

METALICAPT®-MFB21

TECHNICAL DATA SHEET

VERSION 3

METALICAPT®-MFB21 is a polymer weak acid cation exchange fiber containing COOH groups in Na⁺ form. Due to its extremely high surface area, this ion exchanger allows to be up to 20 times quicker in hydrometallurgical operations compare to actual granular/resin materials. Three different fiber forms are available: staple, nonwoven and yarn. METALICAPT®-MFB21 is a nonwoven fabric.

FIBER ADVANTAGES

- **Quicker**
up to 20 times
- **More capacitive**
from 2 to 10 times
- **Offers better threshold**
compliance with present and future environmental requirements, trace pollutant removal
- **Regenerable**
the waste water generated at the time of regeneration is almost neutral; even a weak acid may be used for regeneration
- **Can be kept dry**
no properties lost when dried or compacted
- **Exhibits low degree of volume expansion** when converted from hydrogen form to sodium form

METALICAPT®-MFB21 allows users:

- to enforce compliance with standards of industrial liquid waste;
- to anticipate future regulations ;
- to discharge effluents directly into natural waterways.

Main applications:

- removal of heavy metals from water/waste water: Copper (II), Nickel (II), Zinc (II), Cadmium (II), Cobalt (II), Strontium (II), Lead (II), Magnesium (II), Chromium (III), Iron (II)... etc.;
- water softening : removal of Calcium and Magnesium ions;
- removal (polishing) of soluble ionic contaminants from stream condensate prior to recycle into the steam generators;
- removal of dyes from process or waste effluents;
- protection of aquatic ecosystems.

MATERIAL PROPERTIES

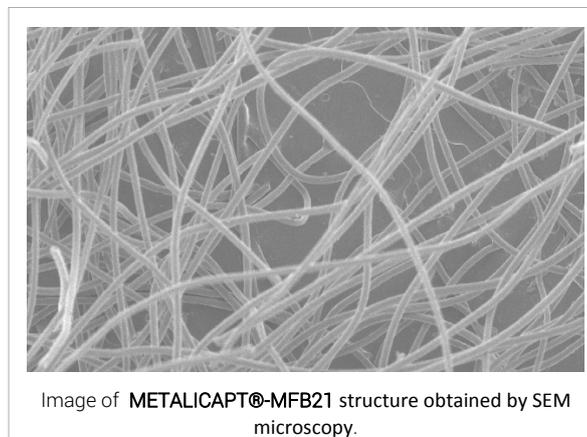
Appearance	Nonwoven pink colored
Matrix	Polyacrylic
Ionic form delivered	Na ⁺
Total exchange capacity	5,3 to 6,2 eq/L
Capacity (Qe) for Copper (II)	100 ≤ Qe ≤ 156 mg Cu(II)/g
Threshold level for Copper (II)	< 0,005 mg/L
Shipment apparent density	0,15 – 0,4 g/mL
pH stability	1-14
Temperature stability	95 °C

FICHE TECHNIQUE - METALICAPT®-MFB21

Regenerant HCl ou H₂SO₄ (3 à 10 %)
 Regenerant volume 2 à 4 BV

MATERIAL DESCRIPTION

METALICAPT®-MFB21 is a polymeric absorbent with a fiber structure insoluble in aqueous solutions. Its chemical composition is similar to weakly acidic cation exchange resin. **METALICAPT®-MFB21** is a nonwoven fabric (felt) delivered dry in Na⁺ form. These fibers, with a diameter of about 30 micrometers, can be observed by electronic microscopy.

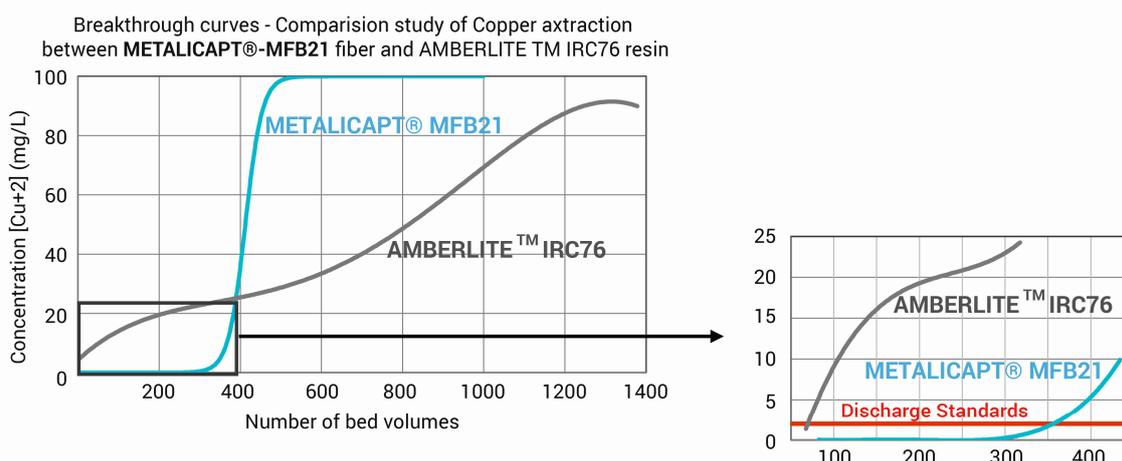


TECHNICAL DATA

Adsorption isotherm for a solution charged with Copper (II) ions

The maximum capacity (Q_{max}) was determined at 176,6 mg of Copper (II)/g for **METALICAPT®-MFB21** material. For comparison, its analog, the **AMBERLITE™IRC86** ion exchange WAC resin showed 47.21 mg of Copper (II)/g of resin when, under the same operating conditions,¹ **METALICAPT®-MFB21** Q_e was detected at 68,92mg/g². In less concentrated Copper solutions³ : **METALICAPT®-MFB21** showed Q_e= 51 mg/g and IRC86 Q_e= 9,6 mg/g . **METALICAPT®-MFB21** presents considerably more performance than IRC86 resin for Copper removal from industrial waste.

Breakthrough curves. They are carried out in open circuit and allow to determine the maximum quantity of pollutant that can be absorbed by material before exceeding the discharge standards. The following study is made under the real conditions of the industrial effluent treatment in surface treatment industry, in particular at peak of productive activity, using a copper solution concentration about 100 mg/L.



As we can see in this graph, **METALICAPT®-MFB21** fiber provides a Copper exit concentration close to zero up to 300 bed volumes. **The discharge requirements are fully complied.** In the case of weakly acidic cation resins IRC,

¹ K. Chandramohan, S. Marimuthu. Adsorptive Removal of Copper from Aqueous Solution By Amberlite Cation-exchange Resin-Equilibrium And Kinetic Studies. *2011 International Conference on Biology, Environment and Chemistry IPCBEE vol.24 (2011)* © (2011), IACSIT Press, Singapore.

² From solution of 1g/l of Cu(II) in deionized water, 303K, following a batch protocol.

³ From solution of 382,72 mg/l of Cu(II) in deionized water, 303 K, following a batch protocol. Copper(II) Removal using Three Cation Exchange Resins: Ion Exchange Equilibrium and Kinetics A.A. Swelam, M.A.El-Nawawy, A.M.A.Salem and A.A. Ayman, *Middle East Journal of Applied Sciences*, vol 05, iss. 04, p. 1017-1027.

the breakthrough happens almost immediately and their application cannot efficiently solve the environmental problem issue due to lowered standards of waste discharge.

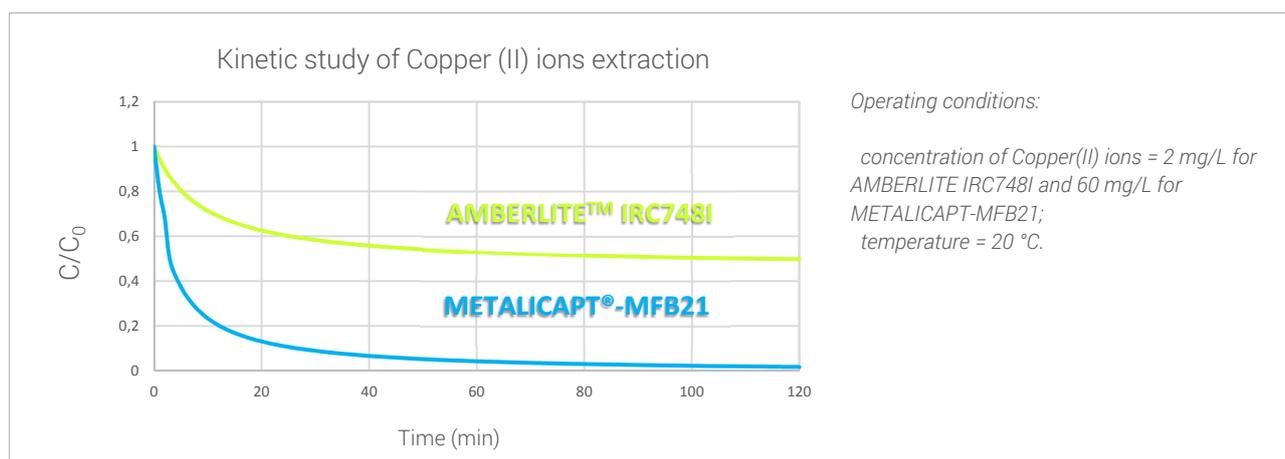
The major advantage of **METALICAPT®-MFB21** is the immediate availability of all active sites on its highly developed surface that allows fast and very efficient capture of metals from waste solution.

METALICAPT®-MFB21 typical appearance breakthrough curves make it easily possible to estimate the volume of effluent from which the discharge standards will be exceeded.

Material performances, demonstrated with a specific protocol in laboratory conditions, are transferable to larger industrial columns. For example, the 9 L columns **M1** of the **Industrial Treatment Kit**, AJELIS basic offer, satisfy heavy metal treatment needs of a great number of surface treatment companies.

Kinetic study of Coper (II) ions removal

A kinetic study was made to compare the efficiency of the **METALICAPT®-MFB21** fiber versus the ion exchange resin **AMBERLITE™ IRC748I**. Under same conditions it was shown that the **METALICAPT®-MFB21** achieves a faster and more important Copper (II) concentration lowering while maintaining a higher capacity of charge.



Additional data are needed to calculate the fiber volumes required for industrial scale applications. They should be requested from AJELIS specialists or should be elaborated and up scaled in our laboratory- and pilot-tests.

The safety data sheet must be observed. It contains additional data on product description, transport, storage, handling, safety and ecology.

In the European Community, Ion exchange resins materials have to be disposed, according to the European waste nomenclature which can be accessed on the internet-site of the European Union.

Material performances were demonstrated with a specific protocols and in adapted conditions. A custom study may be offered by the AJELIS in order to meet customers' needs and to deliver the best solution for the treatment of their waste effluent.