[Form 2 (to be reported to Committee on Countermeasures for Contaminated Water Treatment and to be disclosed to public)

Technology Information	
Area	Treatment of contaminated water (Tritium, etc.)
Title	**Fibrous radionuclide's sorbents FIBAN K-1 and FIBAN K-1-1**
Submitted by	Institute of Physical Organic Chemistry of NAS of Belarus (IPOC)

1. Overview of Technologies (features, specification, functions, owners, etc.)

Trademark of the fiber	Functional groups	Type	Optimal exchange capacity, meq/g *	Optimal swelling, g H_2O / g ion exchanger	pH working range	Maximum temperature, ^0C
FIBAN K-1	$-SO_3^-H^+$	monofunctional strong-acid	3.0	1.0	0 – 14	100 (H^+)
FIBAN K-1-1	$-SO_3^-(K^+, Co^{2+})$ $K_xCo_y[Fe(CN)_6]$	strong-acid, modified by potassium-cobalt ferrocyanide	3.0 10 mass.%	0.7	0 – 11	100

Fibrous sulfonic acid cation exchanger FIBAN K-1 for concentration of heavy metals and radionuclides (e.g. strontium) is polypropylene fiber with graft copolymer of styrene and divinylbenzene, EC = 3 meq/g.

The sorbent exists in two textile forms: staple fiber, nonwoven needle-punched material with surface density 300-500 g/m^2.

Fibrous cation exchanger FIBAN K-1-1 - radiocesium-137 sorbent based on fibrous sulfonic acid cation exchanger FIBAN K-1.

Fibrous radiocesium-137 sorbent FIBAN K-1-1.

Static tests showed that the sorbent is capable to remove 90-95% of the ionic form of radiocesium selectively from the following media: tap water, 0.1 M nitric acid (HNO3), solution containing up to 200 g/L of sodium chloride, water solutions containing surfactants. The distribution coefficients in these media were about 103 ml/g.

In dynamic experiments it was found that 50 g of the sorbent in the form of staple fiber, placed into a 250 cm^3 separatory funnel , are capable to purify 400 column volumes (100dm^3) of water

containing cesium and strontium radionuclides. Extraction factor for cesium is about 95% and for strontium - about 90%.
The sorbent exists in two textile forms: 1) staple fiber 2) Non-woven needle-punched material with surface density 500-850 g/m^2 and the content of the FIBAN K-1-1 about 60 wt %.

Developer and manufacturer - Institute of Physical Organic Chemistry of NAS of Belarus.

2. Notes (Please provide following information if possible.)

- Technology readiness level (including cases of application, not limited to nuclear industry, time line for application)

In the IPOC a process procedure for sorbents production is developed and a pilot production line operates with an annual output of 3 tons.
FIBAN K-1 may be applied in industrial filters for the deep air purification from ammonia, amines, nitrogen-containing heterocycles, aerosols of alkalis (including in clean rooms in the electronic and pharmaceutical industries). Water softening and purification from heavy metal ions.

- Challenges
  Studies of radionuclides sorption in liquids were performed only in laboratory line.

- Others (referential information on patent if any)

【Areas of Technologies Requested】

(1) Accumulation of contaminated water (Storage Tanks, etc.)
(2) Treatment of contaminated water (Tritium, etc.)
(3) Removal of radioactive materials from the seawater in the harbor
(4) Management of contaminated water inside the buildings
(5) Management measures to block groundwater from flowing into the site
(6) Understanding the groundwater flow