The following titration curve is for the titration of 20 mL of 0.1000 M H₃A with 0.1000 M NaOH. The acid dissociation constants for H₃A are: $K_{a1} = 3 \times 10^{-3}$, $K_{a2} = 5 \times 10^{-7}$, and $K_{a3} = 2 \times 10^{-11}$.

1. Write the equilibrium reactions that correspond to the 3 acid dissociation constants.

2. Write the neutralization reaction for a titration to point (a).
3. Write the neutralization reaction for a titration to point (d).

4. Identify the predominant form(s) of $H_3A$ at each of the indicated points on the titration curve. Give only species expected to have $\alpha$-values greater than 0.4.

   At point (c):

   At point (b):

5. What is the pH at the indicated points?

   At point (c):

   At point (b):

What would the curve look like for the titration of the weak base $Na_3A$ with $HCl$? Could you answer similar questions for that titration curve?