PRINCE

SOURCE TO SOLUTION

Pyrolox® Advantage

PYROLOX ADVANTAGE

NSF

Certified to NSF/ANSI 61

Pyrolox® Advantage

Description

Pyrolox® Advantage is an engineered material to complement our range of manganese-based filter media. It combines the surface chemistry of our synthetic Pyrolox® Ultra with the lightweight behaviour of silicate filter media.

Capability

Pyrolox® Advantage can be used to remove a range of soluble inorganic impurities from raw water by oxidation to insoluble form, precipitation, and flocculation. The media can be used in a catalytic configuration with a supplemental oxidant (eg. OCl^- or dissolved O_2) or as a depleted resource requiring regeneration or replacement (eg. cartridge).

Removal of Fe^{2+} and Mn^{2+}

The most common application for this media; manganese minerals have a well-documented record of capability for removal of these species[1]. Pyrolox® Advantage removes soluble ions by the same mechanism as natural ore products, but faster and with better efficiency at low contaminant concentration. Results of our equilibrium and kinetic measurements are given in Appendices A and B.

Removal of As^{3+}

Pyrolox® Advantage can be used to remove soluble arsenic indirectly by co-precipitation with Fe. This requires either the presence of Fe in the raw water or the addition of Fe ahead of the filter system. Pyrolox® Advantage has no inherent capacity to remove arsenic ions and should not be used non-catalytically for the treatment of arsenic-contaminated raw water in the absence of soluble iron.

Typical application requires Fe : As ratio of 30:1. Co-precipitation and removal is a function of bed-contact, pH and ion concentration. For this reason, Prince recommends that filter designers pilot a small installation to confirm efficacy for specific situations. When treating water with > 10 ppb As it may be necessary to add a second polishing stage to the process.

[1] Removal of Soluble Manganese by Oxide-coated Filter Media, Knocke et al. (1991) https://doi.org/10.1002/j.1551-8833.1991.tb07201.x

Technical Parameters

Physical Properties

Colour & Form	Black, free-flowing sand	
Bulk Density as packed[2]	1350 kg/m^3	84 lb/ft^3
True Density (SG)	2700 kg/m^3	170 lb/ft^3
Porosity	50 %	

Sizing

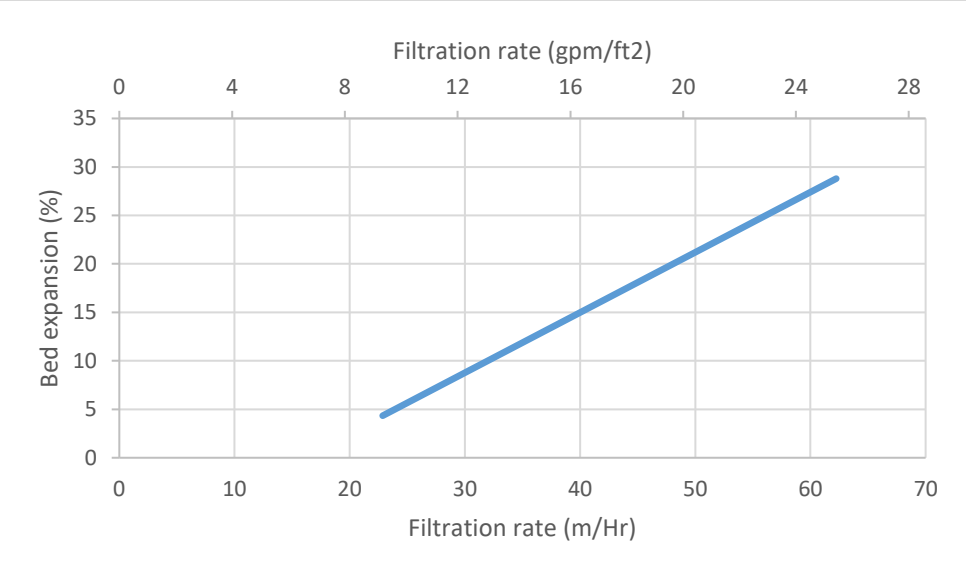
Mesh Size[3]	16 – 44 (BS/ISO)	18 – 45 (ASTM)
Effective Size	560 µm	
Uniformity Coefficient	1.5	

Operating Conditions (Suggested)

Specific operating conditions must be defined by the filter designer

pH Range[4]	6.5 – 8.5	
Freeboard	40 %	
Service Flow Rate	5 – 30 m/hr	2 – 12 gpm/ft^2
Minimum Bed Depth	300 mm	12 in
Flow rate and bed depth should be determined to ensure sufficient bed contact time given the concentration of the contaminant		

Bed Expansion (20 °C)



[2] Range of tapped to loose bulk density 1300 - 1500 kg/m^3 (81 – 94 lb/ft^3)
[3] Range represents the 5 % to 95 % retained on mesh
[4] Mn-based media are not suitable for treating water below pH 6.2 (BS:EN 13752:2012)

Use of Product

Selection

Media depth, volume, and flow rate must be selected to optimise the bed contact time and achieve the desired reduction in contaminant concentration.

Initial commissioning

Pyrolox® Advantage does not require activation to generate a catalytic manganese surface. We acknowledge that the filter installation will require sterilization prior to use; the use of sodium hypochlorite is recommended and has no detrimental effect on the media. The use of hydrogen peroxide is not recommended at any stage based on the advice of BS:EN 13752:2012[5]; it can lead to increased manganese concentrations if used with any manganese-based media.

Use

Pyrolox® Advantage can be used in gravity or pressurized systems. Treated water should be monitored and regular backwashing performed. In catalytic configuration, the incoming raw water requires 60 % oxygen saturation for optimum removal of iron and hypochlorite (OCl^-) levels commensurate with the manganese concentration.

Backwash

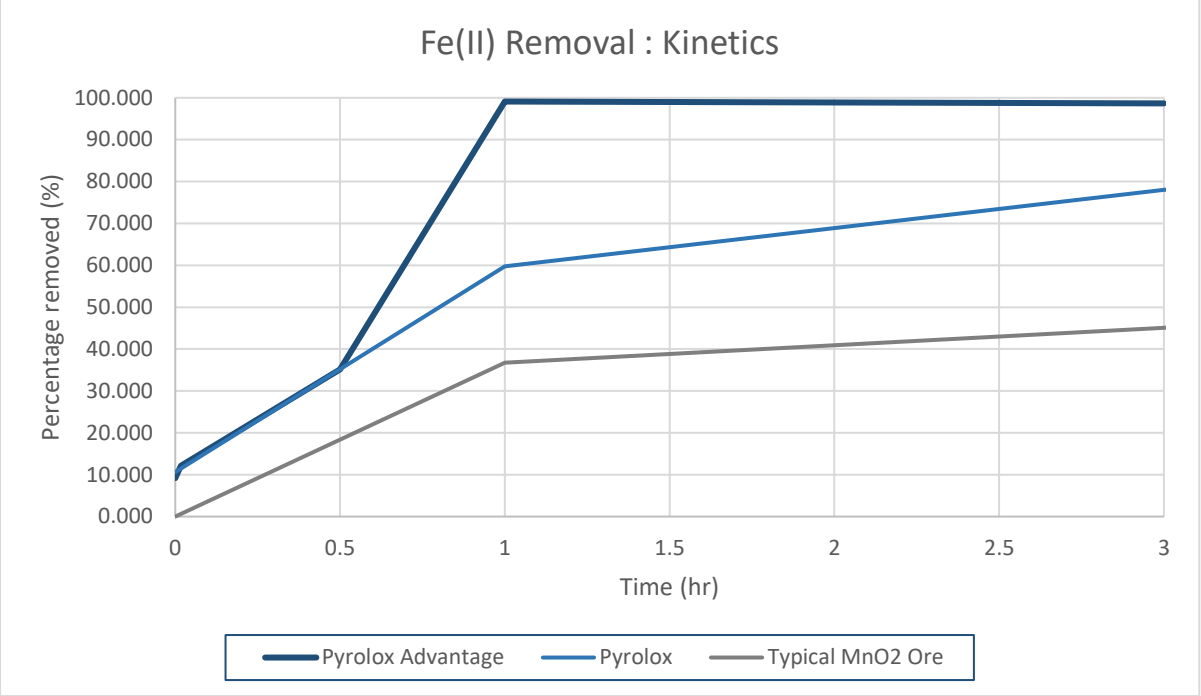
Iron and manganese are precipitated and retained by the filter media. Periodic backwashing is required to ensure the efficiency of the filter media. Excessive run time without backwashing, or incomplete backwashing, will reduce the filter efficiency and deplete the oxidation capacity of the media surface. Maximum run time should be determined by the filter designer specific to the raw water composition. Typical bed expansion is 20 %.

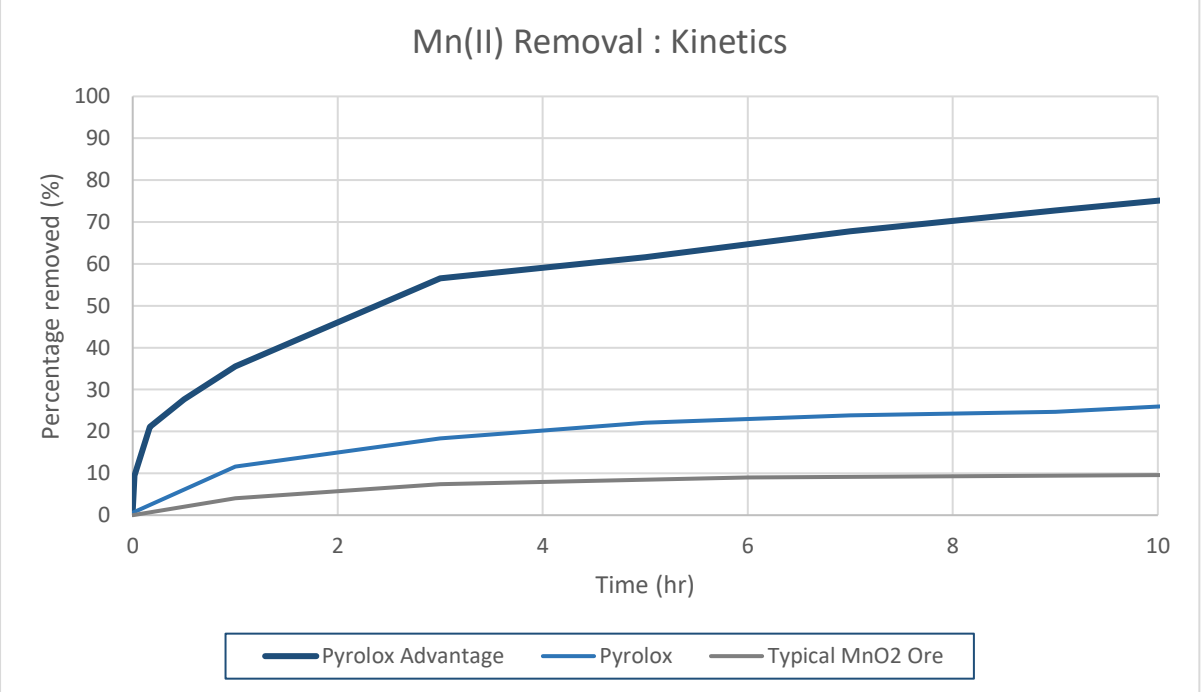
Regeneration

In catalytic use, the media does not require regeneration. If media is used without sufficient dissolved oxygen or oxidising source (*eg.* hypochlorite) the surface will become depleted and require regeneration. Regeneration can be achieved using sodium hypochlorite, but the time and concentration must be determined by the user

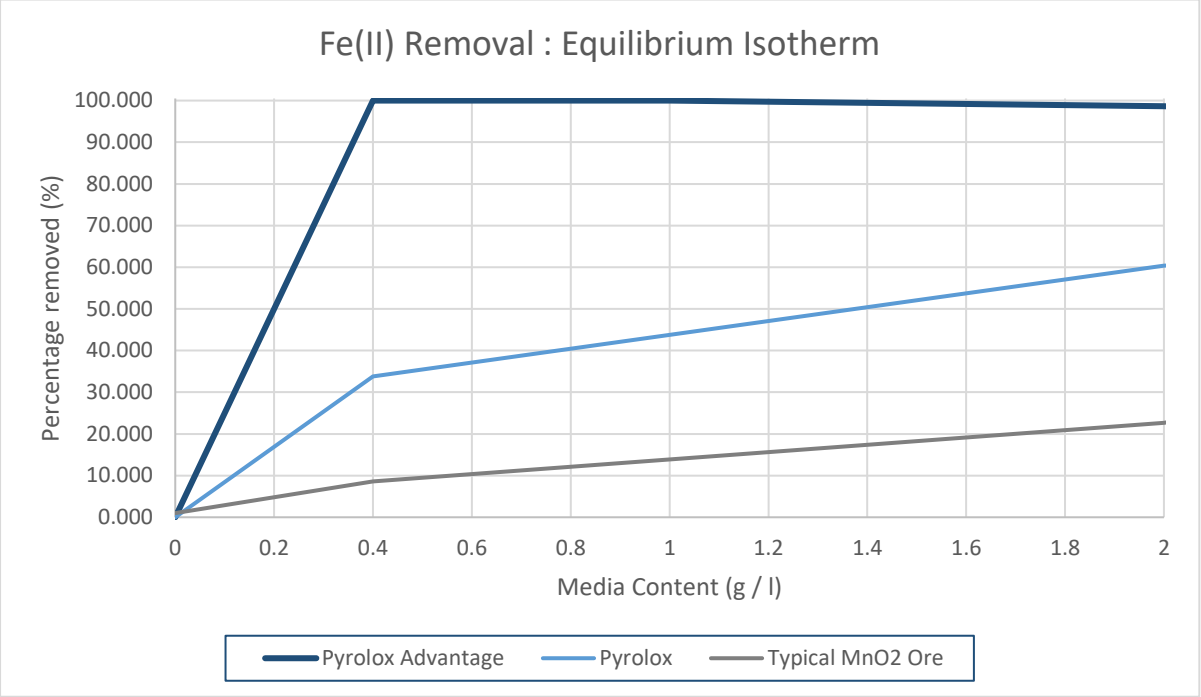
[5] Products used for treatment of water intended for human consumption. *Annexe A*

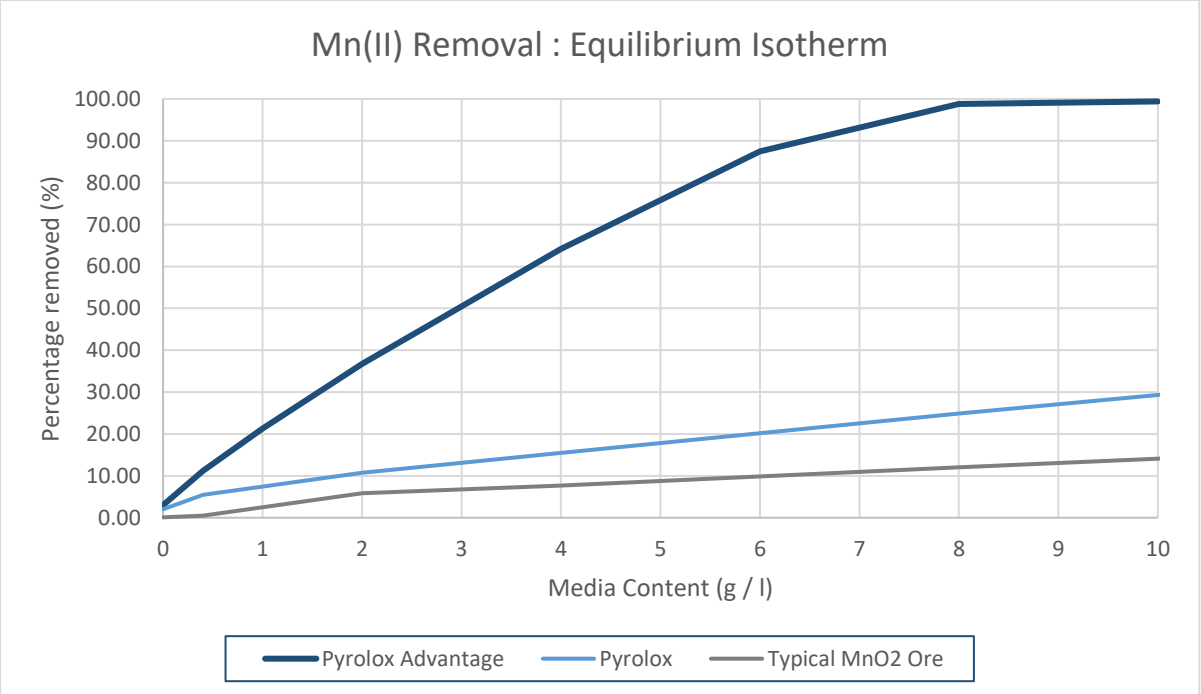
Appendix A : Kinetic Data (~10 ppm)





Appendix B : Equilibrium Data (~10 ppm)





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