AJELIS

Materials for depollution and recycling

TEST KIT

User Manual

Version 2

TABLE OF CONTENTS

Table of contents 3
Presentation 3
Kit contents 3
Instructions for use 5
Examples 6
Regeneration 7

PRESENTATION

This test kit allows the testing of **METALICAPT®** products in operating conditions for the treatment of your effluents:

- capture of polluting ions or ions of interest;
- deionized water production;
- lower the concentrations below discharge thresholds.

METALICAPT® products are made out of polymer fibres which demonstrate a high affinity for ions contained in industrials effluents. Their physical and chemical properties enable a gain in capacity, in speed of capture and in flow rate compared to ion exchange resin currently used. These materials are also reusable thanks to a simple regeneration procedure.

KIT CONTENTS

Syringe of 20 mL

Sampling vial

METALICAPT®-MFB11 Weakly acidic cation exchange fiber

Functional groups	COOH
Ionic form	Na^+
Total exchange capacity	2-5 eq/kg
Maximum operating temperature	80 °C
PH range	1-12 (depending on applications)
Density	0,2 kg/dm³
Regenerant (concentration)	HCl or H_2SO_4 (3 to 10%)
Sodium form conversion	1 to 4 % NaOH

Applications:

- Removal of heavy metals (Copper, Nickel, Zinc, Cadmium, Cobalt, Strontium, Lead, Magnesium, Chromium, Iron);
- Drinking water softening;
- Lowering the concentration beyond current regulations;
- Reduction of the waste volume thanks to concentration.

METALICAPT®-MFC11 Strongly acidic cation exchange fiber

Functional groups	SO_3H
Ionic form	H^+
Total exchange capacity	3-6 eq/kg
Maximum operating temperature	90 °C
PH range	1-14 (depending on applications)
Density	0,2 kg/dm³
Regenerant (concentration)	HCl or H_2SO_4 (3 to 10%)
Sodium form conversion	1 to 4 % NaCl

Applications :

- Removal of heavy metals (Copper, Nickel, Zinc, Cadmium, Cobalt, Strontium, Lead, Magnesium, Chromium, Iron);
- Removal of ionised organic molecules (for examples: dyes, vitamins, antibiotics…);
- Lowering the concentration beyond current regulations;
- Reduction of the waste volume thanks to concentration.

METALICAPT®-MFD11 Cation exchange chelating fiber

Functional groups	$N(CH_2COOH)_2$, COOH
Ionic form	H^+
Total exchange capacity	3-5 eq/kg
Maximum operating temperature	80 °C
PH range	5-12 (depending on applications)
Density	0,2 kg/dm³
Regenerant (concentration)	HCl or H_2SO_4 (3 to 10%)
Sodium form conversion	1 to 4 % NaOH

Applications :

- Water purification (removal of Iron II ions);
- Removal of heavy metals (Copper, Nickel, Zinc, Cadmium, Cobalt, Strontium, Lead, Magnesium, Chromium, Iron);
- High capacity for the radionuclide ^{90}Sr;
- Lowering the concentration beyond current regulations;
- Reduction of the waste volume thanks to concentration.

METALICAPT®-MFF11 Ampholyte weakly acidic cation and basic anion exchange fiber

Functional groups	NH_2, COOH
Ionic form	Na^+
Total exchange capacity	2-2,5 eq/kg (Amine), 0,5-1 eq/kg (Acid)
Maximum operating temperature	80 °C
PH range	1-8 (depending on applications)
Density	0,2 kg/dm³
Regenerant (concentration)	HCl or H_2SO_4 (3 to 10%)
Sodium form conversion	$NaHCO_3$

Applications :

- Removal of heavy metals (Copper, Nickel, Zinc, Cadmium, Cobalt, Strontium, Lead, Magnesium, Chromium, Iron);
- capture des métaux lourds anioniques (oxoanions du Chrome, Molybdène, Tungstène et Vanadium) ;
- Lowering the concentration beyond current regulations;
- Reduction of the waste volume thanks to concentration.

METALICAPT®-MFI11 Specific fiber for Arsenic

Functional groups	Iron hydroxyde nanoparticules
Total exchange capacity	Not specified
Maximum operating temperature	60 °C
PH range	5-10 (depending on applications)
Density	0,3 kg/dm³
Regenerant	Single use product

Applications :

- Water treatment (Removal of Arsenic (III) and Arsenic (IV) ions);
- Removal of heavy metals (Copper, Nickel, Zinc, Cadmium, Cobalt, Strontium, Lead, Magnesium, Chromium, Iron);

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METALICAPT®-MFJ21 Specific fiber for Silver

Functional groups	NH_2, COOH, SH
Total exchange capacity	Non renseignée
Maximum operating temperature	60 °C
PH range	1-12 (depending on applications)
Density	0,2 kg/dm³
Regenerant	Single use product

Applications :
- Water treatment (Removal of Silver (I));
- Removal of heavy metals (Copper, Nickel, Zinc, Cadmium, Cobalt, Strontium, Lead, Magnesium, Chromium, Iron);

METALICAPT®-MFK21 Weakly basic anion exchange fiber

Functional groups	N, NH, NH_2, COOH
Total exchange capacity	2-5 eq/kg (Amine), 1 eq/kg (Acid)
Maximum operating temperature	80 °C
PH range	1-8 (depending on applications)
Density	0,2 kg/dm³
Regenerant (concentration)	HCl or H_2SO_4 (3 to 10%)
Sodium form conversion	1 to 4 % NaOH

Applications :
- Removal of heavy anionic metals (Chromium, Molybdenum, Tungsten and Vanadium oxyanions);
- Lowering the concentration beyond current regulations;
- Reduction of the waste volume thanks to concentration.

METALICAPT®-MFH21 Strongly basic anion exchange fiber

Functional groups	NR_2, NR_3^+
Ionic form	OH^-
Total exchange capacity	1-3 eq/kg (Ammonium), 1 eq/kg (Amines)
Maximum operating temperature	50 °C
PH range	1-12 (depending on applications)
Density	0,2 kg/dm³
Regenerant (concentration)	1 to 4 % NaOH

Applications :
- Removal of heavy anionic metals (Chromium, Molybdenum, Tungsten and Vanadium oxyanions);
- Lowering the concentration beyond current regulations;
- Reduction of the waste volume thanks to concentration.

INSTRUCTIONS FOR USE

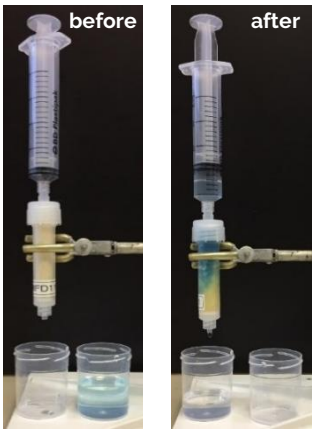
1. Thanks to a piece of adhesive tape, fix the column vertically on the cardboard box as shown in the picture on the right;
2. Sample 20 mL of the solution to be treated using the syringe;
3. Screw the syringe on top of the column;
4. Put the sampling vial below the column;
5. Depress the plunger to inject the solution through the column.

   Caution: do not apply too much pressure. The elution must take between 20 and 40 seconds;
6. Unscrew the syringe et pull the plunger back to fil lit with air;
7. Screw back the syringe onto the column and inject the air into the column to get the leftover solution out;
8. Analyse the initial solution and the treated solution.

EXAMPLES

Example 1: Removal of Copper ions from an effluent

A solution containing 5 g/L of Copper is treated by **METALICAPT®-MFD11**. A strong blue coloration of the fibre combined with a total discoloration of the solution is observed. The analysis of the treated solution shows a level of Copper of 0.05 mg/L.



Example 2: Production of deionized water

Tap water, with a measured conductivity of 600 µS/cm is treated by **METALICAPT®-MFC11** and **METALICAPT®-MFH21**. The analysis of the treated solution shows a conductivity of 3 µS/cm.

Example 3: Removal of Copper and its counter ion from an effluent

METALICAPT® materials can be combined in order to remove all ions from the solution. Here a Copper sulphate solution is treated by **METALICAPT®-MFC11** and **METALICAPT®-MFH21**. The Copper ion and its counter ion (sulphate) are removed to obtain a deionized water.

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REGENERATION

Most of **METALICAPT®** materials can be re-used after being saturated thanks to a regeneration process, which is described hereafter. Each material has its own regeneration process:

METALICAPT®-MFB11 / METALICAPT®-MFD11 / METALICAPT®-MFK21

1. With the help of the syringe, inject 20 mL of hydrochloric acid 3%;
2. With the help of the syringe, inject 20 mL of deionized water;
3. With the help of the syringe, inject 20 mL of sodium hydroxide 4%;
4. With the help of the syringe, inject 20 mL of deionized water;
5. Measure the pH of the last drop;
6. Repeat step 4 until the pH reaches the same value as the one of the deionized water;
7. Dry the column by injecting air inside;
8. The column is ready to be re-used.

METALICAPT®-MFC11

1. With the help of the syringe, inject 20 mL of hydrochloric acid 3%;
2. With the help of the syringe, inject 20 mL of deionized water;
3. Measure the pH of the last drop;
4. Repeat step 2 until the pH reaches the same value as the one of the deionized water;
5. Dry the column by injecting air inside;
6. The column is ready to be re-used.

METALICAPT®-MFF11 / METALICAPT®-MFJ21*

1. With the help of the syringe, inject 20 mL of hydrochloric acid 3%;
2. With the help of the syringe, inject 20 mL of deionized water;
3. With the help of the syringe, inject 20 mL de carbonate de sodium 8% ;
4. With the help of the syringe, inject 20 mL of deionized water;
5. Measure the pH of the last drop;
6. Repeat step 4 until the pH reaches the same value as the one of the deionized water;
7. Dry the column by injecting air inside;
8. The column is ready to be re-used.

Note that in the case of the removal of Silver ions, **METALICAPT®-MFJ21** cannot be regenerated.

METALICAPT®-MFH21

1. With the help of the syringe, inject 20 mL of sodium hydroxide 4%;
2. Attendre 5 min ;
3. With the help of the syringe, inject 20 mL of sodium hydroxide 4%;
4. Attendre 5 min ;
5. With the help of the syringe, inject 20 mL of deionized water;
6. Measure the pH of the last drop;
7. Repeat step 5 until the pH reaches the same value as the one of the deionized water;
8. Dry the column by injecting air inside;
9. The column is ready to be re-used.

METALICAPT®-MFI11

This material cannot be regenerated..

Material performances were demonstrated with a specific protocol and in adapted conditions. A personalized study may be offered by the AJELIS Company in order to meet your needs and deliver the best solution for your effluent decontamination problematic

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