Acid-Base Titration Curve

(1) Consider this titration curve.

   (a) This is a _____ (strong/weak acid) titrated with a strong base. The acid is _____ (monoprotic/diprotic).

   (b) Place a dot (•) at the equivalence point. The pH at the equivalence point is ____

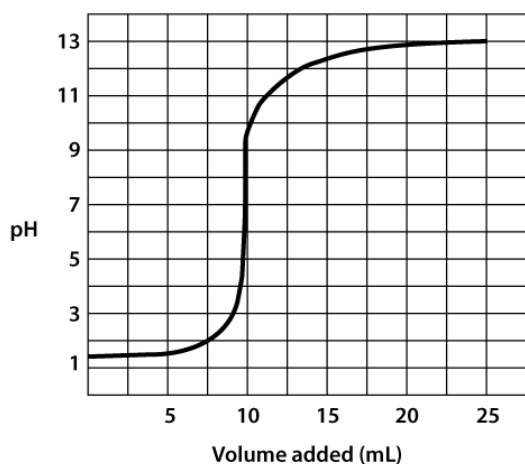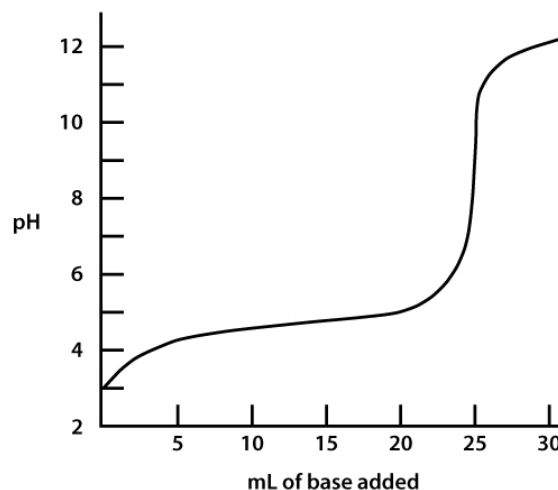   (c) What volume of the base was used to titrate the acid solution? _____ mL

   (d) Place a box (■) on the curve where the pH of the solution = pK_a of the acid.

      i. What is the pH at this point? _____

      ii. What is the pKa of the acid? _____

      iii. What is the Ka of the acid? _____

(2) From the given titration curve, determine the following:

   (a) if the acids/bases are strong or weak

   (b) the volume required to reach the equivalence point

(c) whether the acid or base was added from the buret

(d) the pH at the equivalence point

(e) the concentration of base used if this titration started with 50.0 mL of 0.050M acid.

Acid-Base Titration Curve

Answers

(1) Consider this titration curve.

(a) This is a <u>weak</u> (strong/weak acid) titrated with a strong base. The acid is <u>monoprotic</u> (monoprotic/diprotic).

(b) Place a dot (·) at the equivalence point. The pH at the equivalence point is <u>9</u>
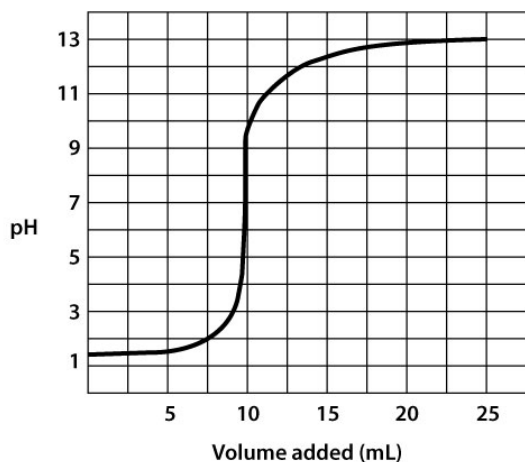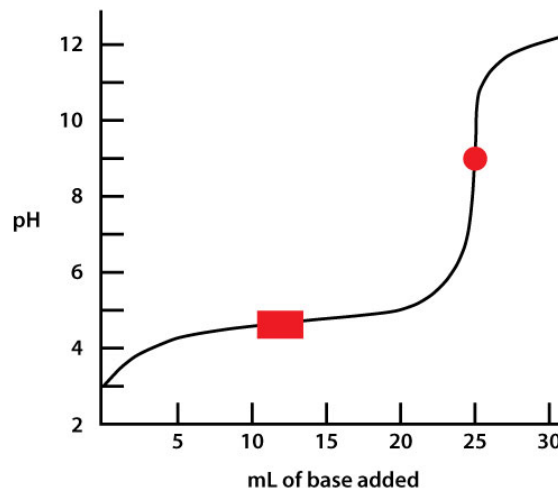
(c) What volume of the base was used to titrate the acid solution? <u>25</u> mL

(d) Place a box (■) on the curve where the pH of the solution = pK_a of the acid.

i. What is the pH at this point? <u>4.8</u>

ii. What is the pKa of the acid? <u>4.8</u>

iii. What is the Ka of the acid? <u>1.6×10^{-5}</u>

(2) From the given titration curve, determine the following:

(a) if the acids/bases are strong or weak

Strong acid and strong base because there is a steep vertical region cantered at pH 7.

(b) the volume required to reach the equivalence point

10 mL. The center of the vertical region occurs with 10 mL of base added.

(c) whether the acid or base was added from the buret

Before adding anything else, the flask contained the acid, as evidenced by a pH of 1.5. As the solution is added from the buret, the pH climbs and finishes in the basic pH region.

(d) the pH at the equivalence point

pH value is 7. The center of the vertical region occurs at pH 7.

(e) the concentration of base used if this titration started with 50.0 mL of 0.050M acid.

At the equivalence point

$M_A V_A = M_B V_B$ => (0.050 M)(50 mL) = (M_B)(10 mL) => M_B = 0.25 M