

Precision in prediction: The role of manganese carbonates in modelling AMD

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We mine for
progress



**MINE WASTE
MANAGEMENT**
GREENROAD GROUP

Project Aims

- Understand the ANC of manganese carbonates from a Tasmanian mine known to contain Iron/Manganese carbonates.
- Iron and manganese can be problematic for ANC testing
- **Is ANC testing suitable for these samples?**

Acid neutralising capacity or 'ANC'

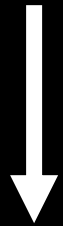
“Ability of a rock to neutralise acid”

Carbonate minerals generally have a high
ANC.

ANC is a key parameter of acid-base accounting to
predict AMD

Acid-neutralising capacity test

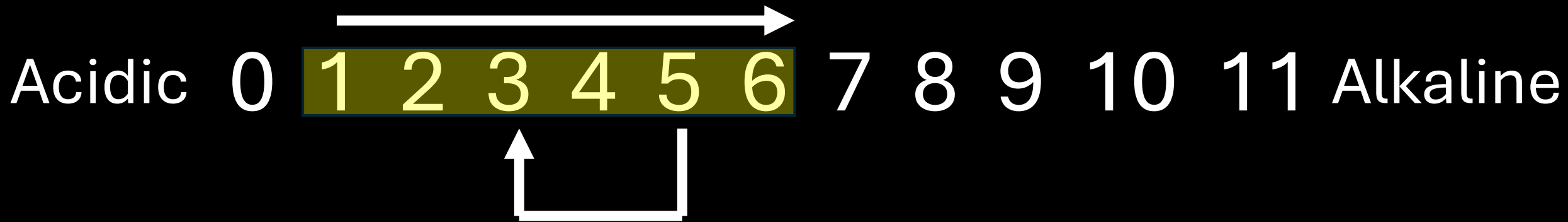
Test start, $\text{Fe}^{2+}/\text{Mn}^{2+}$ dissolved



Acidic 0 1 2 3 4 5 6 7 8 9 10 11 Alkaline

Acid-neutralising capacity test

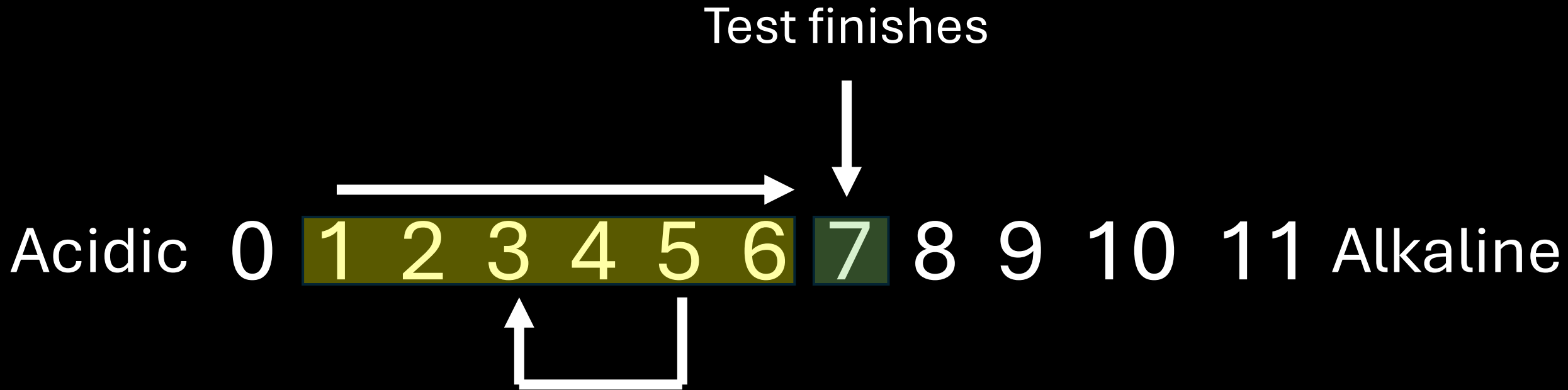
Add base (NaOH), raise pH, neutralise acid



Fe^{2+} removal from solution = secondary acidity

Secondary acidity = lowers / stalls pH

Acid-neutralising capacity test



Fe^{2+} removed from solution, acidity recorded

Acid-neutralising capacity test

Test finishes
here



Acidic 0 1 2 3 4 5 6 7 8 9 10 11 Alkaline



Mn²⁺ effectively removed at pH 10.6

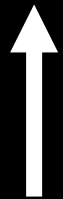
No Mn²⁺ precipitation = unrecorded secondary acidity

Studying dissolved metals in ANC testing

End sample:
dissolved metals***



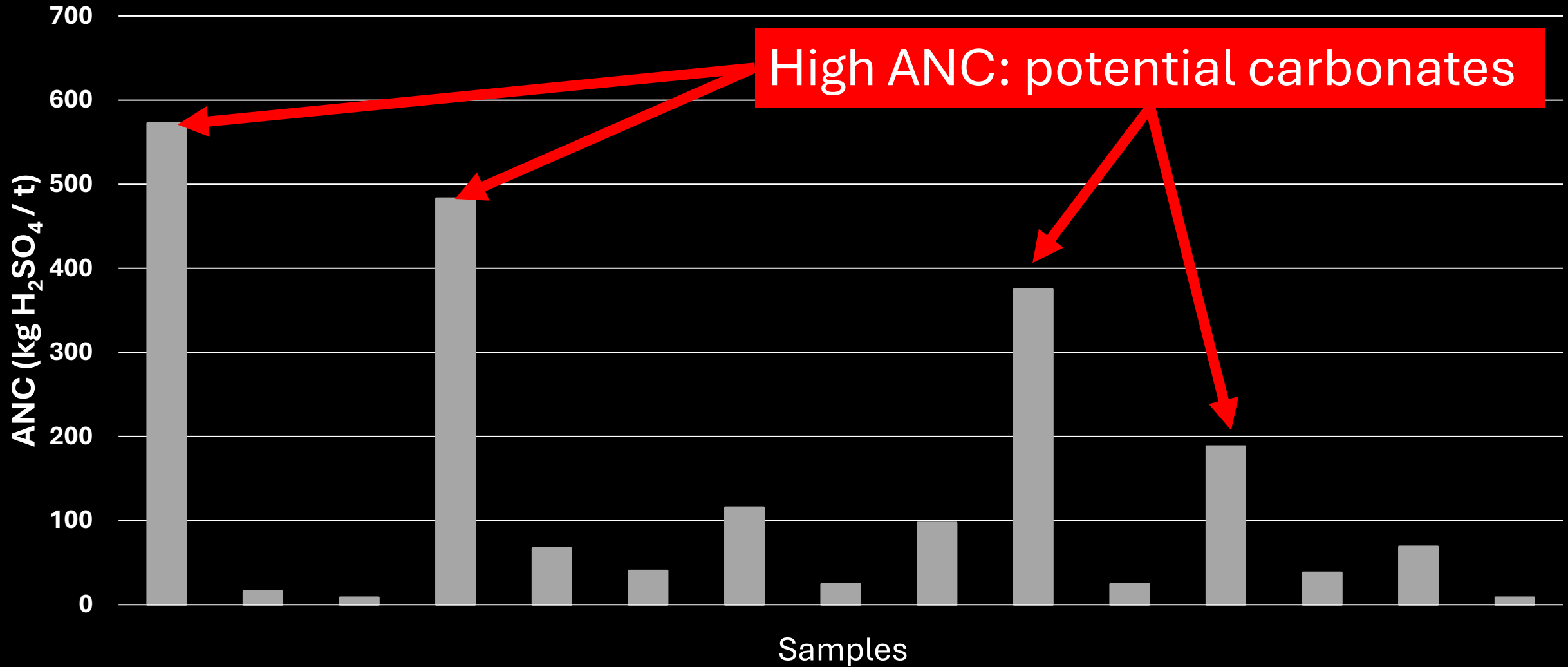
Acidic 0 1 2 3 4 5 6 7 8 9 10 11 Alkaline



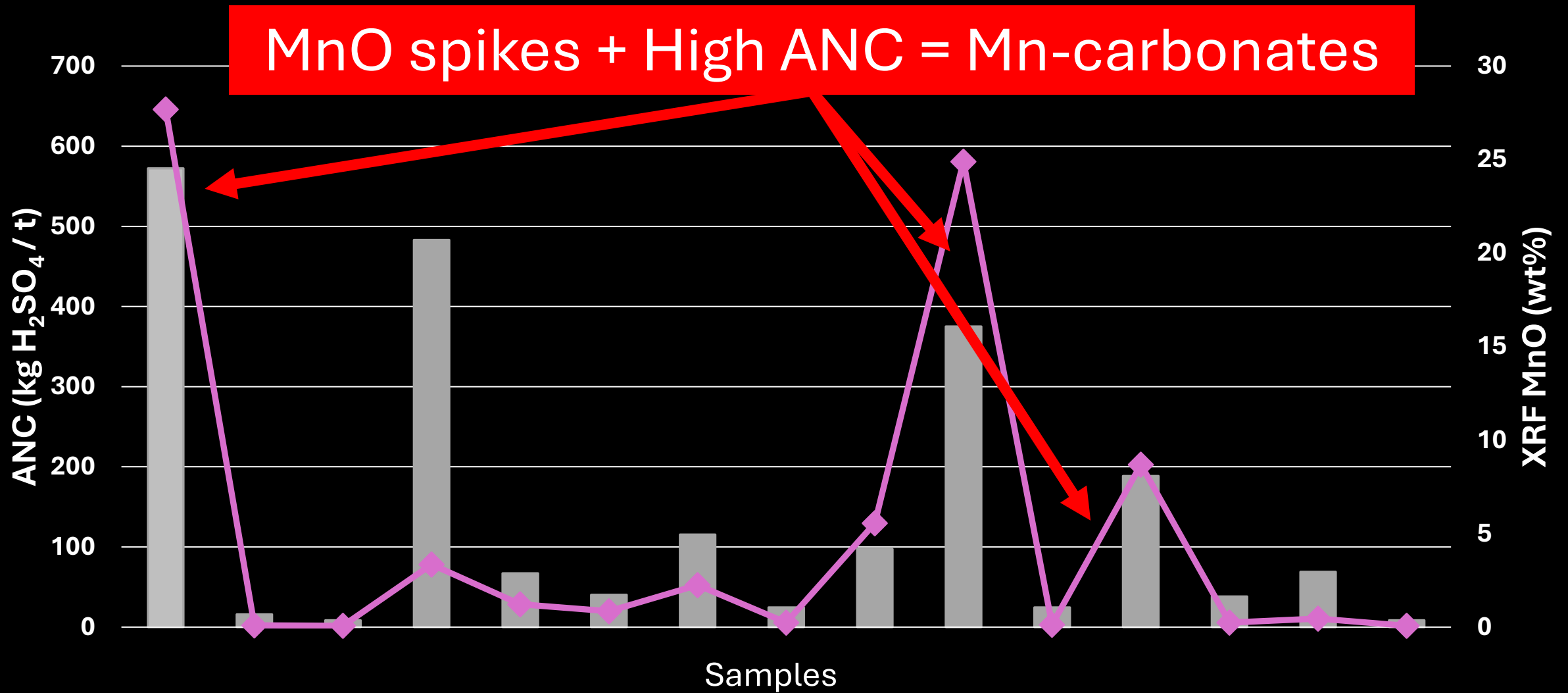
Start sample:
dissolved metals

***Significant dissolved metals in end sample... ANC invalid

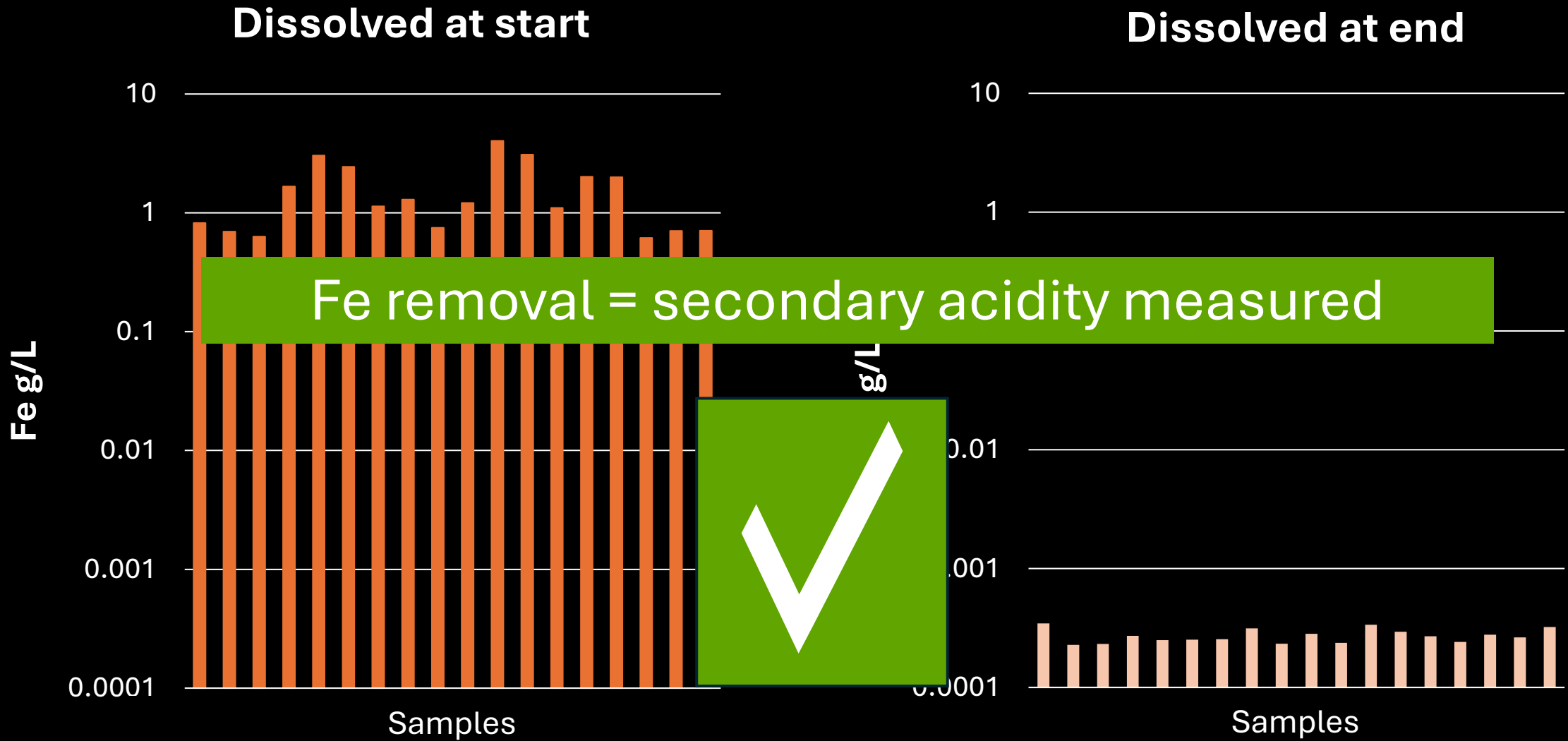
Large ANC value = large neutralising potential



Significant Mn components, potential secondary acidity?



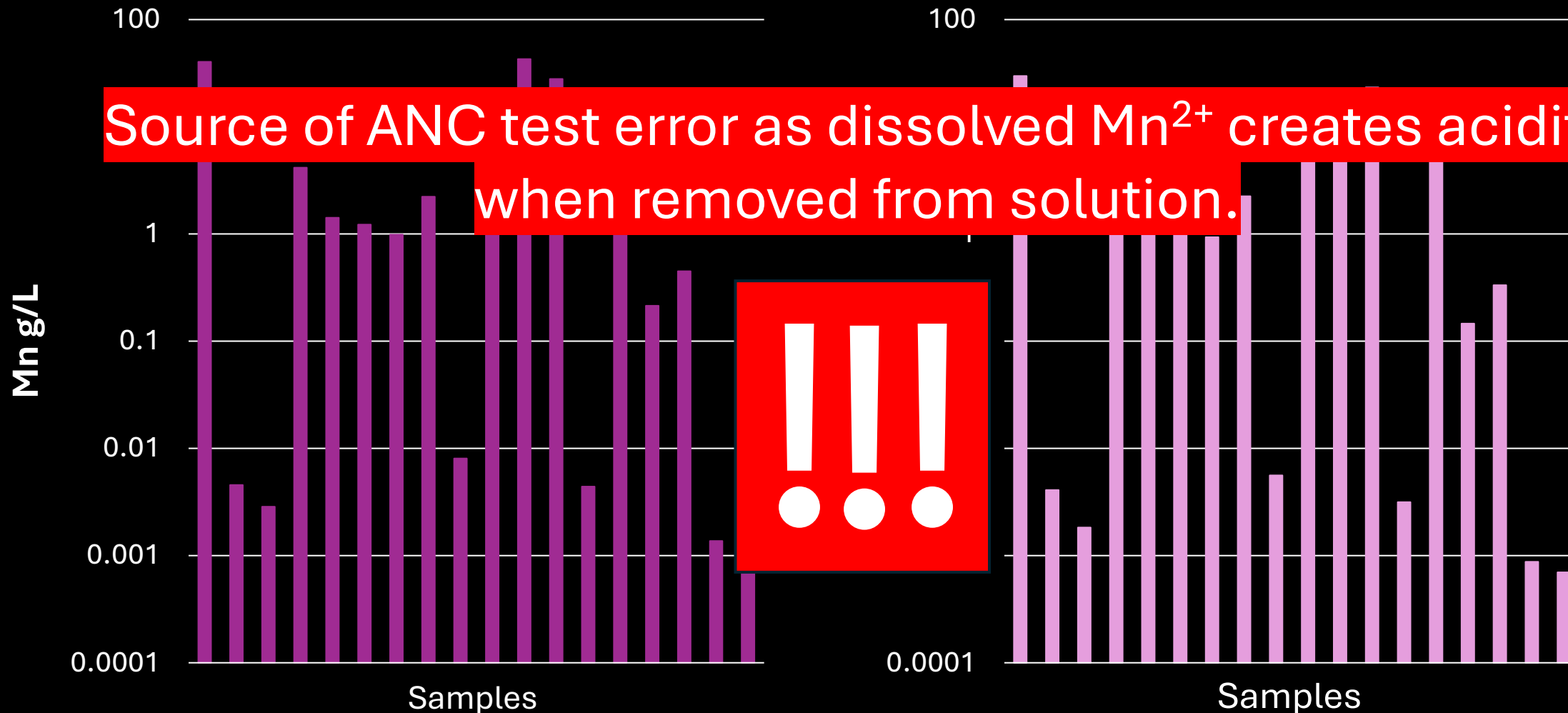
Fe removed from solution at end of test



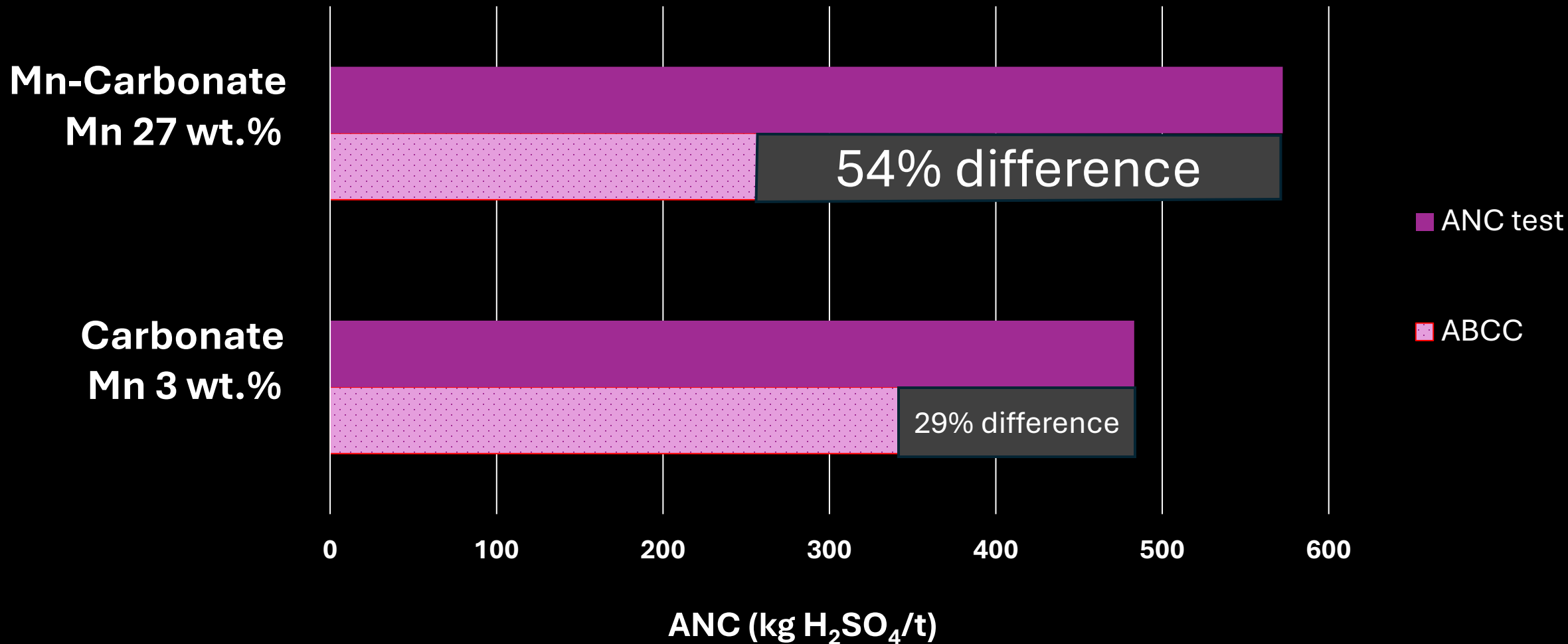
Mn abundant, not removed from solution

Dissolved at start

Dissolved at end



Experimentally calculated ANC is less than measured ANC



Key take aways

- Mn^{2+} was not removed from solution in ANC testing of mine samples.
- Dissolved Mn^{2+} creates acidity when removed from solution, source of ANC test error...
- ANC of a Mn-carbonate measured by ABCC method was 54% lower than ANC testing predicted.