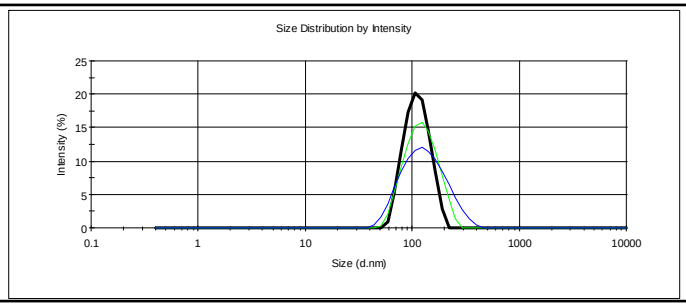
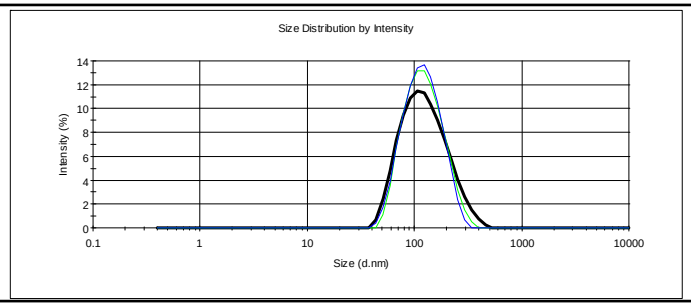
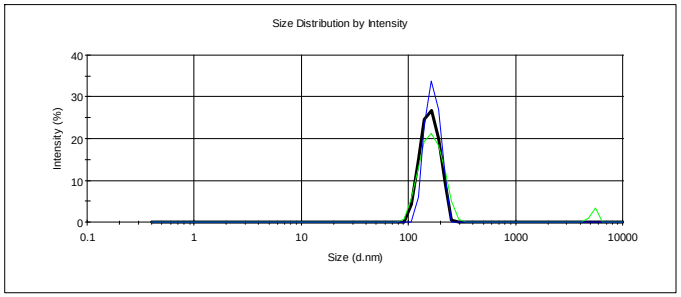
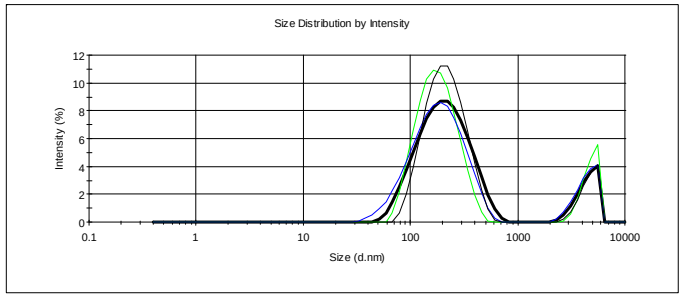
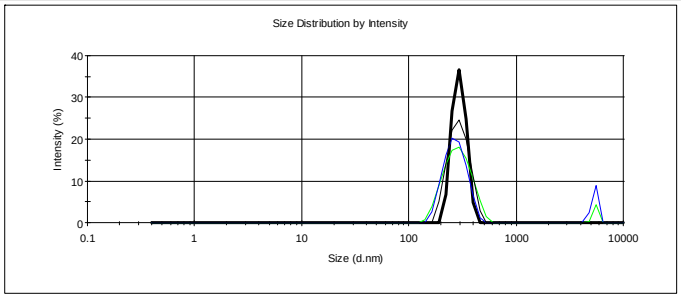
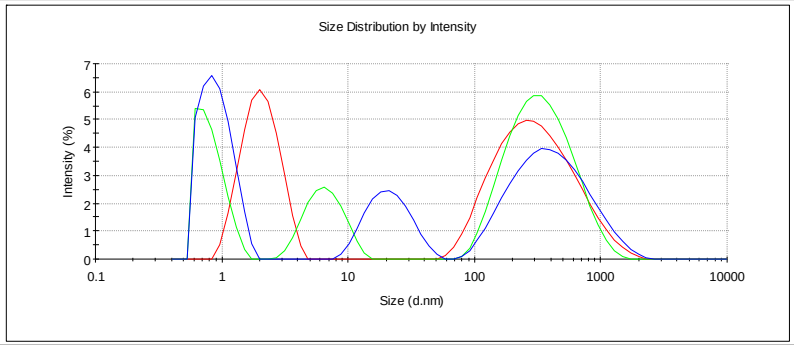
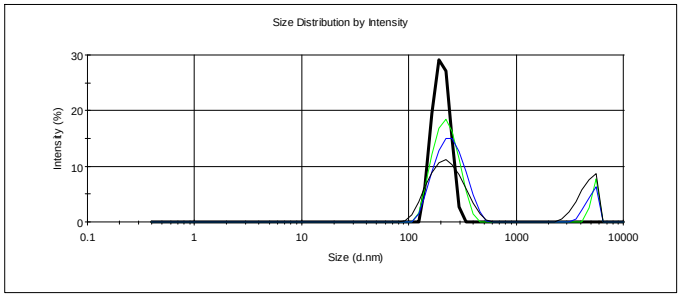
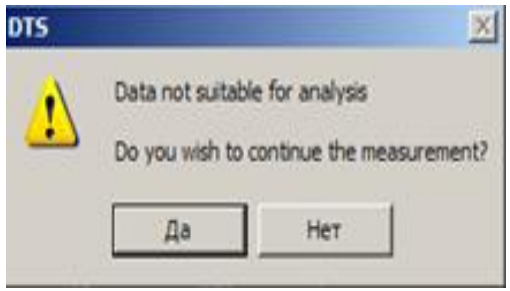
1-Laboratory table

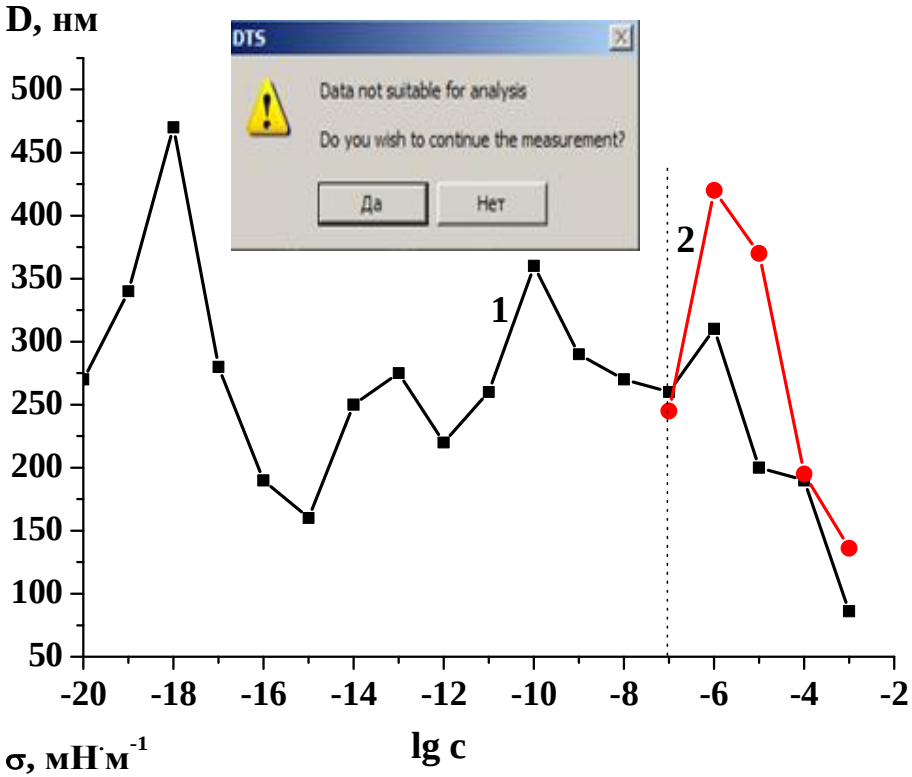
2-Permalloy container

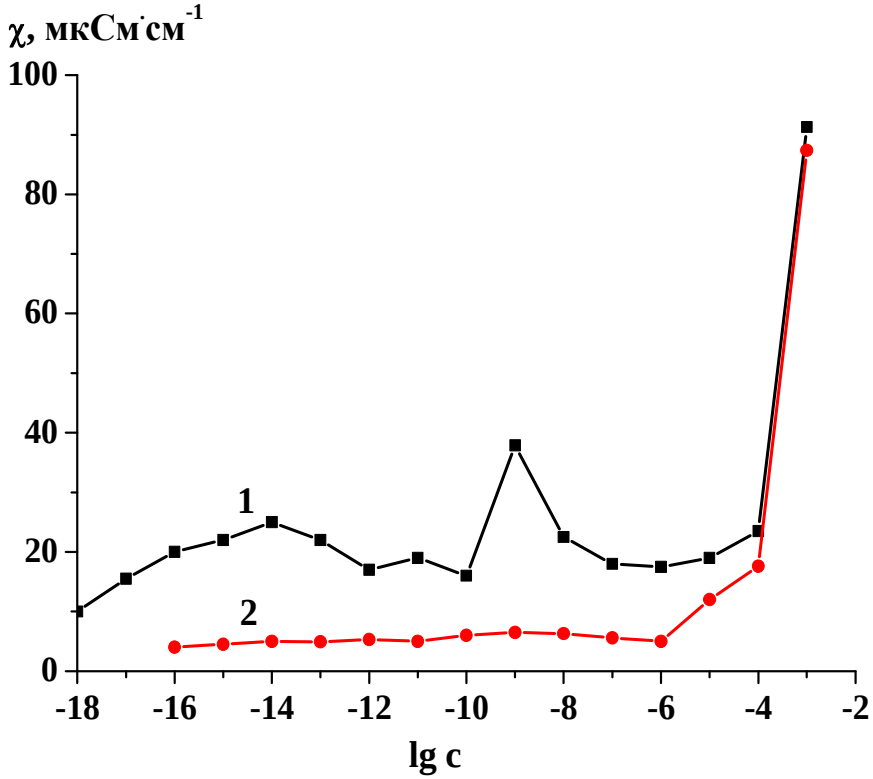
PHENOZAN POTASSIUM SALT- was synthesized as the hybrid product with antioxidant and anticholinesterate activity at the N.M. Emanual Institute of Biochemical Physics of Russian Academy of Sciences

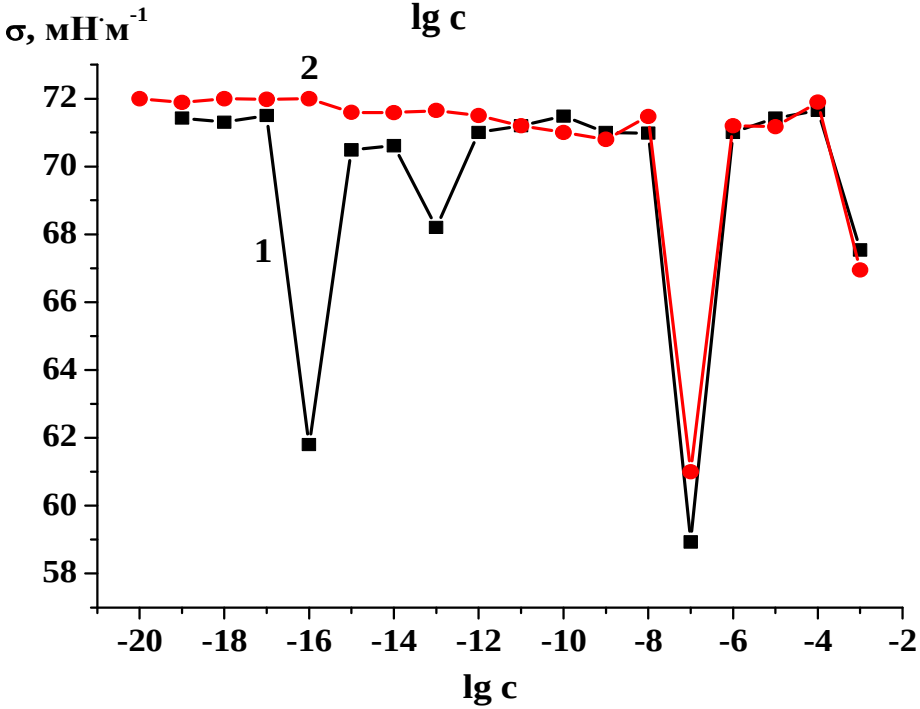


Laboratory table — Phenozan potassium salt — Permalloy container

	10^{-3}	
	10^{-4}	
	10^{-6}	
	10^{-8}	





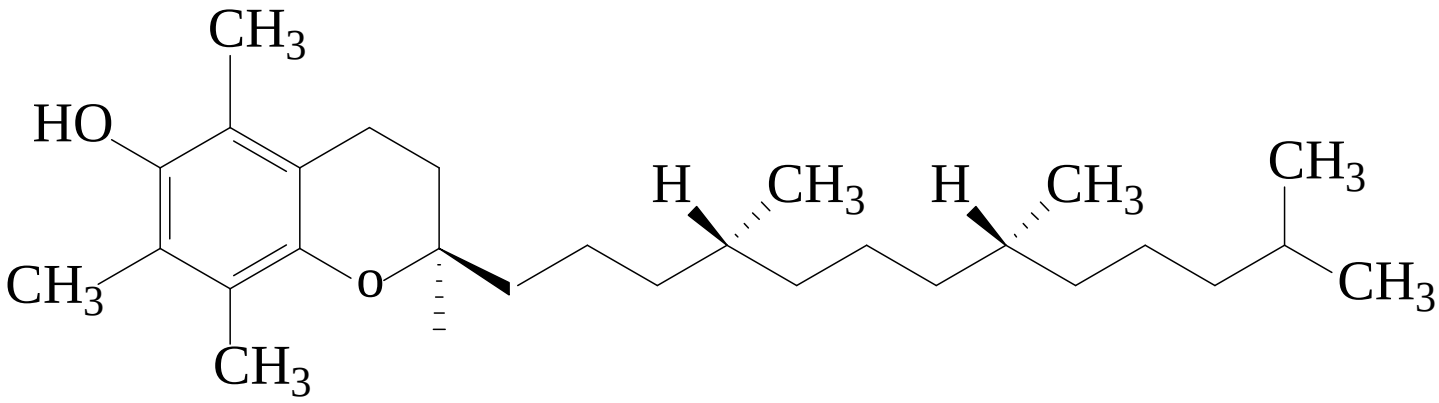


PHENOZAN POTASSIUM SALT

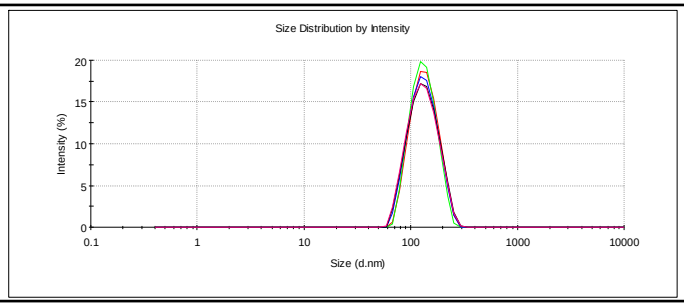
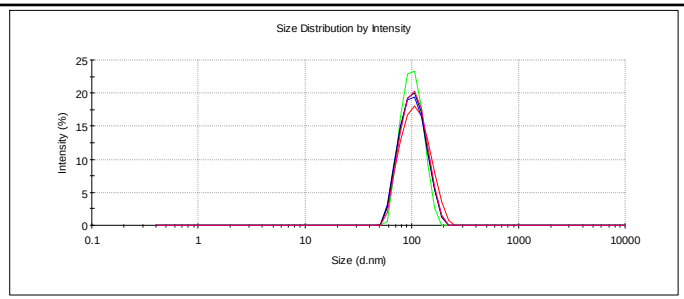
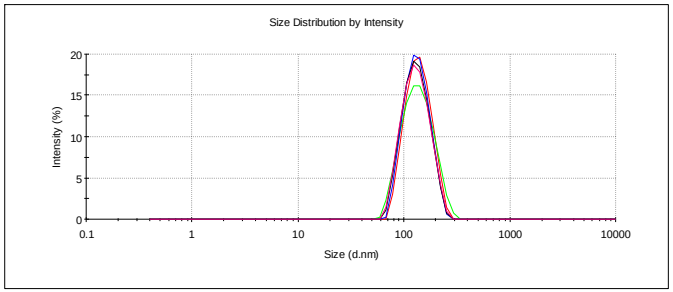
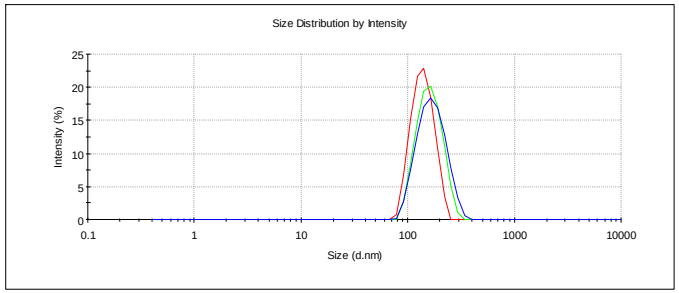
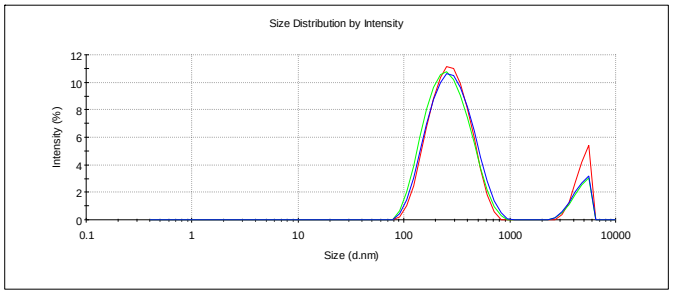
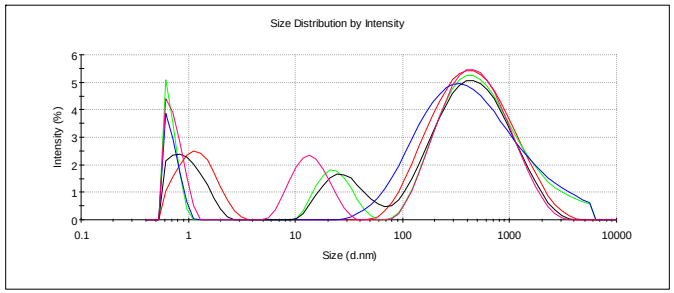
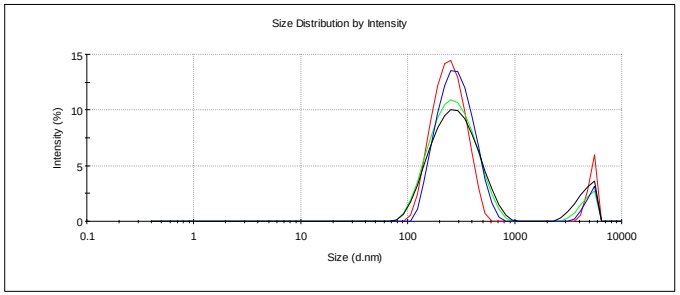
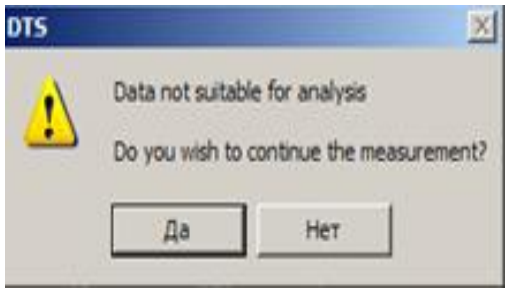
1-Laboratory table

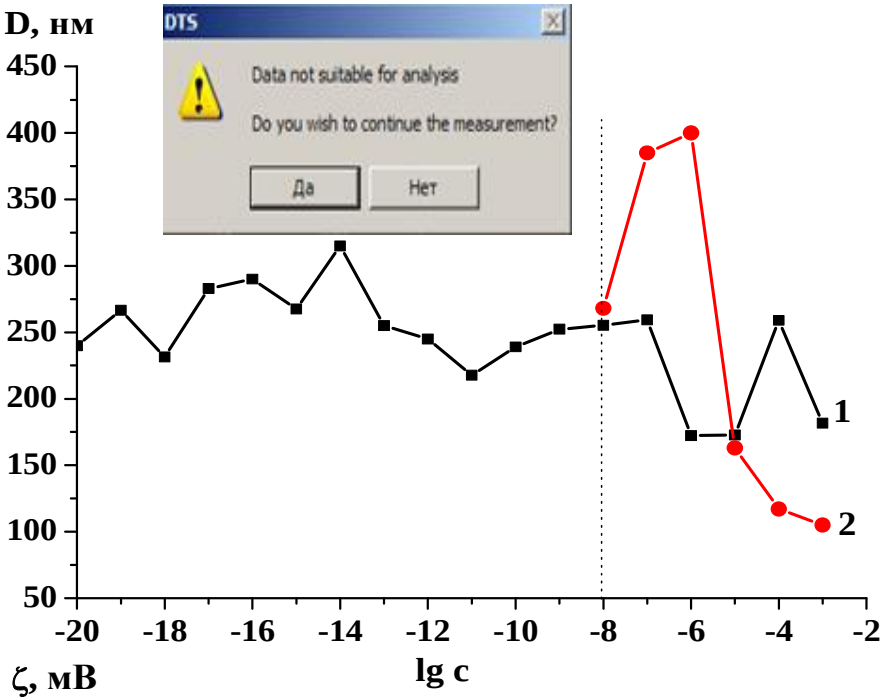
2-Permalloy container

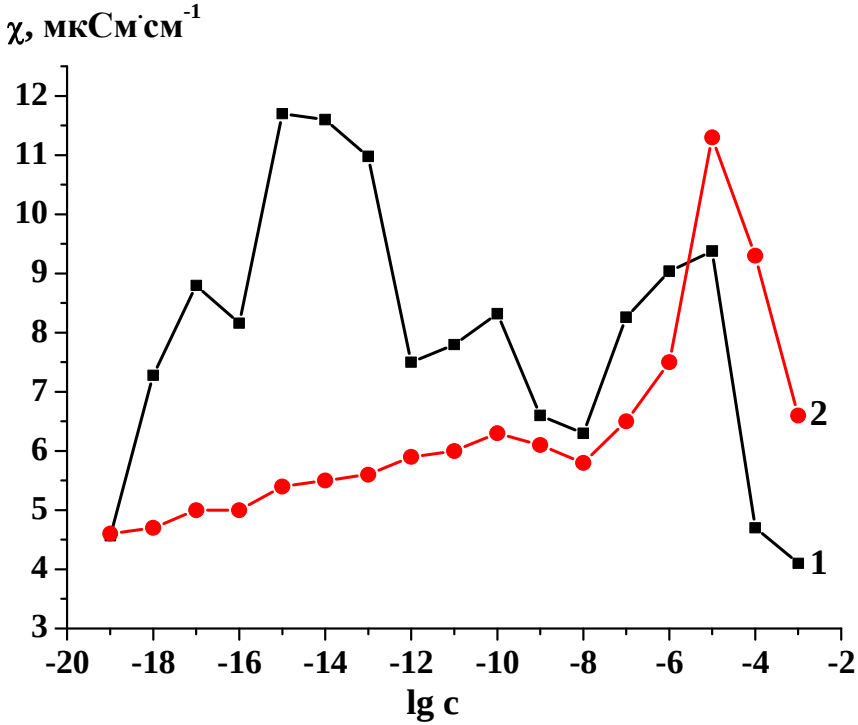
α-TOCOPHEROL – natural antioxidant

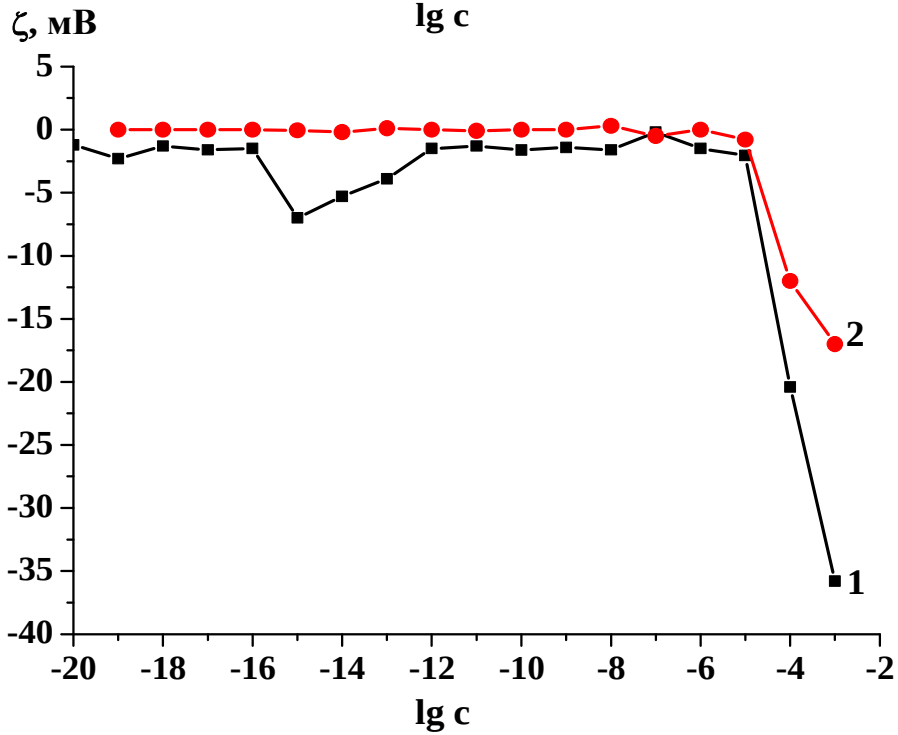


Laboratory table — α-Tocopherol — Permalloy container

Laboratory table		Permalloy container
	10^{-3}	
	10^{-5}	
	10^{-6}	
	10^{-9}	





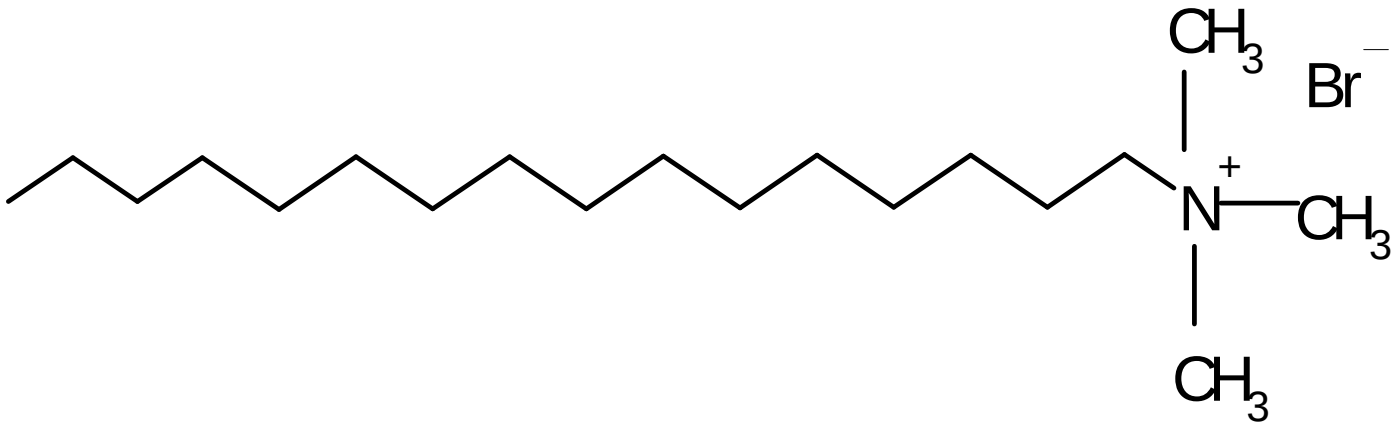


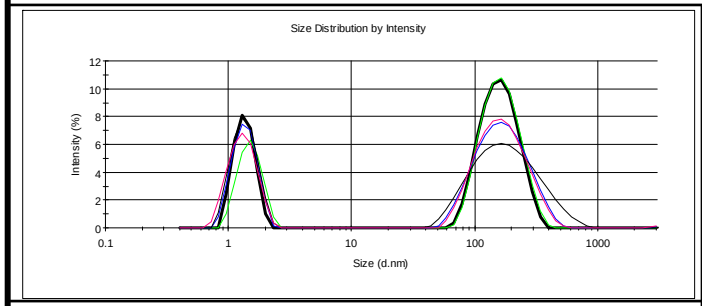
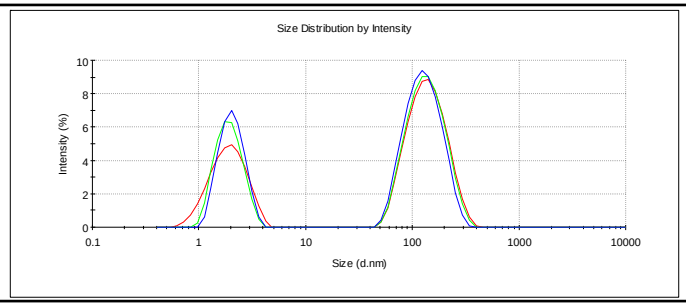
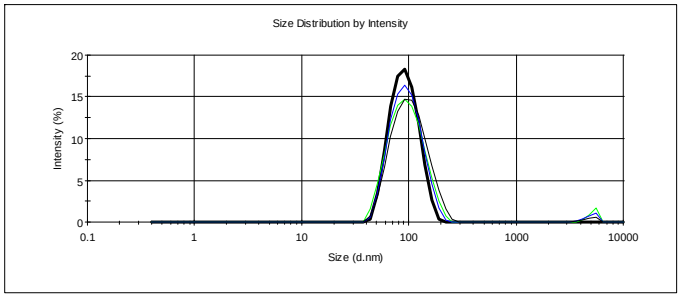
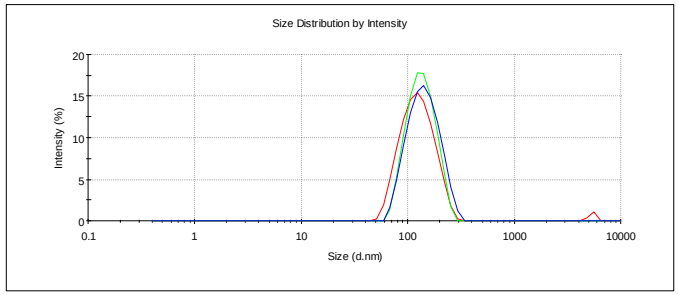
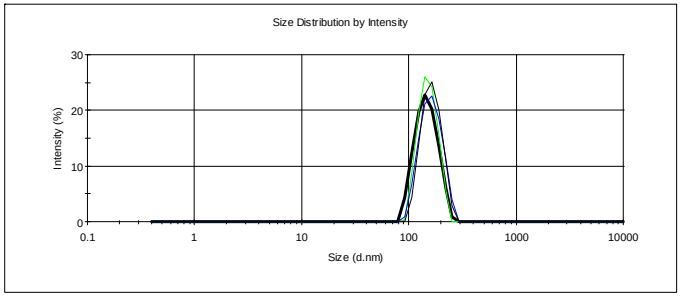
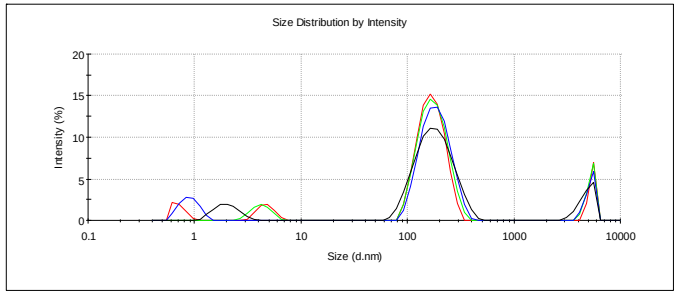
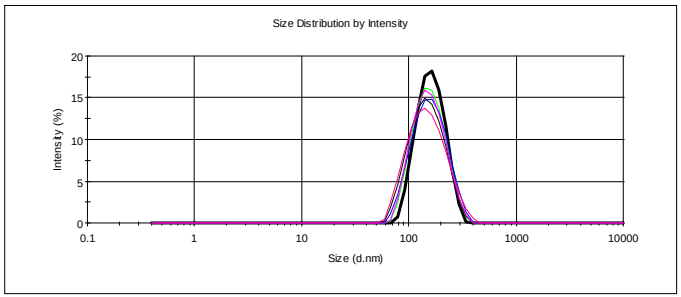
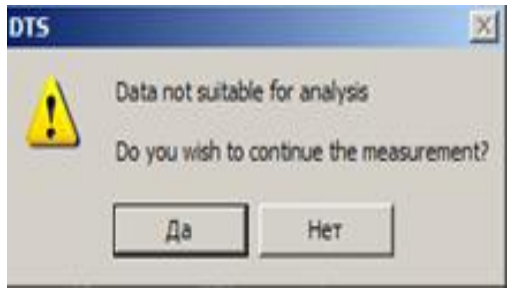
α-TOCOPHEROL

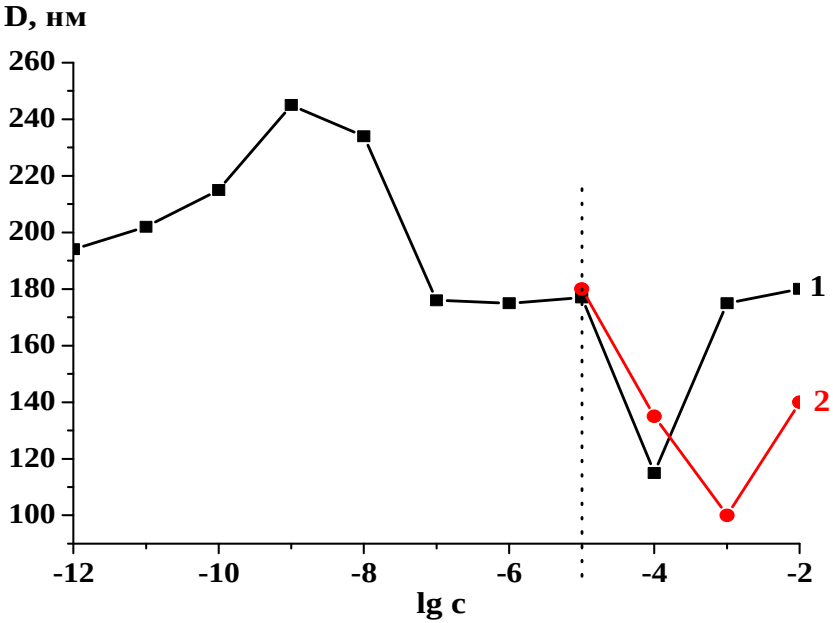
1-Laboratory table

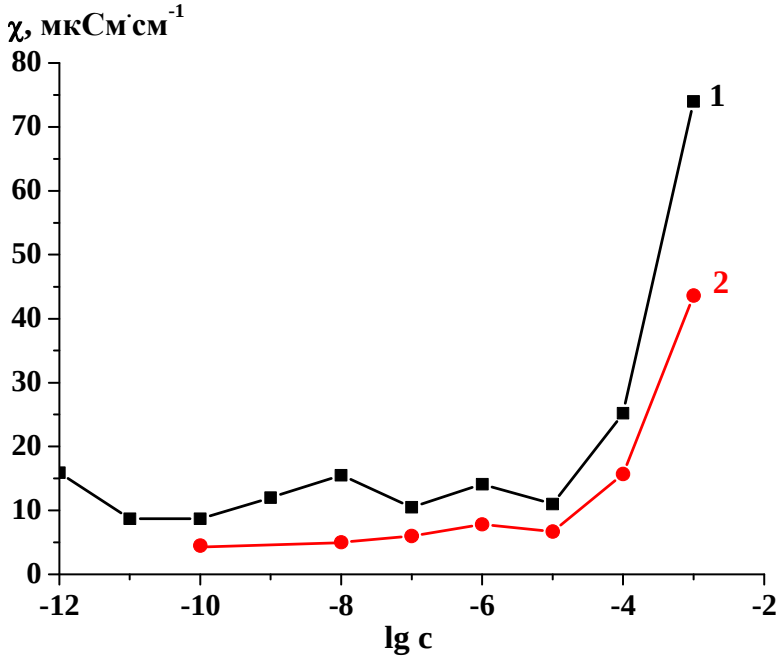
2-Permalloy container

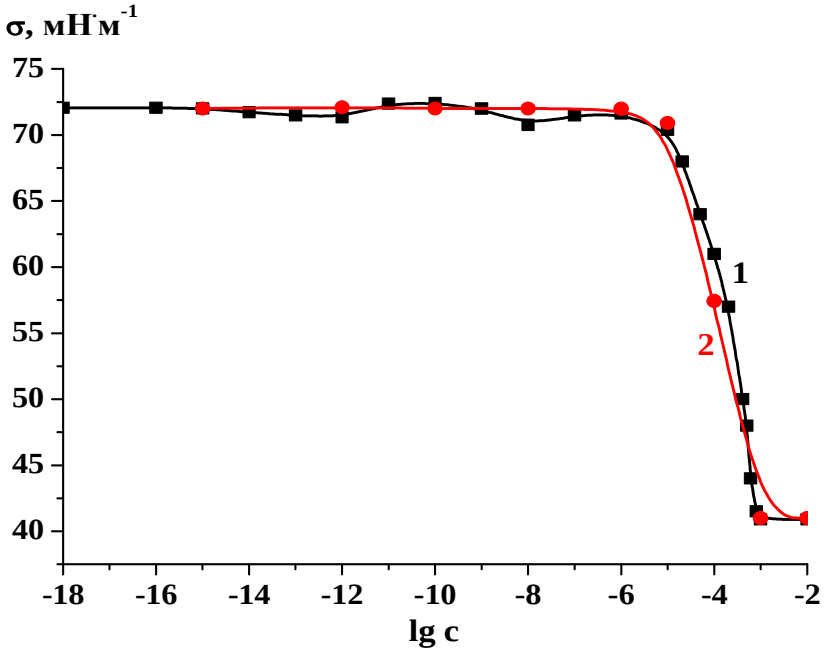
Cetyltrimethylammonium bromide (CTAB)



Laboratory table		CTAB	Permalloy container	
	+65 mV	10^{-2}		+15 mV
	+20 mV	10^{-4}		+4 mV
	0 mV	10^{-5}		+4.2 mV
	-8 mV	10^{-6}		0







CTAB

1-Laboratory table

2-Permalloy container

IN PERMALLOY CONTAINER
THERE OBSERVES
THE TRANSFORMATION OF

«NON-CLASSIC BEHAVIOR»

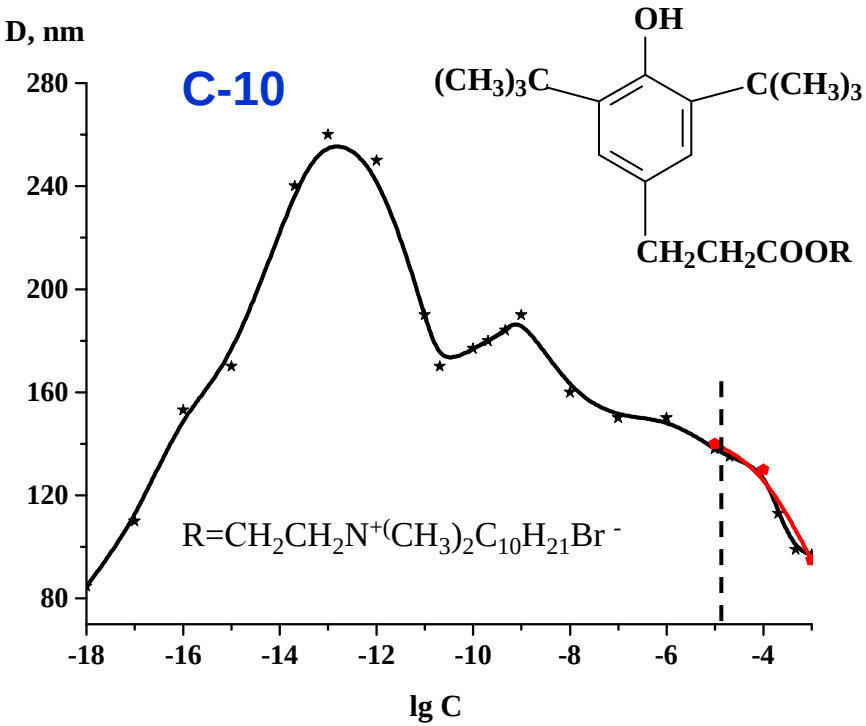
IN

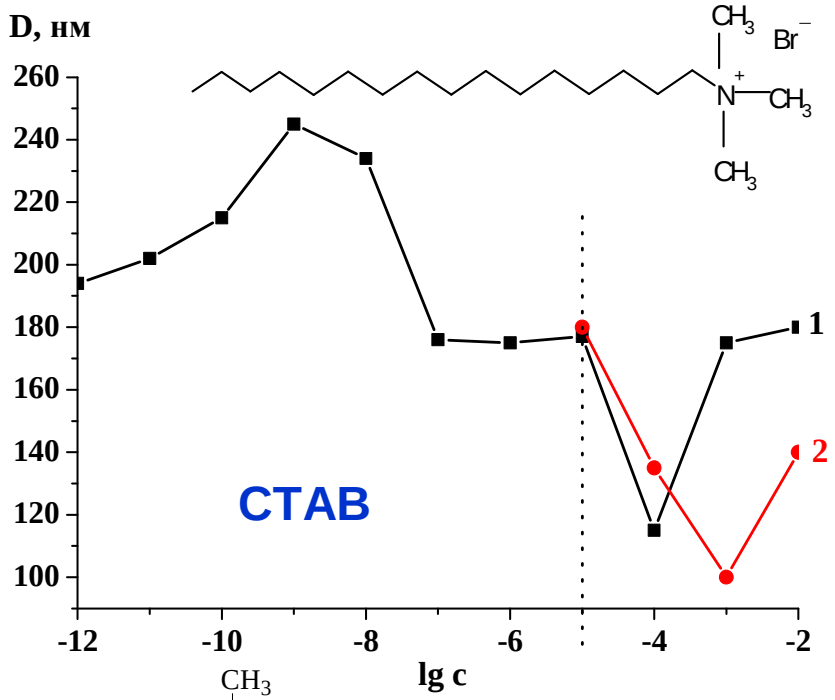
«CLASSIC BEHAVIOR»

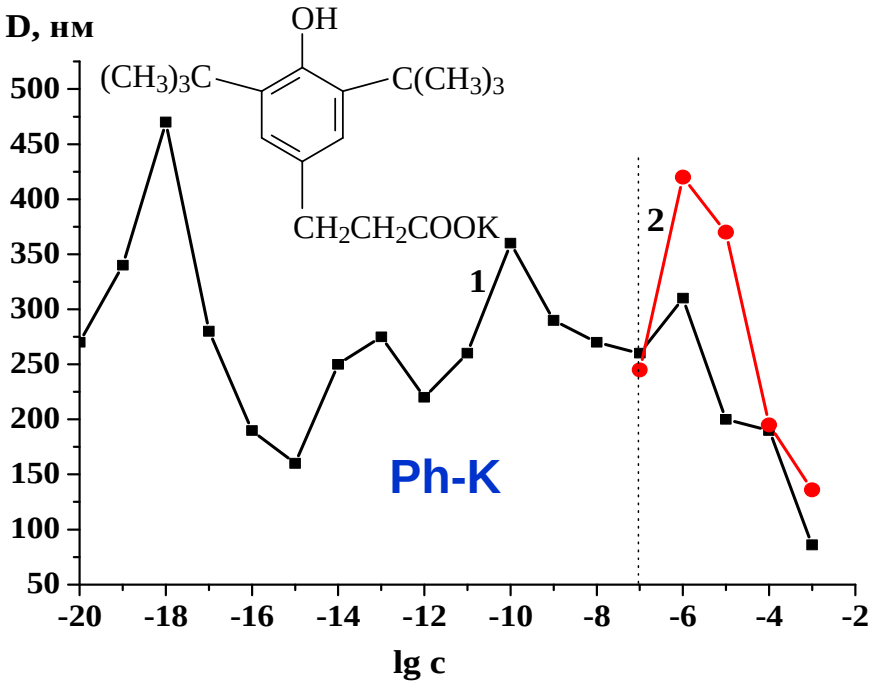
NO EM FIELDS

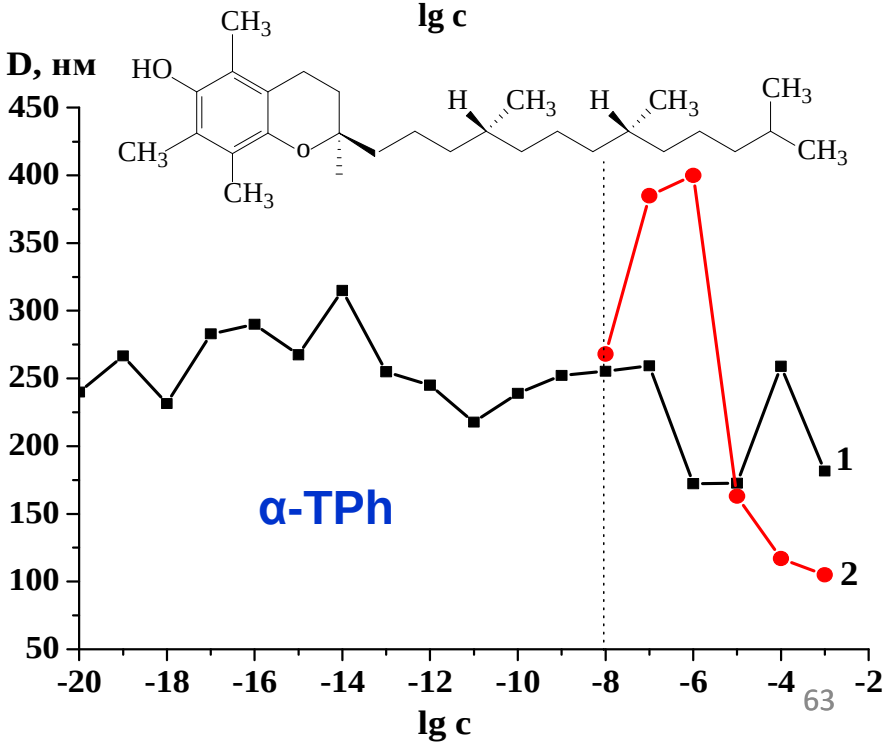
NO NANOASSOCIATES

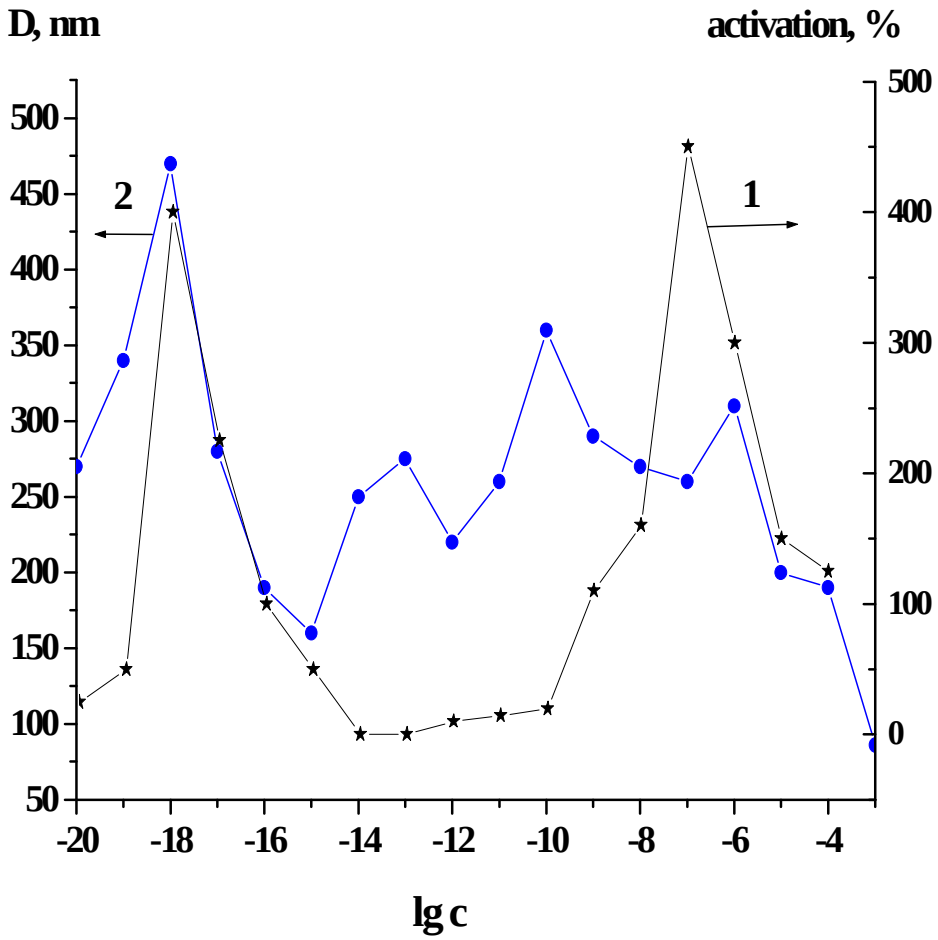
NO «NON-CLASSIC BEHAVIOR»

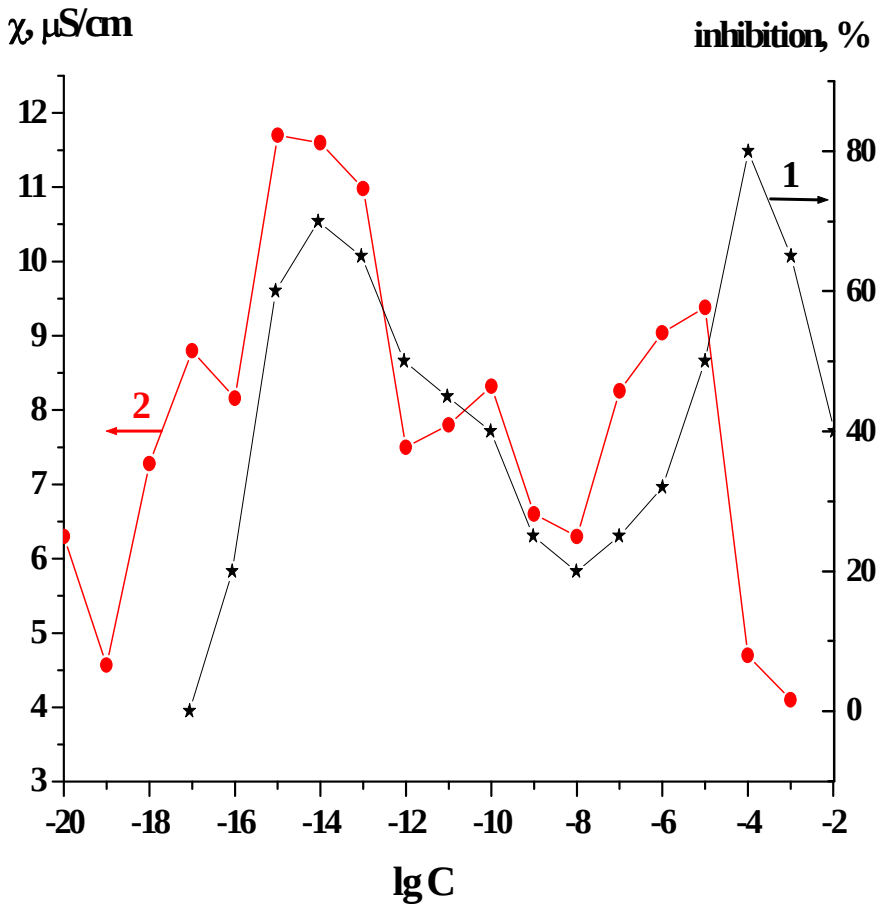

D, nm
C-10
OH
(CH3)3C
C(CH3)3
CH2CH2COOR
R=CH2CH2N+(CH3)2C10H21Br -
lg C


D, нм
CTAB
CH3
Br−
N+
1
2
lg c


D, нм
OH
(CH3)3C
C(CH3)3
CH2CH2COOK
Ph-K
1
2
lg c


D, нм
HO
CH3
H
α-TPh
1
2
lg c


D, nm
activation, %
2
1
lg c


χ, μS/cm
inhibition, %
2
1
lg C

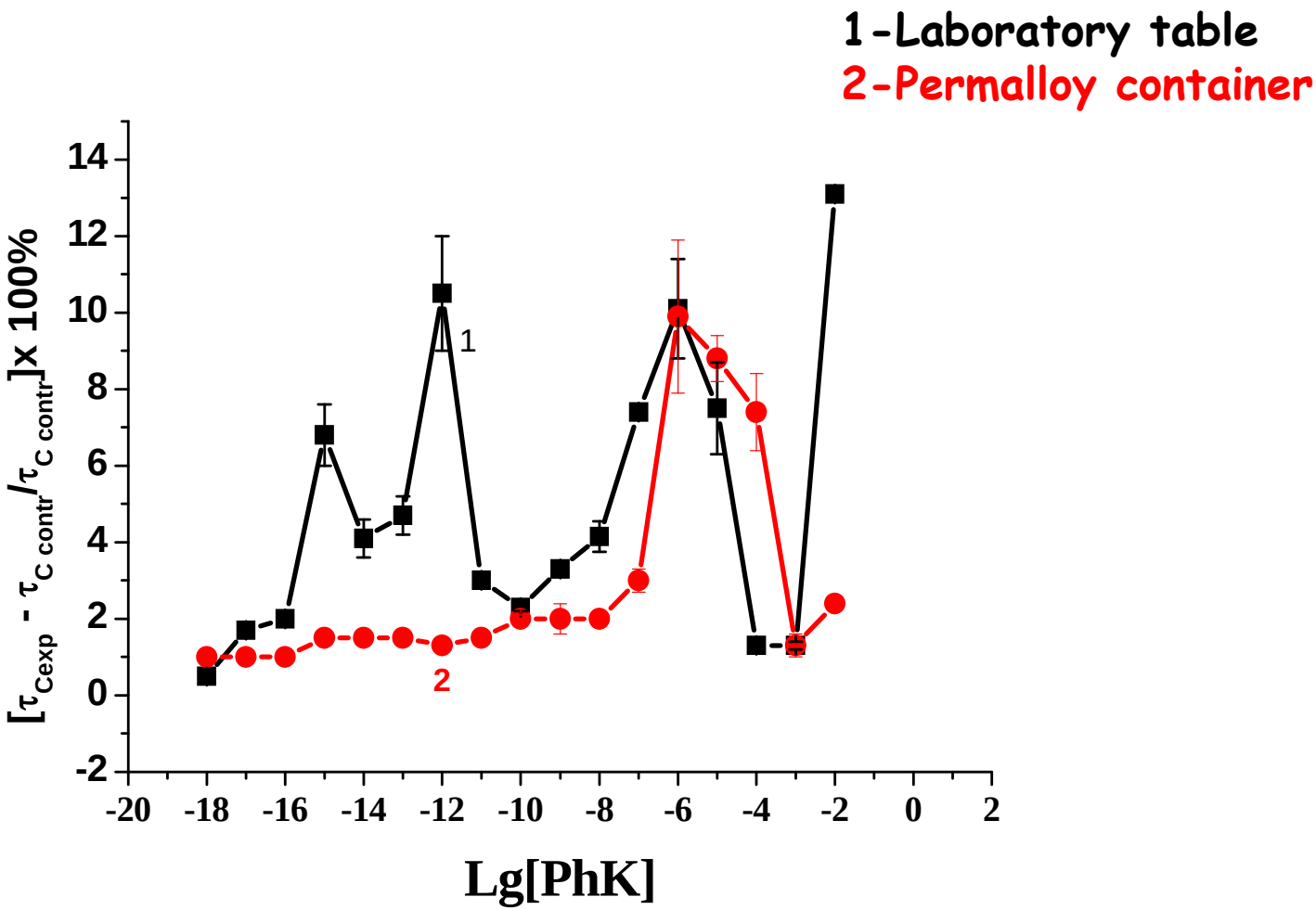
NO EM FIELDS

NO NANOASSOCIATES

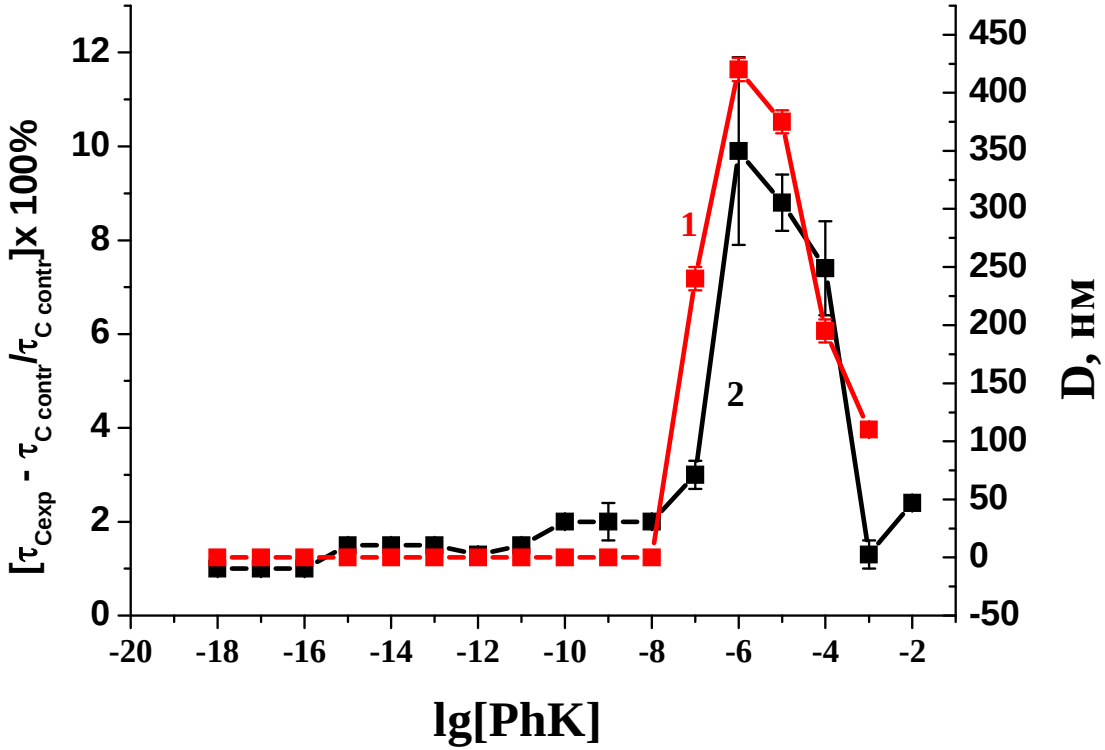
NO BIOEFFECTS

N.PALMINA AND CO-WORKERS

BIOEFFECT OF POTASSIUM PHENOSAN



Концентрационная зависимость изменения микровязкости липидной компоненты синаптосом головного мозга мышей, фиксируемой методом ЭПР с помощью стабильного свободного радикала 16-доксилстеариновой кислоты, нитроксильный фрагмент которой локализован на глубине 22-26 Ao, под действием синтетического антиоксиданта фенозана калия.

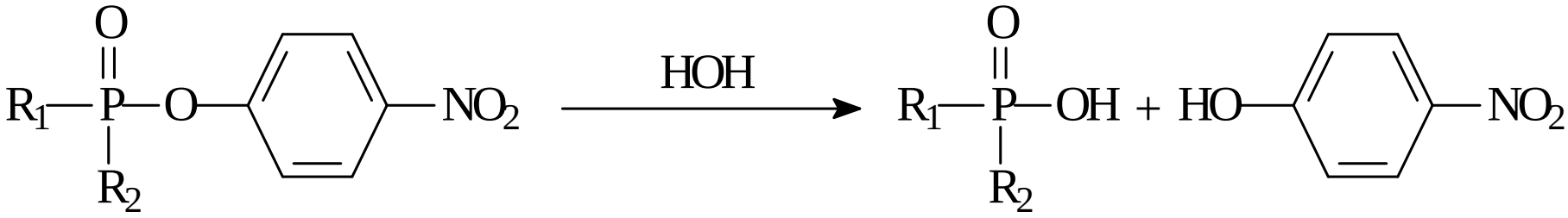


Изменение микровязкости липидов синаптосом в области локализации зонда С -16 (кривая 1) и диаметра наноассоциатов ФК (кривая 2) в растворе в случае использования контейнера.

NO EM FIELDS

NO NANOASSOCIATES

NO BIOEFFECTS



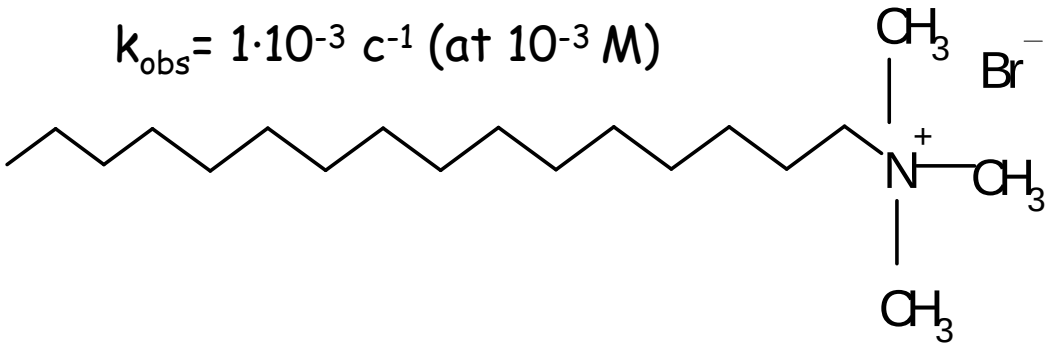
$R_1=R_2=OC_6H_5$

4-nitrophenyldiphenoxiphosphat

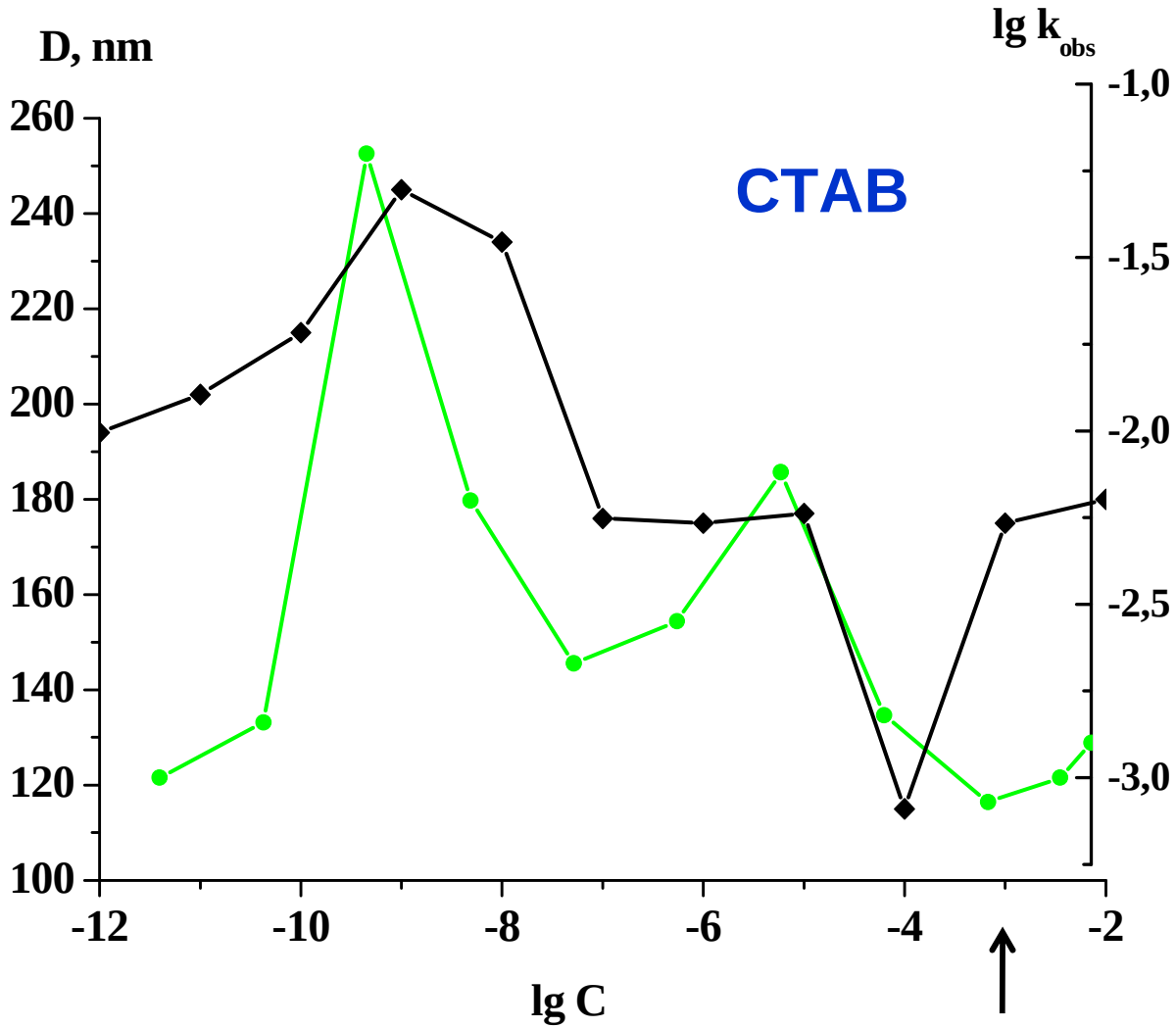
pH=8, 25 º C

MICELLAR CATALYSIS OF CTAB

k_{obs}= 1·10^{-3} c^{-1} (at 10^{-3} M)



Laboratory table

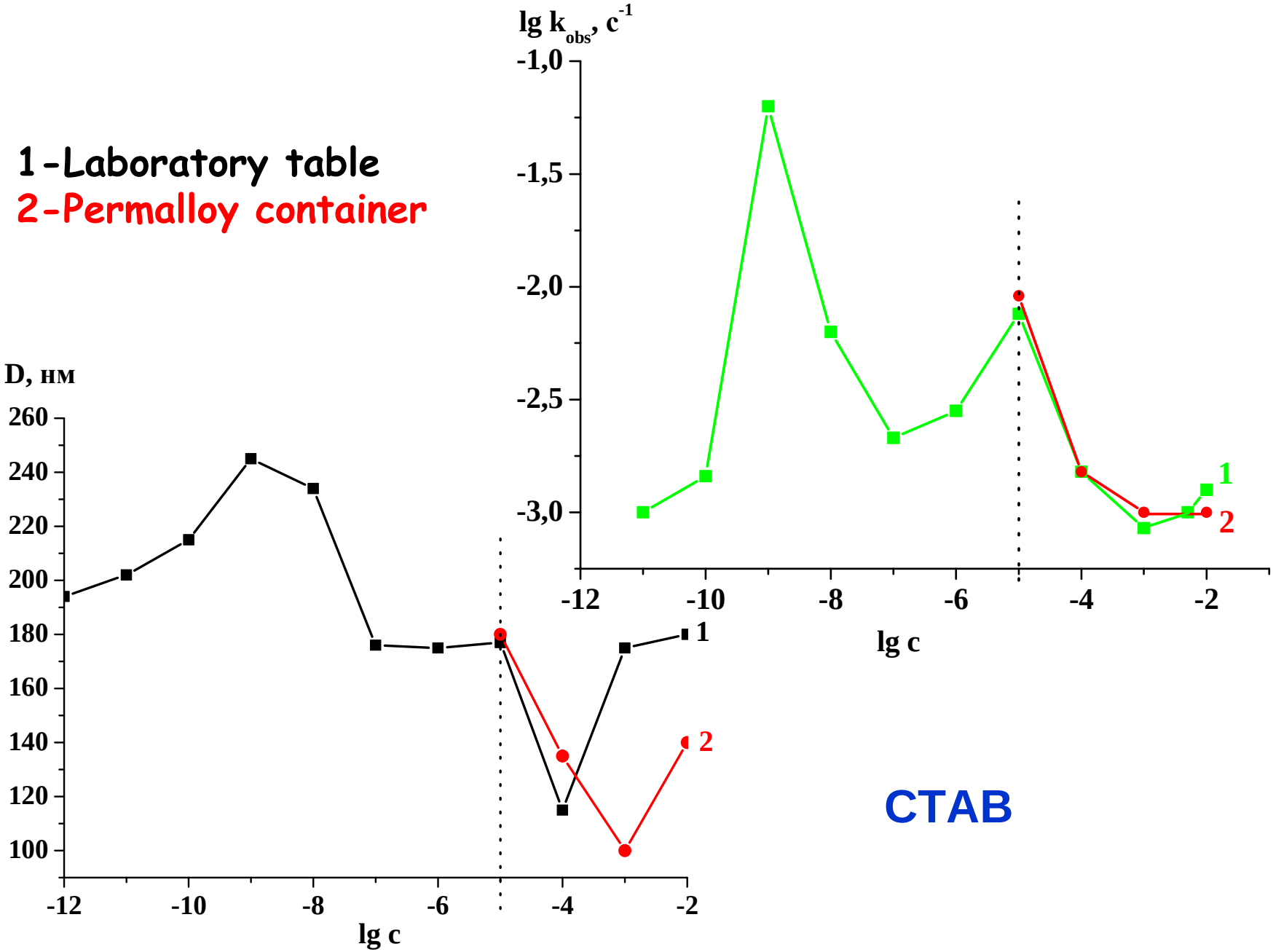


k_{obs}= 60·10^{-3} c^{-1} (at 10^{-9} M)

k_{obs}= 1·10^{-3} c^{-1} (at 10^{-3} M)

1-Laboratory table

2-Permalloy container



CTAB

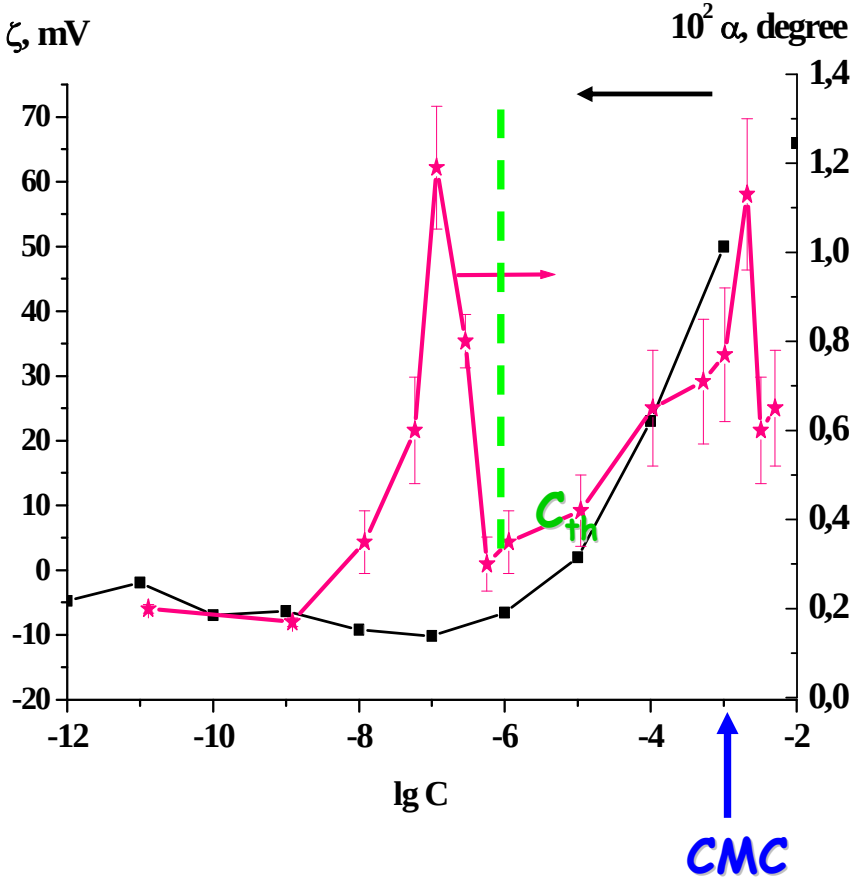
NO EM FIELDS

NO NANOASSOCIATES

NO CATALYTIC EFFECT

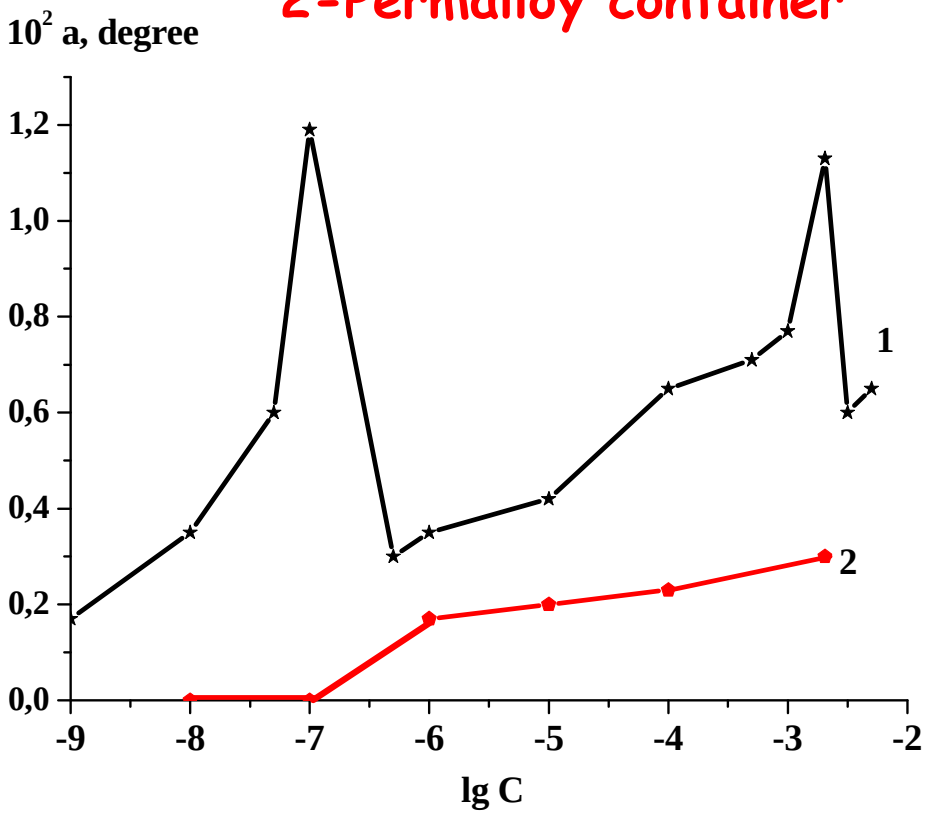
Optical activity (α) of CTAB solutions

Perkin Elmer 341
α^{30}_{D}, *l=0.56 dm*



Max ζ- potential at 10^{-7} M = -10 mV

1-Laboratory table
2-Permalloy container



A.I. Rusanov, et al // Langmuir, 2010, 26(17), 13767–13769.

NO EM FIELDS

NO NANOASSOCIATES

NO OPTICAL ACTIVITY

FORMATION OF NANOASSOCIATES IS THE KEY TO UNDERSTSNDING OF THE BEHAVIOR OF HIGH DILUTED AQUEOUS SOLUTIONS

WHAT IS THE COMPOSITION OF NANOASSOCIATES?

ESTIMATIONS SHOW, THAT AMOUNTS OF SOLUTES ARE DEFICIENT IN ORDER TO FORM NANOENTITIES OF SIZE OBSERVED

MAIN PART OF NANOASSOCIATES ARE WATER MOLECULES

100 nm SIZE CORRESPONDS TO 6 – 8 MILLIONS OF WATER MOLECULES

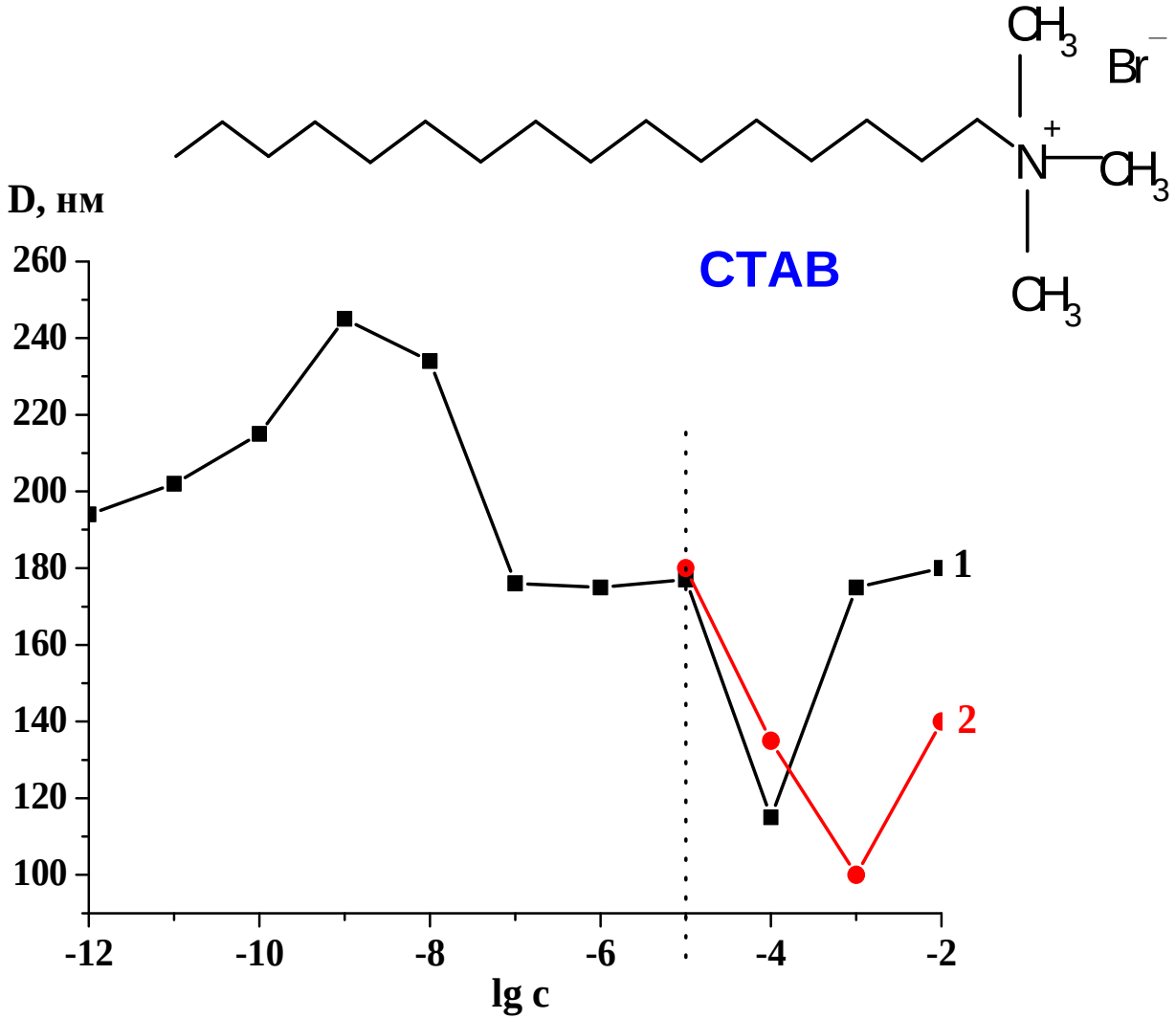
WHAT IS THE NATURE OF NANOASSOCIATES?

WHAT ARE FORCES WHICH KEEP TOGETHER MILLIONS OF MOLECULES?

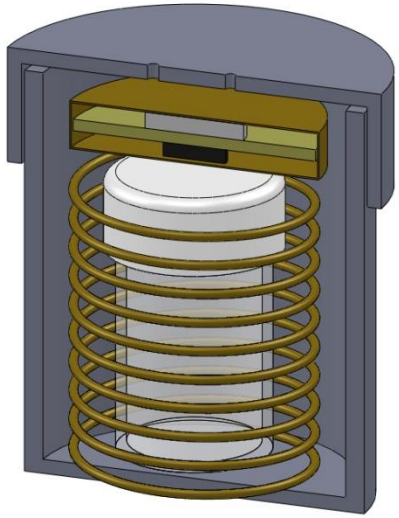
IS IT KNOWN OR IT IS UNKNOWN BEFORE STATE OF MATTER, WHICH IS REALIZED UNDER THE INFLUENCE OF SOLUTES AND EM FIELDS

AT THE LEAST IN THE HIGH DILUTED AQUEOUS SOLUTIONS?

EMF

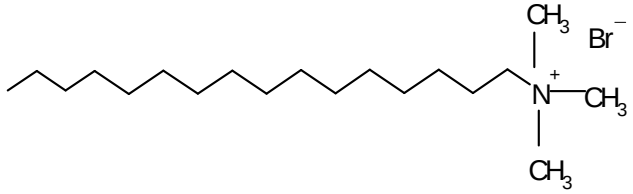

CH3
Br−
+
N
CH3
CH3
CTAB
D, нм
260
240
220
200
180
160
140
120
100
-12
-10
-8
-6
-4
-2
lg c
1
2

7 Hz

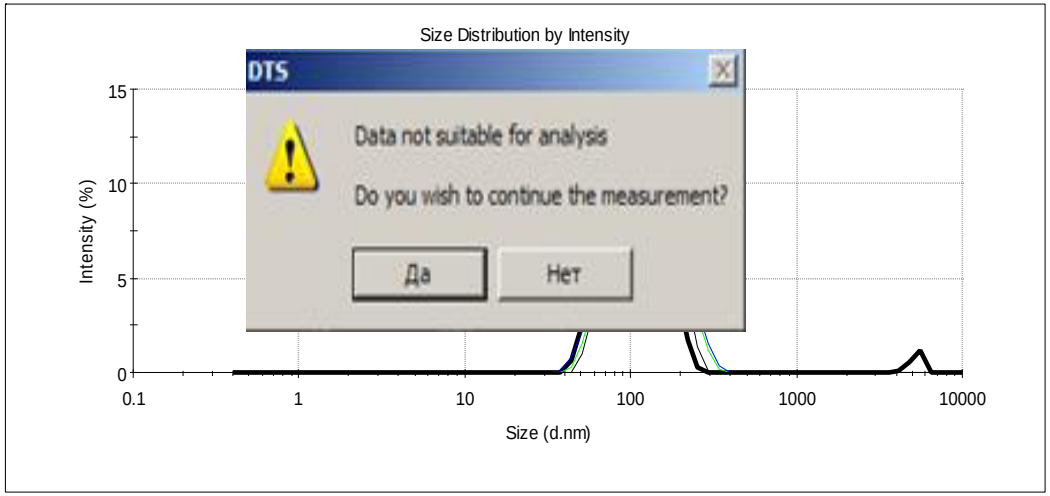


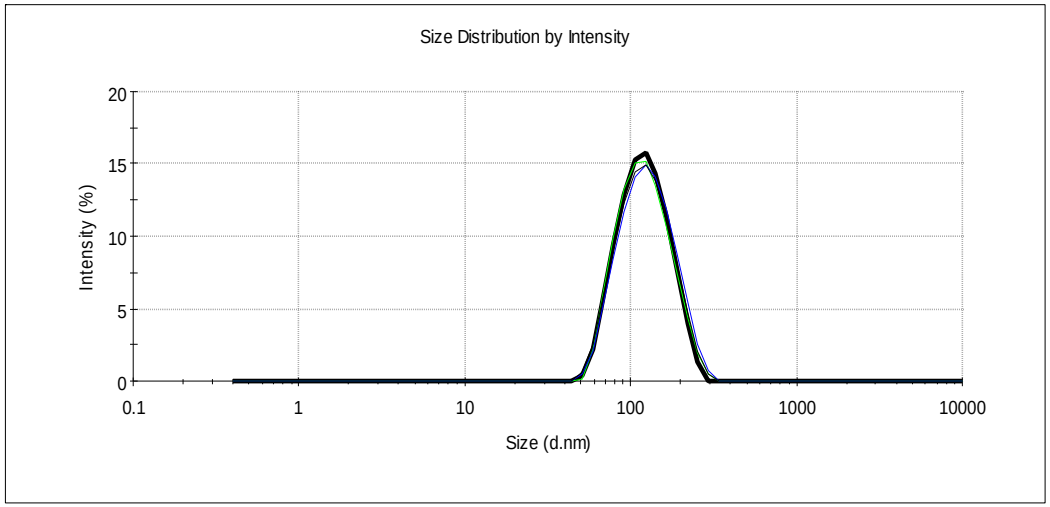
Permalloy container

Laboratory table



CTAB 10^{-9} M





In 2010 L. Montagnier and E. Del Giudice with co-workers

expressed the opinion that good candidates as environmental EM fields, under influence of which coherent domains in water can be formed, may be the Schumann modes of the geomagnetic field.

They are 7.83, 14.3, 20.8, 27.3, 33.8 Hz.

«Effect of ultra-low concentration and electromagnetic fields» was observed. It consists in formation of nano-sized (D up to 400 nm, ζ up to -20 mV) entities («nano-associates») in high-diluted water solutions UNDER INFLUENCE OF SOLUTES and EXTERNAL ELECTROMAGNETIC FIELDS. The main part of such «nano-associates» is water. There are substances either able or not able to develop this effect.

CONCLUSION

It was realized

At the first time complex physicochemical study of high diluted aqueous solutions.

It was shown

High diluted aqueous solutions are qualitatively new specific region of solution.

It was discovered

The unknown before phenomenon: the formation of nano-sized entities («nanoassociates») in high diluted aqueous solutions under the influence of solutes and environmental electromagnetic fields («the effect of ultra-low concentrations and electromagnetic fields»)

It was established

The formation of «nanoassociates» determines properties of high diluted aqueous solutions

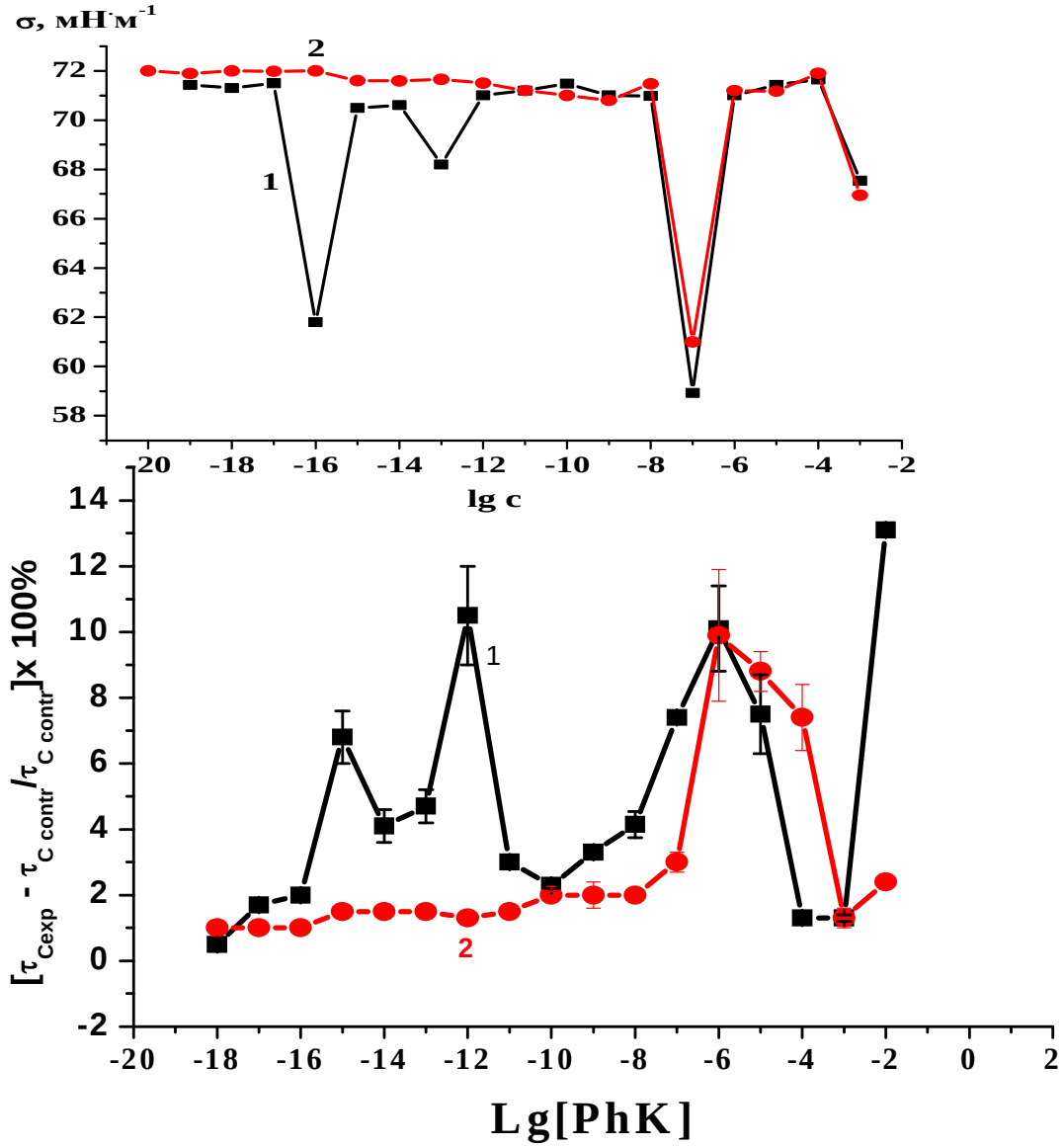
PREDICTION OF BIO-EFFECTS IN HIGH DILUTED SOLUTIONS

ON THE BASIS OF PHYSICOCHEMICAL INVESTIGATIONS OF SOLUTIONS

«classic behavior» - NO BIOEFFECTS

«non-classic behavior» - BIOEFFECTS IS POSSIBLE

PHENOZAN POTASSIUM



TOOK ACTIVE PART IN THE WORK

Ph.D. Murtazina L.I.

Dr.Sci. Ryzhkina I.S.

Kiseleva Ju.V.

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Thank you for your kind attention!

Publications

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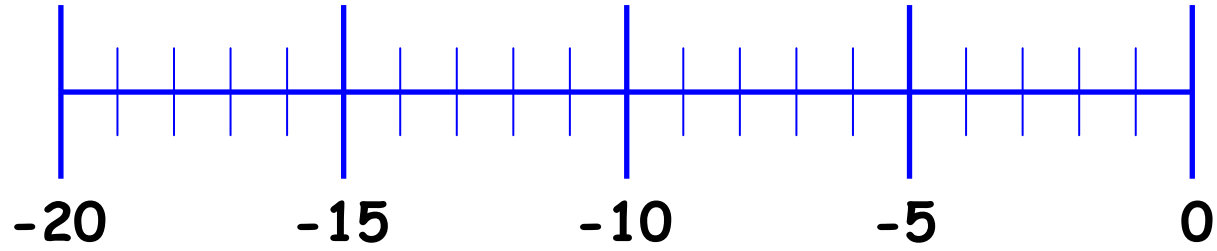
2. Доклады академии наук, 2009, том 429, № 1, С. 128-131.	Doklady Biochemistry and Biophysics, 2009, Vol. 429, pp. 301–304.
3. Доклады академии наук, 2009, том 428, № 4, с. 487–491	Doklady Physical Chemistry, 2009, Vol. 428, Part 2, pp. 196–200.
4. Доклады академии наук, 2009, том 428, № 5, с. 628–632.	Doklady Physical Chemistry, 2009, Vol. 428, Part 2, pp. 201–205.
5. Доклады академии наук, 2010, том 433, № 5, с. 647–651.	Doklady Physical Chemistry, 2010, Vol. 433, Part 2, pp. 142–146.
6. Доклады академии наук, 2011, том 438, № 2, с. 207-211.	Doklady Physical Chemistry, 2011, Vol. 438, Part 1, pp. 98–102.
7. Доклады академии наук, 2011, том 438, № 5, С. 635–639.	Doklady Physical Chemistry, 2011, Vol. 438, Part 2, pp. 109–113.
8. Mendeleev Commun. -2010. -№ 20.- С. 148-150.	
9. Chemical Physics Letters.-2011.-V.511.-P.247-250.	
10. Доклады академии наук, 2011, том 440, №6, С.778-781.	Doklady Physical Chemistry, 2011, Vol. 440, Part 2, pp. 201–204.
11. Доклады академии наук, 2011, том 440, №1, С.59-63.	Doklady Physical Chemistry, 2011, Vol. 440, Part 1, pp. 157–161.



lg C (C mol/L)

$6 \cdot 10^{3}$	$6 \cdot 10^{8}$	$6 \cdot 10^{13}$	$6 \cdot 10^{18}$	$6 \cdot 10^{23}$	number of molecules in a liter
6	$6 \cdot 10^{5}$	$6 \cdot 10^{10}$	$6 \cdot 10^{15}$	$6 \cdot 10^{20}$	number of molecules in a milliliter

In 2010 L. Montagnier and E. Del Giudice with co-workers

expressed the opinion that good candidates as environmental EM fields, under influence of which coherent domains in water can be formed, may be the Schumann modes of the geomagnetic field.

They are 7.83, 14.3, 20.8, 27.3, 33.8 Hz.

NaCl

Простые гомеопатические средства назад к списку

А Б В Г Д И К Л М <Н> О П Р С Т У Ф Х Ц
A B C D F G H I J K L M N O P Q R S T U V Z

Натриум хлоратум / Natrium chloratum

Основные лекарственные формы.Гомеопатические гранулы D3, C3, C6, C12 и выше. Капли D3, C3, C6, C12 и выше.

Показания к применению. Хронические воспалительные заболевания желудка, толстого кишечника, дыхательных путей. Воспаление глаз. Катаракта. Гонорея. При нарушении функции нервной системы и кровообращения.

www.mhc.ru

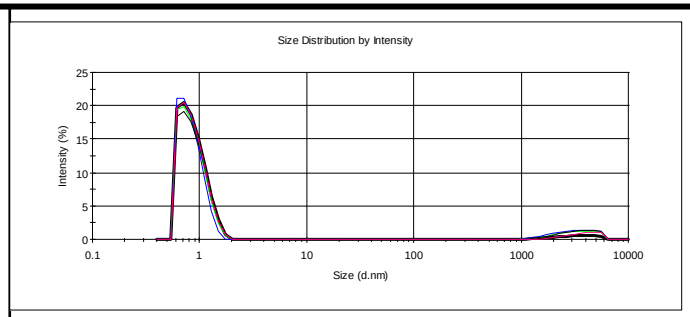
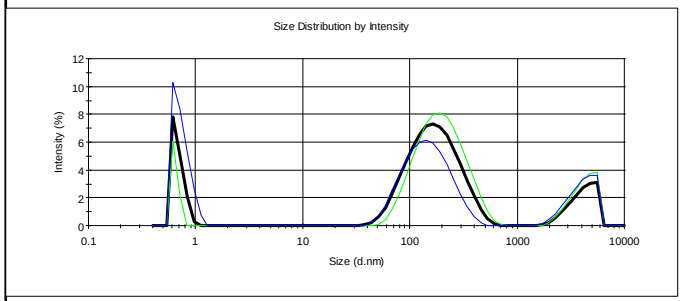
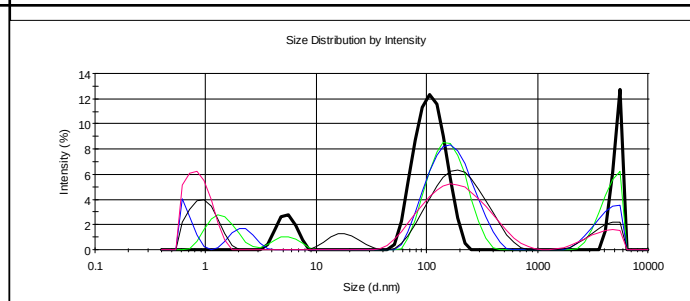
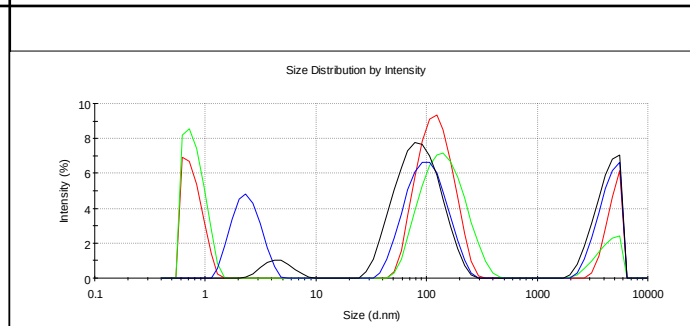
10% - 1%

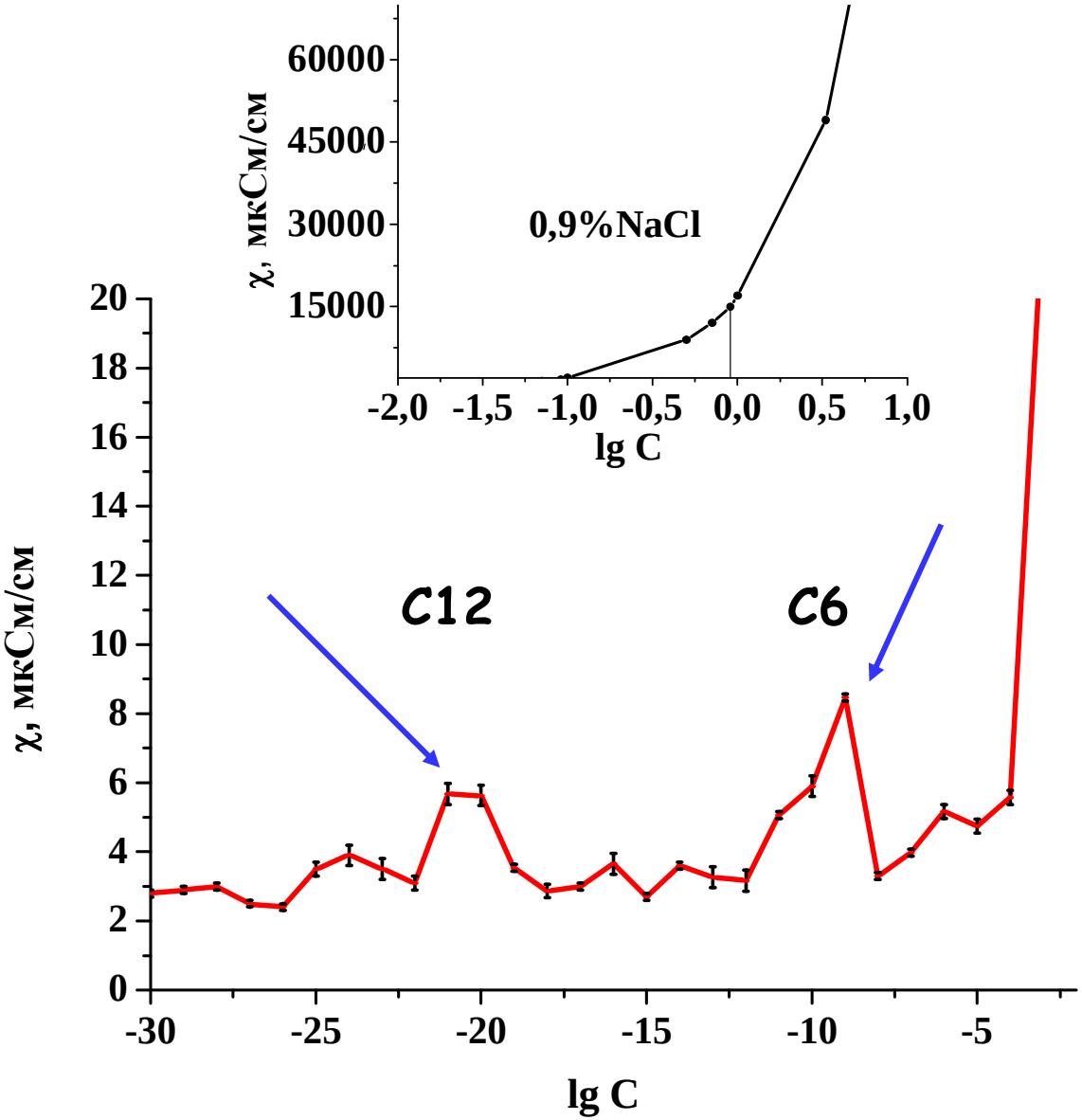
0.9%-физ. раствор

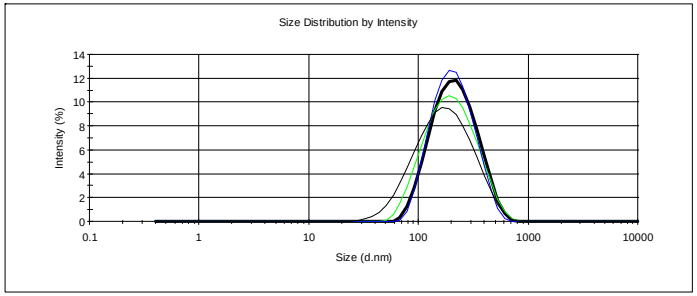
0.8% - 10^{-30} %

C6-?

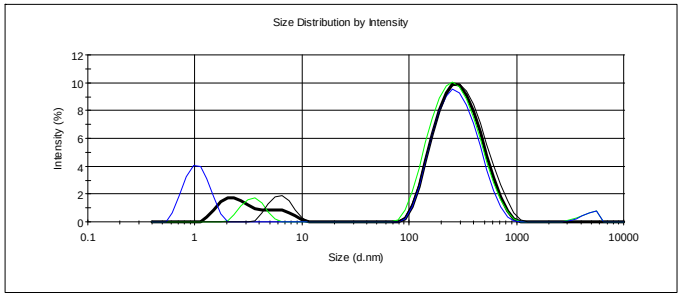
C12-?

10%	
0.9% (физ. р-р)	
10^{-4}%	
10^{-10}%	





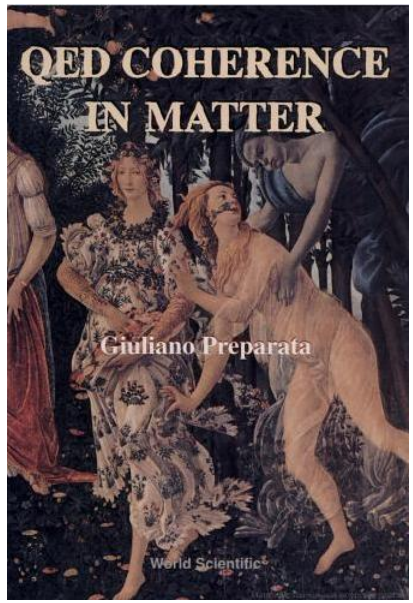
C6 Ξ 10^{-9} об.%



C12 Ξ 10^{-21} об.%

QFT QED

G.Preparata, E.Del Guidice



G.Preparata, 1995,QED Coherence In Matter, World Scientific Publiching , Singapure

E.Del Guidice et al, 1995-2010, >10 publications

E.Del Guidice et al, Water, 2010,*2*,566

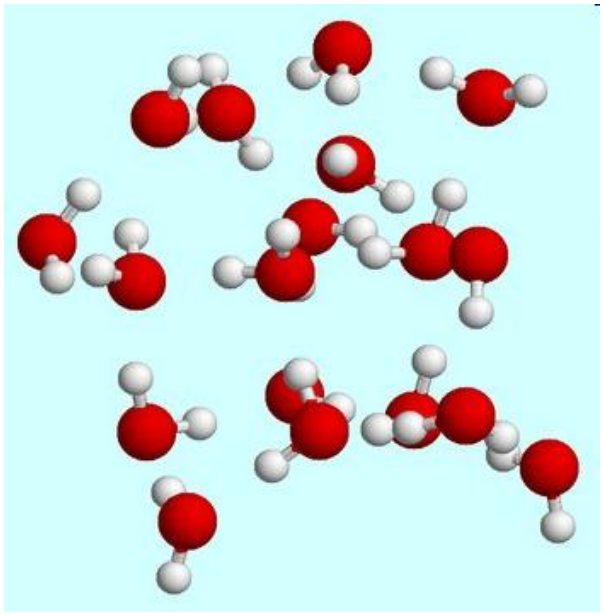
N. Marchettini, E.Del Giudice, V. Voeikov, E. Tiezzi/ Journal of Theoretical Biology, 2010, 265, 511-516.

L.Montagnier, E.Del Guidice et al, arXiv:1012.5166vl[q-bio.OT] 23 Dec 2010

Образование когерентных доменов (CD)

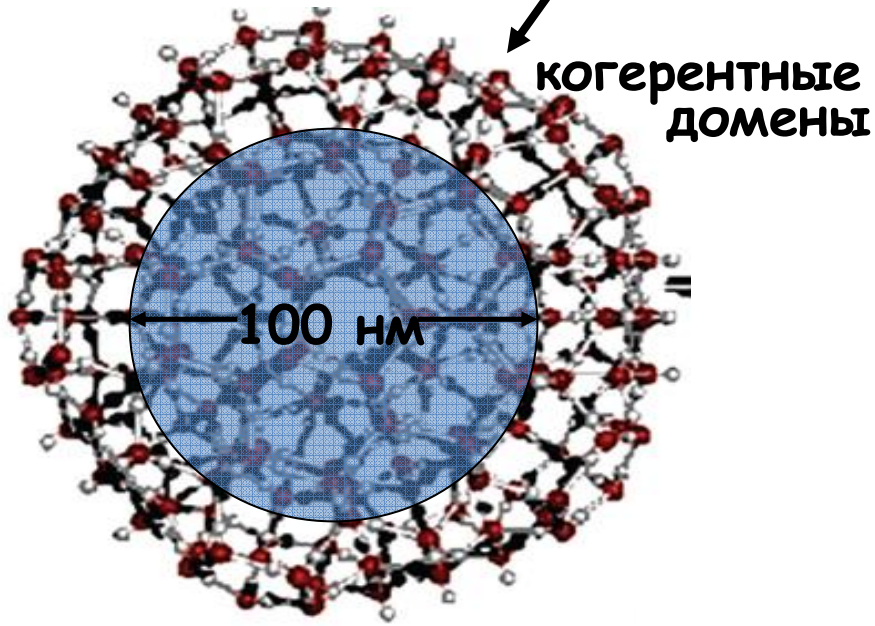
жидкая вода

	некогерентная	когерентная
0°C	50%	50%
30°C	60%	40%

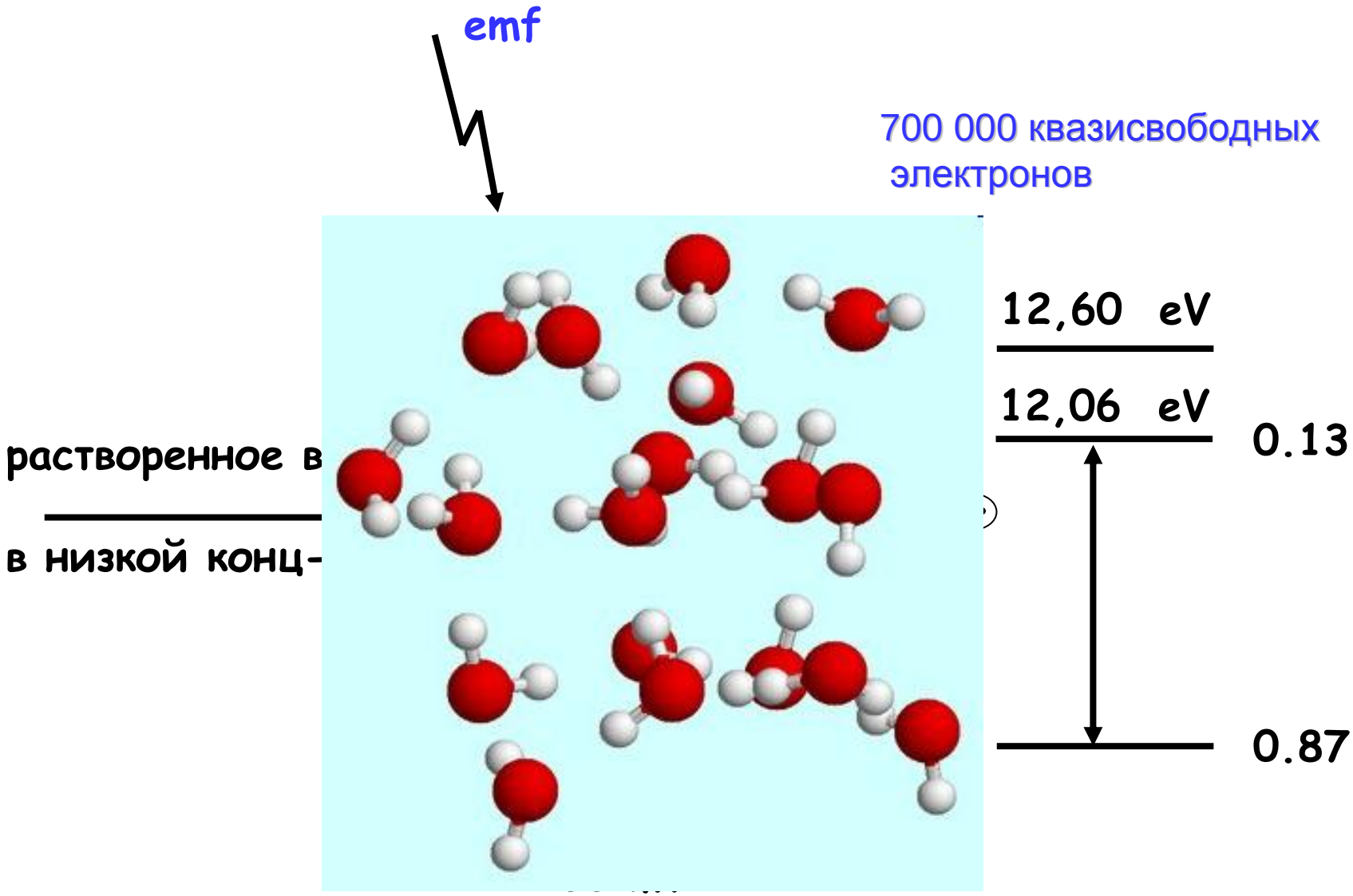


тепловое

движение

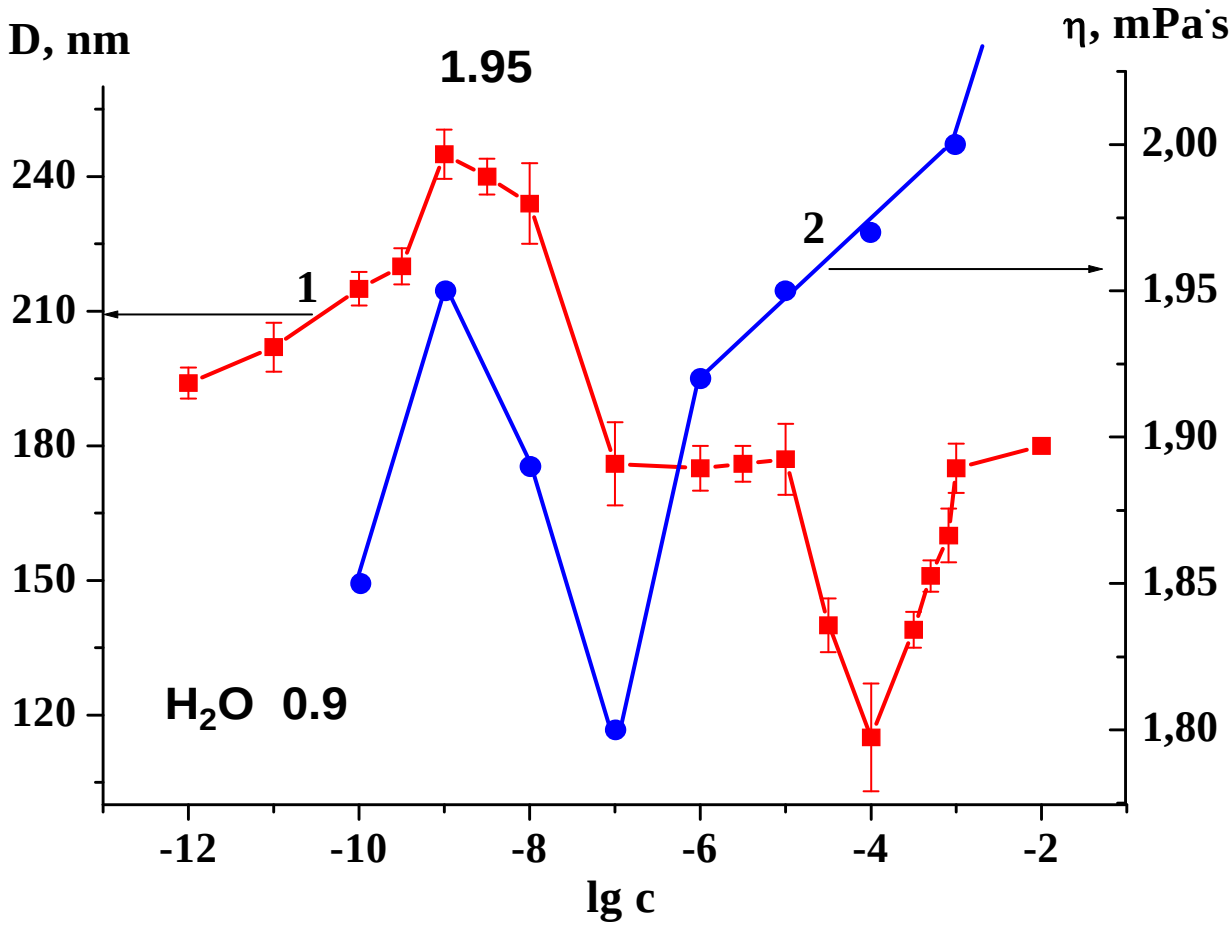


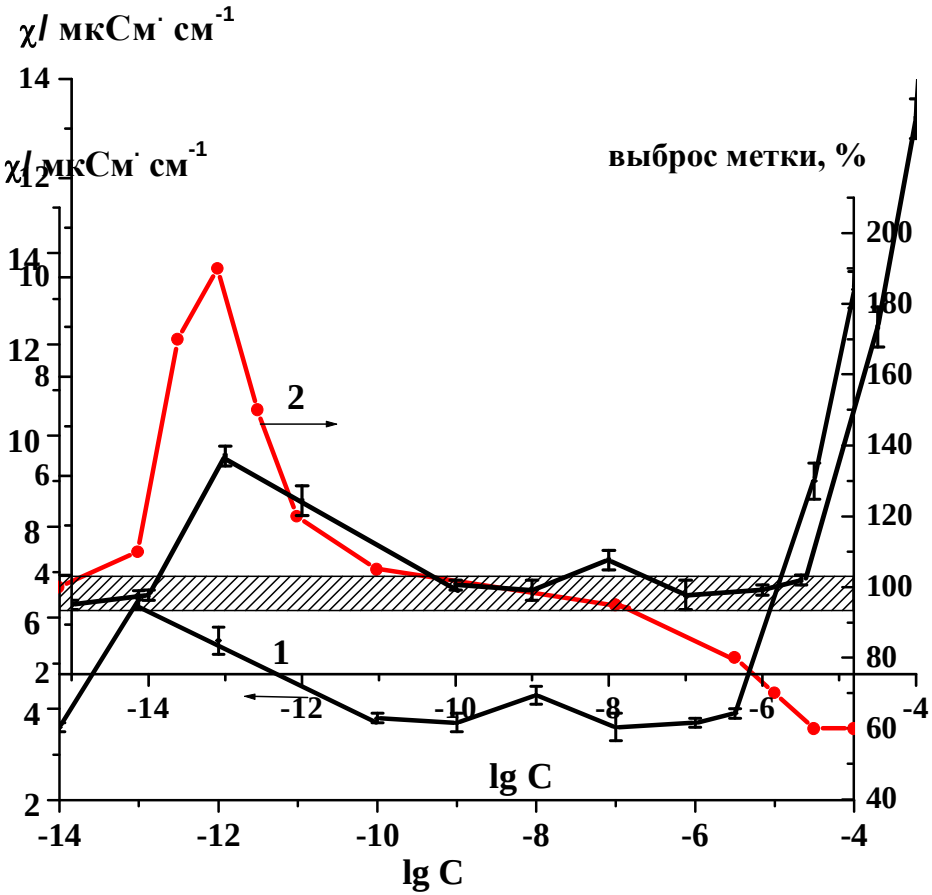
≈ 5,5 млн. молекул



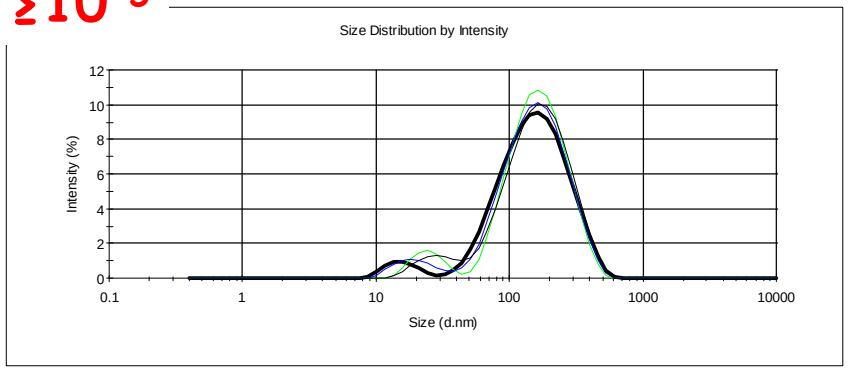
Кандидат в природные источники emf – шумановские моды геомагнитного поля Земли 7,83, 14,3, 20,8, 27,3, 33,8 Гц.

CTAB

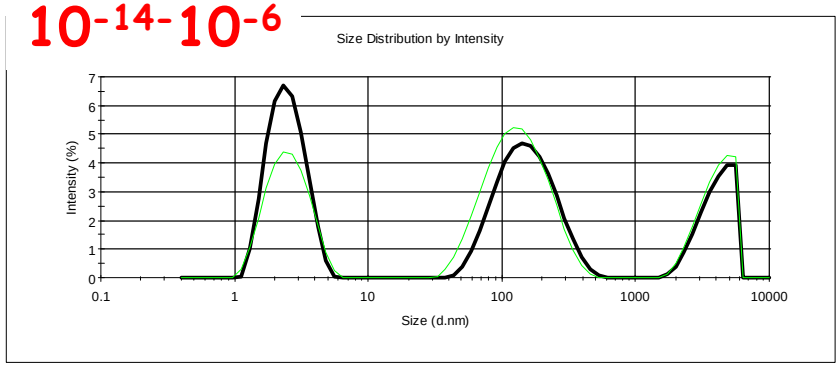

D, nm
η, mPa·s
1.95
240
210
180
150
120
2,00
1,95
1,90
1,85
1,80
1
2
H2O 0.9
-12
-10
-8
-6
-4
-2
lg c



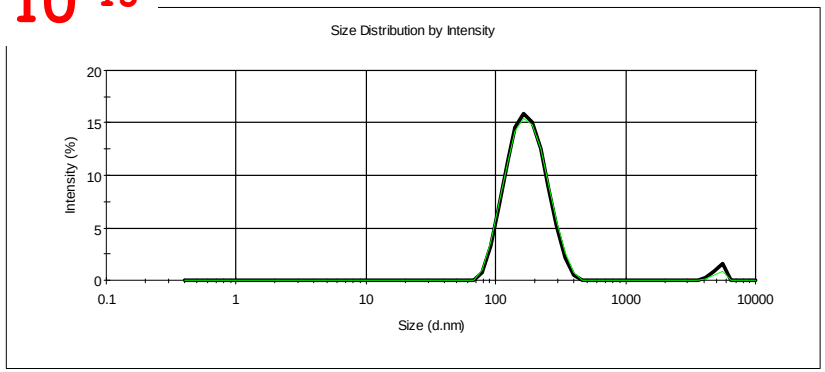
≥10-5



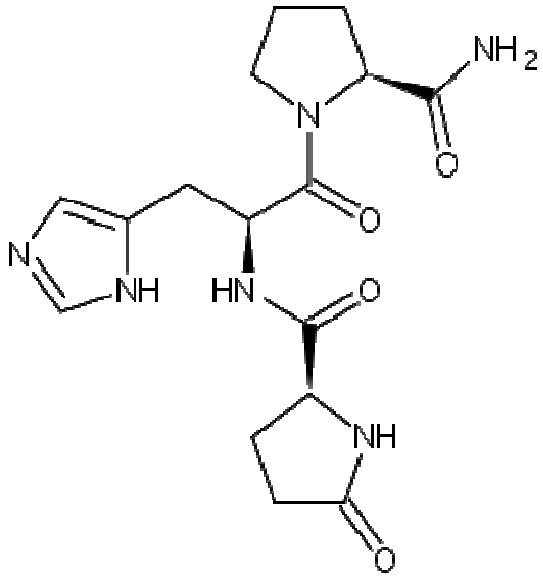
10-14-10-6



10-13



Thyrotropin-Releasing Hormone – (тиреотропин-рилизинг-гормон)



ТРГ является нейропептидом, принимающим участие в регуляции некоторых психических функций.

10^{-10} – 10^{-9} М – присутствует в организме

10^{-18} – 10^{-10} М – изменяет сократительную активность лимфатических сосудов, оказывает антиэпилептическое действие. (И.П. Ашмарин и сотруд.)

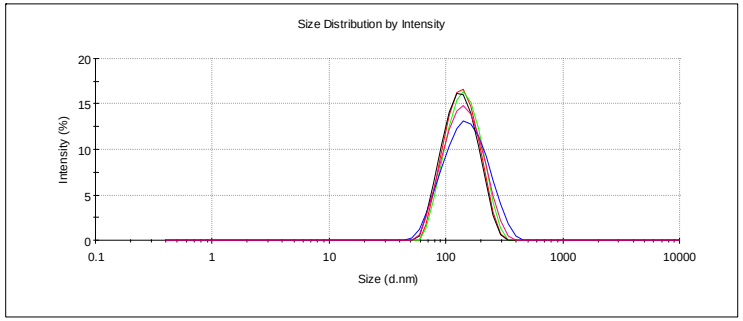
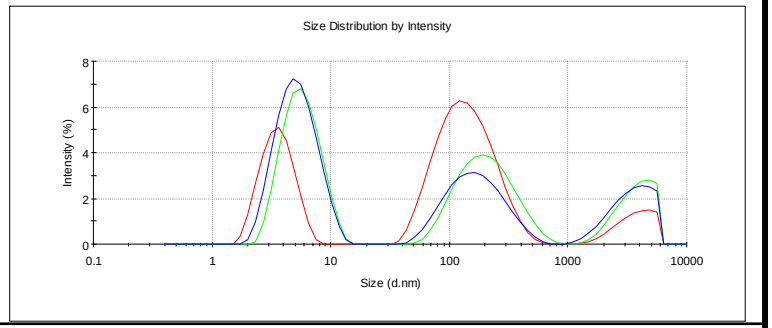
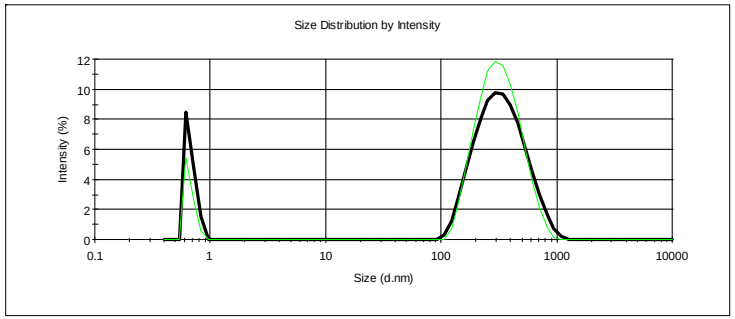
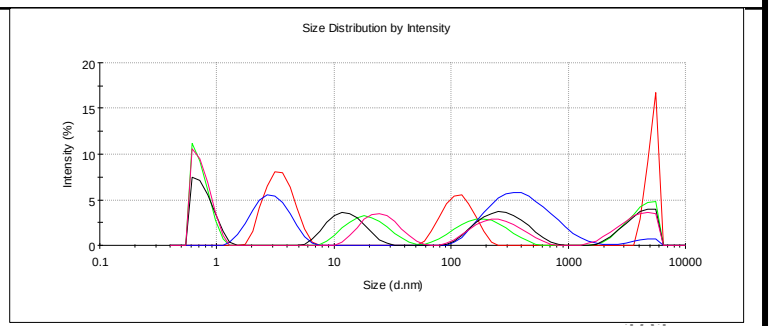
10^{-4} – 10^{-3} М – усиливает судороги

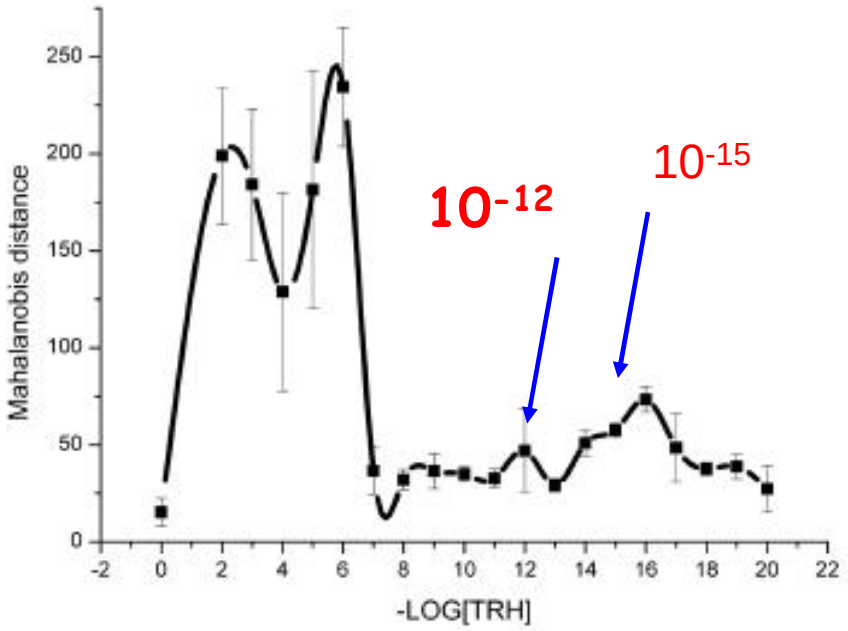
Ashmarin I.P., Asanova L.M., Abbasova K.R at al. Neuropeptide thyroliberin in ultralow doses – anticonvulsant defense of brain//Radiazionnaya biologiya. Radioecologiya - 2003. – V.43 – P. 324-328

10^{-2}-10^{-4}

10^{-5}, 10^{-11}

10^{-6}-10^{-14}

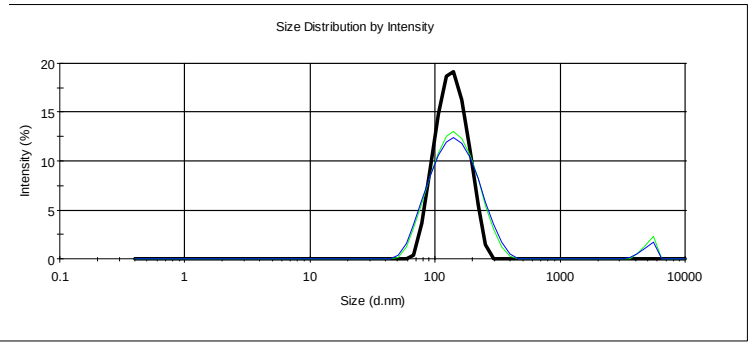
10^{-3}	
10^{-5}	
10^{-9}	
10^{-16}	



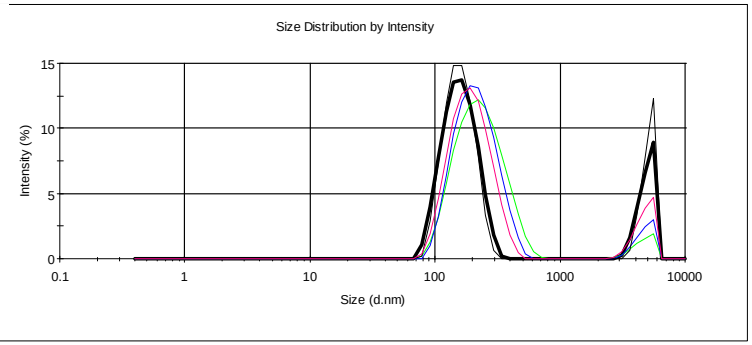
Влияние растворов ТРГ на колебания ИК-спектр воды. В качестве количественной оценки приведен критерий Махаланобиса.

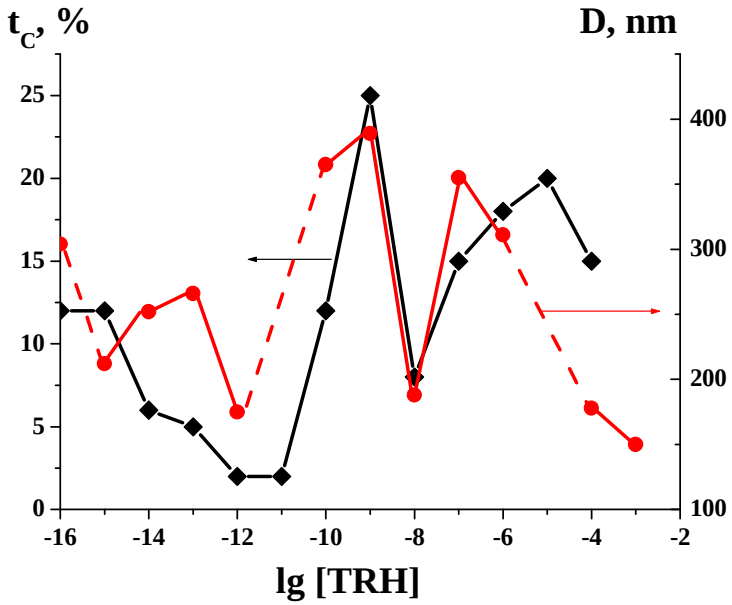
Zhernovkov V.E., Roshchina I.A., Zubareva G.M., Shmatov G.P., Lokshin B.V., Palmina, N.P. // Water. 2010. V.2. P. 58-68.

10-12



10-15





Зависимость размеров наноассоциатов водных растворов ТРГ (1) и микровязкости плазматических мембран клеток печени (в % по отношению к контролю) (2) от концентрации.