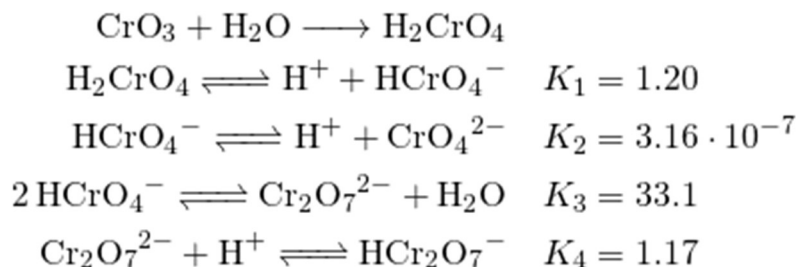


When dissolving chromium(VII) oxide in water, the following processes occur:



1. Write the equations corresponding to the equilibrium constants of the given reactions. Write the mass-balance and charge-balance equations.
2. Having made reasonable assumptions (state them in your answer), calculate the concentrations of all the aqueous species in a "0.1 M" chromium oxide solution. What is the pH of the solution?
3. By adding potassium hydroxide to 100 mL of the solution, the solution from (2) was adjusted to pH 4. Calculate the concentrations of all the aqueous species at pH 4 and determine the mass of potassium hydroxide added to the original solution.
4. Determine the pH value at which the concentrations of chromate and dichromate ions are equal.
5. Determine the pH value at which the concentrations of hydrochromate (HCrO_4^-) and dichromate ions are equal. Is there a unique answer to this question?