**Chemistry 3.6 AS 91392** Demonstrate understanding of equilibrium principles in aqueous systems



Writing Excellence answers to **Titration Curve – Equivalence Point pH** questions

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| **Titration Curve – Equivalence Point pH QUESTION** | |
| **Question:**  20.00 mL of 0.320 mol L–1 ammonia, NH3, is titrated with 0.640 mol L–1 hydrochloric acid, HCl.  p*K*a(NH4+) = 9.24  Show, by calculation, that the pH at the equivalence point (point C) is 4.96.  Kw = 1 x 10-14 | |
| **ANSWER** | |
| **1.** determine if equivalence point is greater or less than 7 (from curve or strong base/weak acid strong acid/weak base  And write down all available information |  |
| **2.** Write down neutralisation equation |  |
| **3.** calculate *n*(Base) to neutralise (and reach equivalence point and therefore n(Acid) from 1:1 equation)  n = cv  *also assume n*(NH3) =  *n*(NH4+)  *3sgf and units* |  |
| **4.** calculate *v*(Acid) to neutralise  (n(NH3) = n(HCl) from 1:1 equation)  v=n/c  *3sgf and units* |  |
| **5**. calculate c(B+)  c = n/total v  *also assume n*(B) =  *n*(B+) see step 3.  B = NH3 B+ = NH4+  total v = start volume base + v acid added  *3sgf and units* |  |
| **6**. calculate [H3O+]  Ka = 10-pKa  [H3O+] = √ Ka x c(B+)  *3sgf and units B+ = HA* |  |
| **7**. Calculate pH  pH = -log [H3O+]  *3sgf*  *Check pH against estimate on curve* |  |

NOTE: The white column is how your answer would appear on your test paper so make sure you **write out complete sentences**. The grey area is just to help you structure your answer and would not appear in the question.