

Q8. Which one of the following solutions can be classified as a buffer system?

- A)  $\text{Na}_2\text{CO}_3 / \text{H}_2\text{CO}_3$        B)  $\text{Na}_2\text{HPO}_4 / \text{NaH}_2\text{PO}_4$       C)  $\text{KCl} / \text{HCl}$   
 D)  $\text{H}_2\text{SO}_4 / \text{NaHSO}_3$       E)  $\text{KOH} / \text{NaOH}$

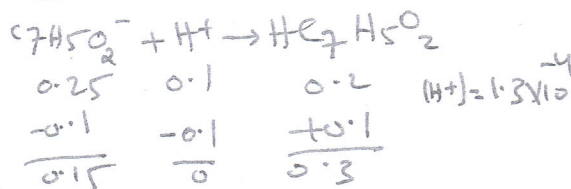
Q9. A 1.00 L buffer solution is 0.200 M in  $\text{HC}_7\text{H}_5\text{O}_2$  and 0.250 M in  $\text{LiC}_7\text{H}_5\text{O}_2$ . Calculate the pH of the solution after the addition of 100.0 mL of 1.00 M  $\text{HCl}$ . The  $K_a$  for  $\text{HC}_7\text{H}_5\text{O}_2$  is  $6.5 \times 10^{-5}$ .

- A) 4.19      B) 5.03      C) 4.41      D) 3.34       E) 3.89

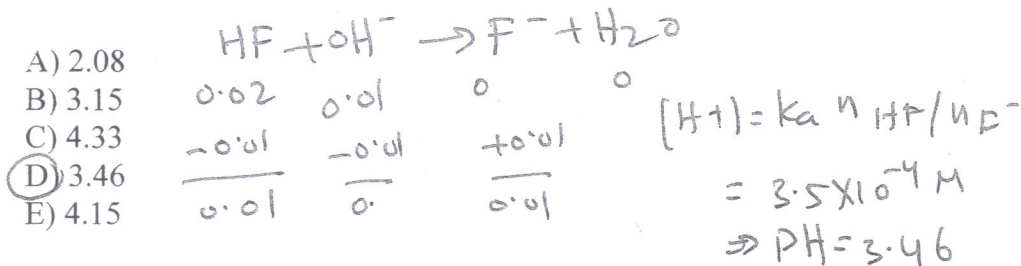
Q10.

When titrating  $\text{HF}$  with  $\text{NaOH}$  at  $25^\circ\text{C}$ , the

- A) pH will be less than 7 at the equivalence point.  
 B) pH will be equal to 7 at the equivalence point.  
 C) pH will be greater than 7 at the equivalence point.  
 D) titration will require more moles of base than acid to reach the equivalence point.  
 E) titration will require more moles of acid than base to reach the equivalence point.



Q11. A 100.0 mL sample of 0.20 M  $\text{HF}$  is titrated with 0.10 M  $\text{KOH}$ . Determine the pH of the solution after the addition of 100.0 mL of  $\text{KOH}$ . The  $K_a$  of  $\text{HF}$  is  $3.5 \times 10^{-4}$ .



Q12. A 100.0 mL sample of 0.10 M  $\text{NH}_3$  is titrated with 0.10 M  $\text{HNO}_3$ . Determine the pH of the solution after the addition of 100.0 mL of  $\text{HNO}_3$ . The  $K_b$  of  $\text{NH}_3$  is  $1.8 \times 10^{-5}$ .

