



FILMTEC™ Membranes

Water Chemistry and Pretreatment: Calcium Fluoride Scale Prevention

Calcium Fluoride Scale Prevention

Fluoride levels in the feed water of as low as 0.1 mg/L can create a scaling potential if the calcium concentration is high. The calculation of the scaling potential is analogous to the procedure described in [Calcium Sulfate Scale Prevention \(Section 2.4.3\)](#) for CaSO₄.

Calculation

1. Calculate the ionic strength of the concentrate stream (I_c) following the procedure described in [Scaling Calculation, General \(Section 2.4.1\)](#):

$$I_c = I_f \left(\frac{1}{1-Y} \right)$$

2. Calculate the ion product (IP_c) for CaF₂ in the concentrate stream:

$$IP_c = \left[({}^m\text{Ca}^{2+})_f \left(\frac{1}{1-Y} \right) \right] \left[({}^m\text{F}^-)_f \left(\frac{1}{1-Y} \right) \right]^2$$

where:

$$({}^m\text{Ca}^{2+})_f = M \text{ Ca}^{2+} \text{ in feed, mol/L}$$

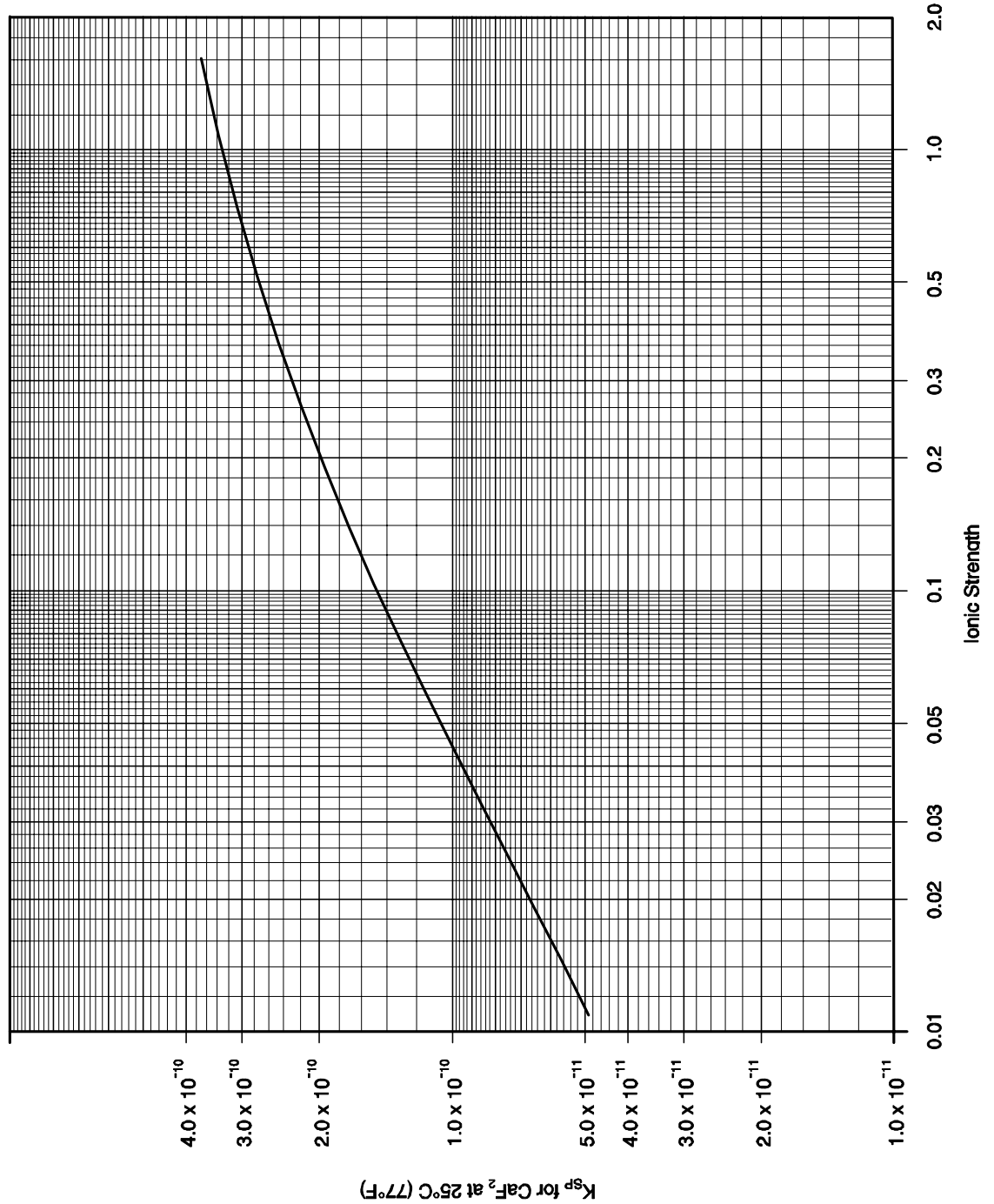
$$({}^m\text{F}^-)_f = M \text{ F}^- \text{ in feed, mol/L}$$

3. Compare IP_c for CaF₂ with the solubility product (K_{sp}) of CaF₂ at the ionic strength of the concentrate stream, Figure 2.9 / [11](#). If $IP_c \geq K_{sp}$, CaF₂ scaling can occur, and adjustment is required.

Adjustments for CaF₂ Scale Control

The adjustments discussed in [Calcium Sulfate Scale Prevention \(Section 2.4.3\)](#) for CaSO₄ scale control apply as well for CaF₂ scale control.

Figure 2.9 K_{sp} for CaF_2 versus ionic strength /11/



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