

Designing a Titrimetric Method of Analysis

You have been asked to develop a titrimetric method for the analysis of solutions that are nominally 20-25 mM in nitrilotriacetic acid, a triprotic weak acid with successive acid dissociation constants of 2.2×10^{-2} , 1.1×10^{-3} , and 5.2×10^{-11} . A titrant that is nominally 0.1 M NaOH is available, although other concentrations may be made. Titrations using approximately 25-mL of titrant are desirable.

Determine a suitable sample volume and concentration of titrant.

Sketch the expected titration curve for your sample and determine which of the three potential equivalence points is best suited for this analysis.

Select a suitable visual indicator.

Estimate the maximum titration error based on the worst-case scenario of over-titrating or under-titrating the equivalence point due to the indicator's pH range.