CONVERSION OF I_2 IN IONIC FORMS ON THE COMPOSITE MATERIALS "FIZKHIMIN"™ IN WATER COOLANT AT NUCLEAR POWER PLANTS.

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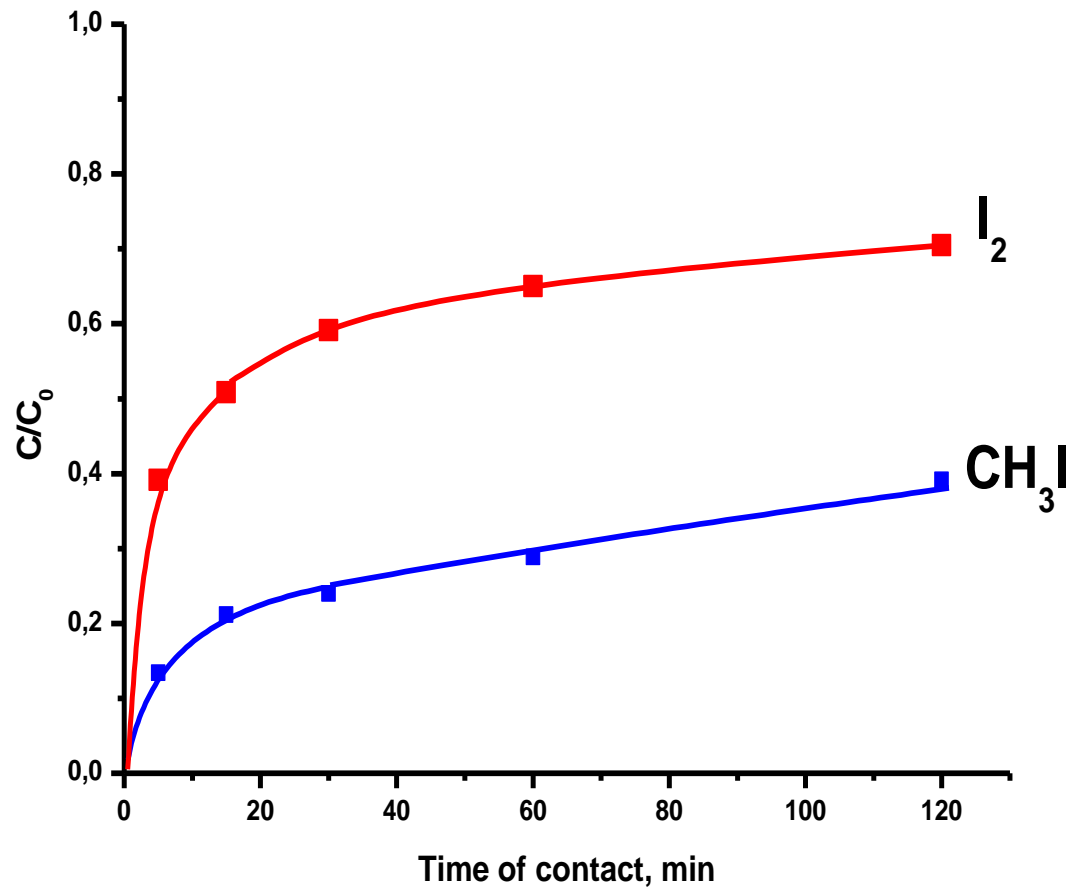**Eng. Igor' A. Rumer**
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I^-, IO_3^-, I_2, CH_3I

Anion- and cation- ion-exchange resins

KU-2 and AV-18

The absorption of I_2 and CH_3I on anion-exchange resin AV-18 from the water coolant of WWER-type NPPs*

* The water coolant of the WWER-type NPPs:
[NaCl] = 1.17 mg/dm³; [NH_4Cl] = 29.96 mg/dm³; [H_3BO_3] = 5 g/dm³; pH 7 - 8.5

Distribution coefficients K_d for I_2 and CH_3I on anion-exchange resin AV-18 from the water coolant of WWER-type NPPs

$(V/m = 100; [CH_3{}^{131}I] = 10^{-5} M; [I_2] = 9 \cdot 10^{-4} M)$

NN	Time of contact between solid and liquid phases	K_d, cm³/g	
		I_2	CH_3I
1	15 min	$103.5 \pm 3,0$	$12.9 \pm 0,6$
2	60 min	$145.1 \pm 4,5$	$30.2 \pm 1,4$
3	120 min	$244.5 \pm 6,1$	$41.9 \pm 1,7$
4	24 h	$>10^3$	$182.7 \pm 3,4$

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Aim of the work is to develop a new effective material to absorb molecular and organic iodine from water solutions

It is desirable to employ materials that are used on working NPPs to coolant decontamination

Ion-exchange resin - **KU-2**

Some characteristics of the new materials based on cation-exchange resin KU-2

Material	Quantity of d-elements on cation-exchange resin KU-2		Colour
	mg/g	% wt.	
IPCE-C1	79.93 81.28	8.0 8.1	brown with metal gloss
IPCE-C2	55.69 54.68	5.6 5.5	brown with metal gloss
IPCE-CS	99.82 103.02	10.0 10.3	grey

IPCE-C1 - about 8.0 wt.% of Cu
IPCE-C2 - about 5.5 wt.% of Cu
IPCE-CS - the total content of metals about 10.0 wt.%
at molar relation Cu : Ag = 4 : 1

Distribution coefficients K_d for $^{131}I^-$, $^{131}IO_3^-$, $CH_3^{131}I$ and I_2 on the modified resin KU-2 from a water coolant of the WWER-type NPPs*
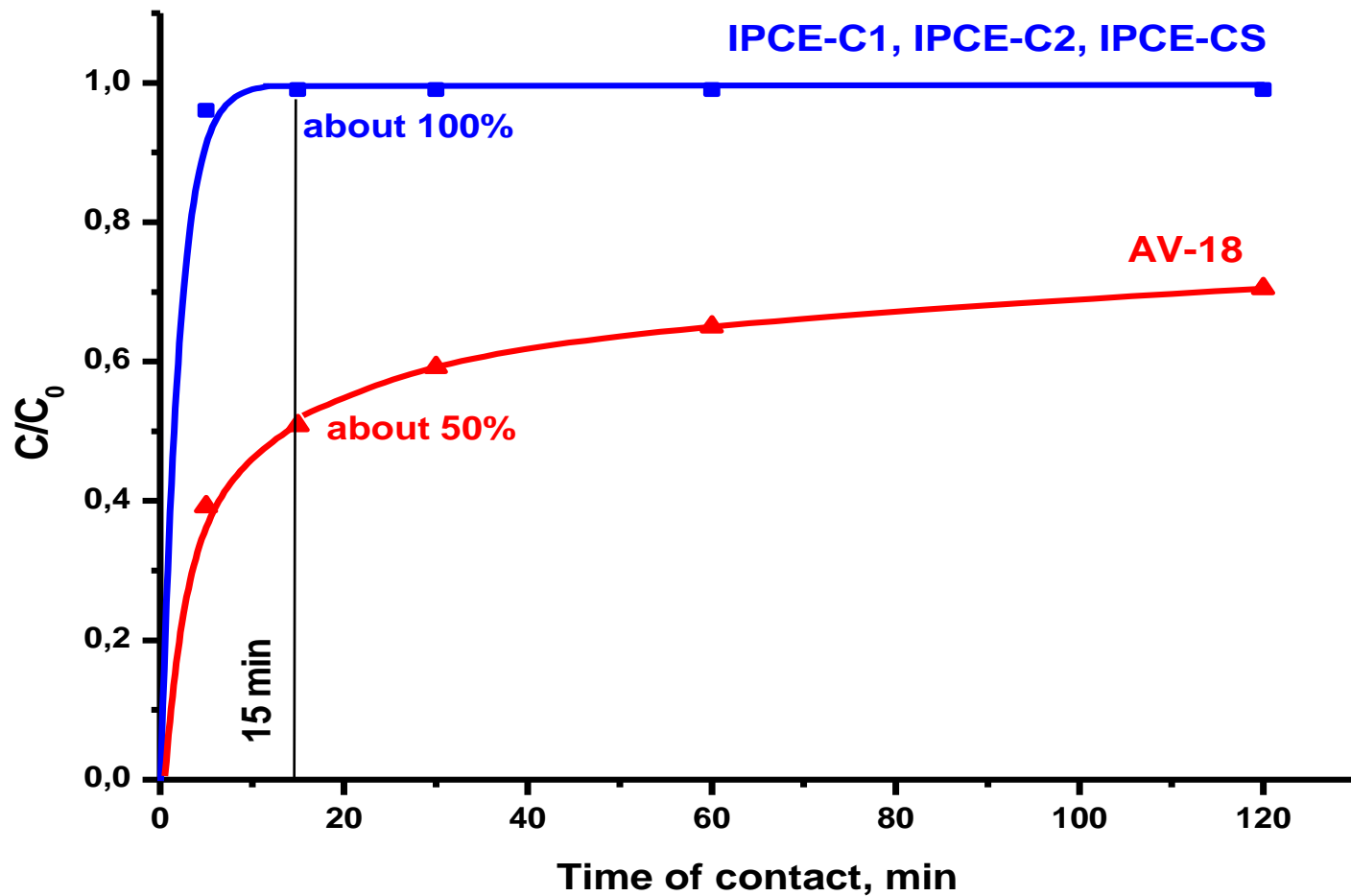
$(V/m = 100;\ [K^{131}IO_3] = 10^{-5}\ M;\ [K^{131}I] = 10^{-5}\ M;\ [CH_3^{131}I] = 10^{-5}\ M;\ [I_2] = 9 \cdot 10^{-4}\ M$

Time of contact between liquid phase and material is 120 min)

NN	Material	K_d, cm³/g			
		$^{131}I^-$	$^{131}IO_3^-$	I_2	$CH_3^{131}I$
1	KU-2	-	-	1.5 ± 0.4	1.5 ± 0.4
2	IPCE-C1	21.2 ± 2.0	36.4 ± 1.6	$(2.1 \pm 0.9) \cdot 10^3$	8.5 ± 1.3
3	IPCE-C2	150.0 ± 5.5	41.2 ± 2.7	$(2.3 \pm 0.8) \cdot 10^3$	8.5 ± 1.3
4	IPCE-CS	136.0 ± 5.0	35.2 ± 1.9	$(2.3 \pm 1.0) \cdot 10^3$	10.6 ± 1.4

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Dependence of I$_2$ sorption on the time of contact between solid and liquid phases

THANK YOU !