

**Marks**  
**7**

- A 20.0 mL solution of nitrous acid ( $\text{HNO}_2$ ,  $\text{p}K_a = 3.15$ ) was titrated to its equivalence point with 24.8 mL of 0.020 M NaOH. What is the concentration of the  $\text{HNO}_2$  solution?

Answer:

What was the pH at the start of the titration?

pH =

What was the pH after (a) 12.4 mL and (b) 24.8 mL of the NaOH had been added?

(a) 12.4 mL: pH =

(b) 24.8 mL: pH =

Qualitatively, how would each of these three pH values be affected if 0.020 M  $\text{NH}_3$  had been used in place of the NaOH solution? The  $\text{p}K_b$  of  $\text{NH}_3$  is 4.76.