NEW COMPOSITE MATERIALS FOR DECREASING OF RADIOACTIVE MOLECULAR IODINE IN THE WATER COOLANT ON THE WORKING AND NEW DEVELOPED NPPs.

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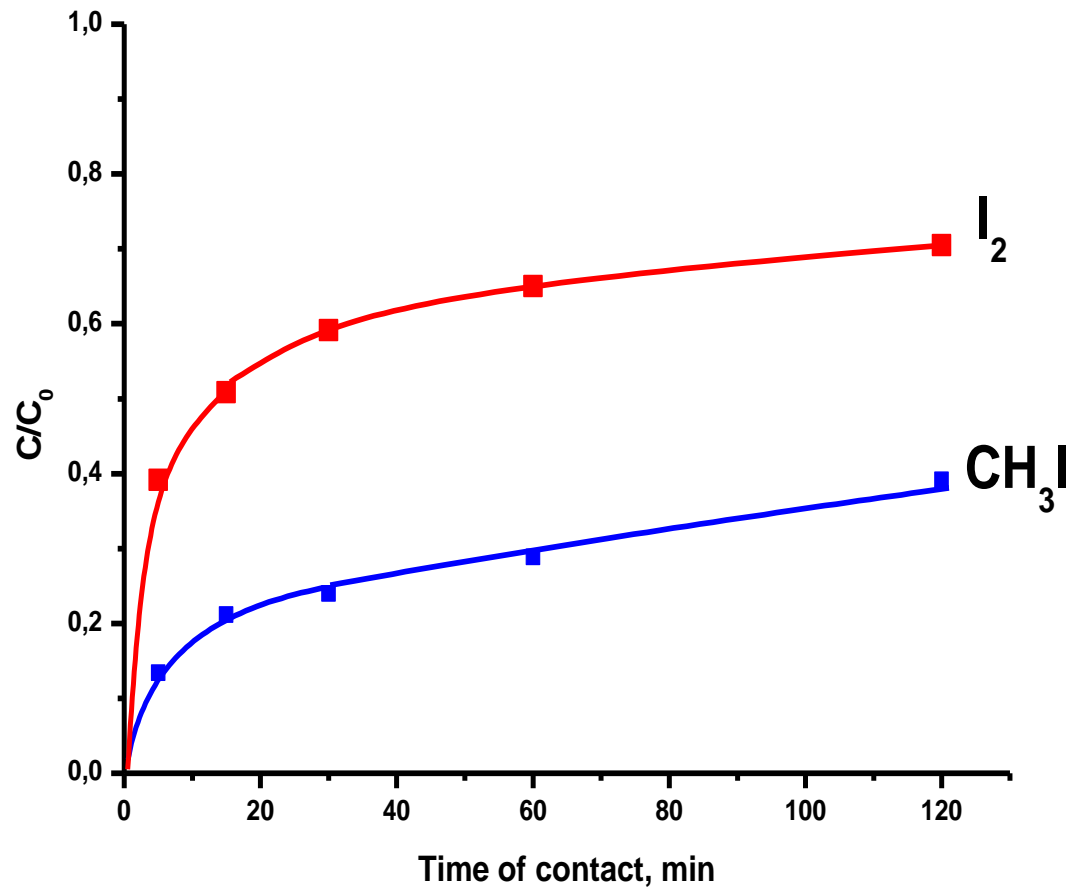**Dr. Lubov' V. Mizina**
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I^-, IO_3^-, I_2, CH_3I

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*
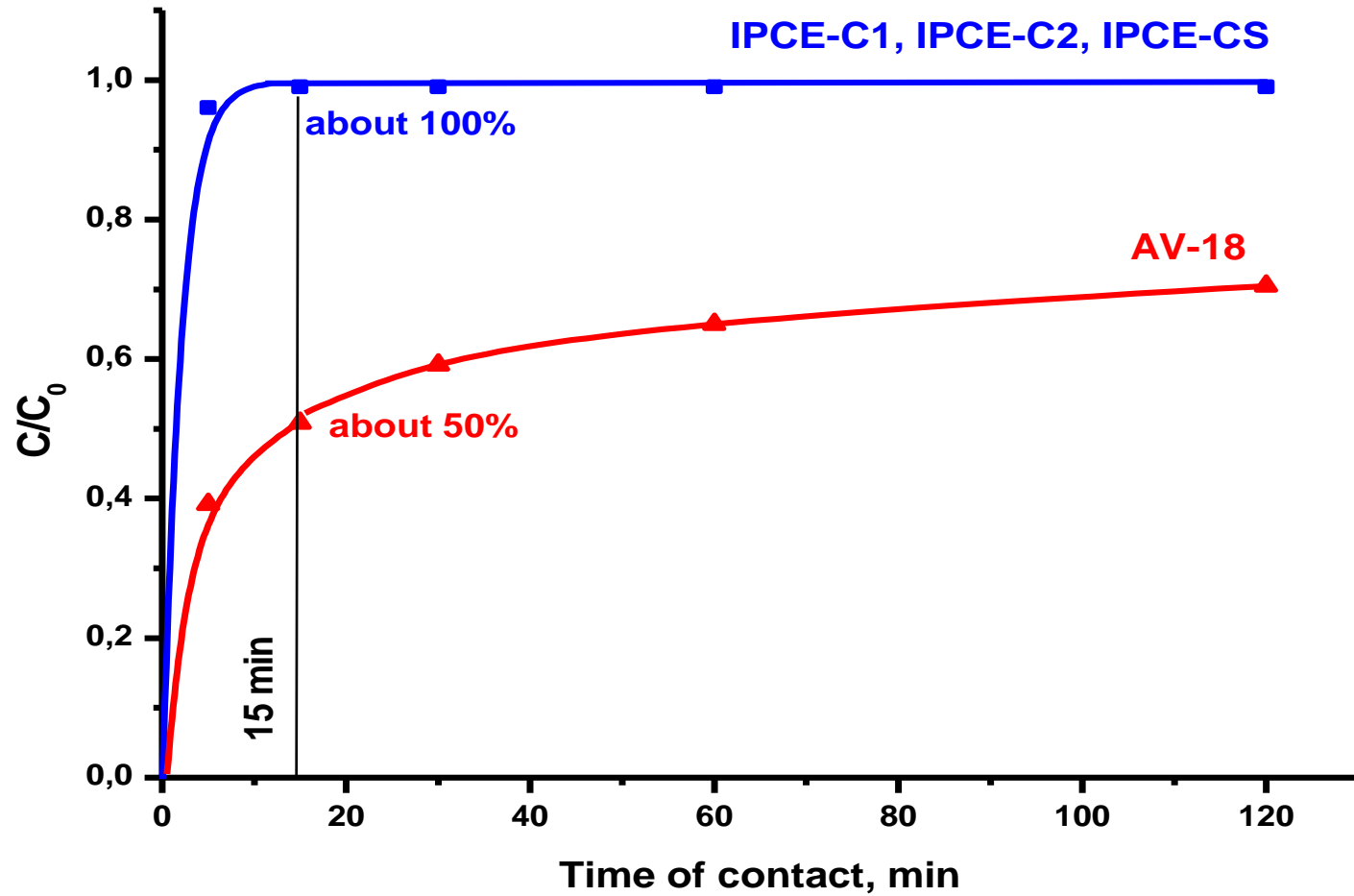
$(V/m = 100$; $[K^{131}IO_3] = 10^{-5}$ M; $[K^{131}I] = 10^{-5}$ M; $[CH_3^{131}I] = 10^{-5}$ M; $[I_2] = 9 \cdot 10^{-4}$ M

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

* 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

Dependence of I_2 sorption on the time of contact between solid and liquid phases

THANK YOU !