pH DETERMINATION

1 CHANGE OF pH OF BUFFER AFTER ITS DILUTION

CHANGE OF pH OF BUFFER AFTER ADDITION OF ACID

PRINCIPLE OF THE METHOD

Buffers are mixtures of weak acids and their salts with strong bases or mixtures of weak bases and their salts with strong acids. They are able to maintain approximately the same pH value after the addition of a small amount of strong acid or base. After the addition of a small amount of strong acid to the buffer, the pH changes only little. The buffer base is a reserve which prevents a greater change in pH. Buffers also resist pH changes after dilution.

MATERIALS AND INSTRUMENTS

glass beakers, a graduated pipette, an automatic pipette, a pipette pump, a glass rod, a pH tester Checker

CHEMICALS

phosphate-citrate buffer (citric acid/Na_2HPO_4) - A, B, C

0,1 mol/l HCl

PROCEDURE OF MEASUREMENT BY A pH METER

1. Turn on ("ON") or turn off ("OFF") the ph meter by a switch (button) which is on the red cover of the pH meter.
2. Turn on the pH meter and wait until the display shows the measurement mode "pH".
3. Mix thoroughly the measured solution before the measurement.
4. Dip the electrode into the test solution (the electrode immersion depth approximately 4 cm) and wait until the value on the display stabilizes.
5. Read the measured pH value on the display.
6. The electrode must be dipped in the solution only for necessary period of time.
7. It is necessary to rinse the electrode with distilled water after each measurement.
8. If pH measurements are not performed immediately after each other, it is necessary to keep the electrode between measurements in a test tube with the storage solution (electrode must not dry out).
9. After the measurement rinse carefully the electrode with distilled water and dip it back into the storage solution.
10. Turn off the pH meter.

PROCEDURE OF pH MEASUREMENT OF BUFFERS

1. Measure pH of the undiluted phosphate-citrate buffer in the beaker A, B or C.
2. Dilute the undiluted phosphate-citrate buffer ten times in the following way: Pipet 5 ml of the buffer to an empty beaker. Then add water after the mark of 50 ml. Stir with a glass rod.
3. Measure pH of the undiluted and the diluted phosphate-citrate buffer in the beakers using the pH meter.
4. Add 0,5 ml of 0,1 mol/l HCl to both beakers using the automatic pipette, stir and measure pH.
5. Twice repeat the step number 4.
6. Write all measured values in the tables.
7. Find out the change of pH value of the phosphate-citrate buffer after dilution. Compare the changes of pH values of both buffers after the addition of HCl.

TABLES OF THE MEASURED pH VALUES

SOLUTION	**pH**	**Δ pH**
a. undiluted phosphate-citrate buffer		
b. + 0,5 ml 0,1 mol/l HCl		(a - b)
c. + 0,5 ml 0,1 mol/l HCl		(a - c)
d. + 0,5 ml 0,1 mol/l HCl		(a - d)

SOLUTION	**pH**	**Δ pH**
e. 10x diluted phosphate-citrate buffer		
f. + 0,5 ml 0,1 mol/l HCl		(e - f)
g. + 0,5 ml 0,1 mol/l HCl		(e - g)
h. + 0,5 ml 0,1 mol/l HCl		(e - h)

SOLUTION	**pH**	**Δ pH**
a. undiluted phosphate-citrate buffer		
e. 10x diluted phosphate-citrate buffer		(e - a)

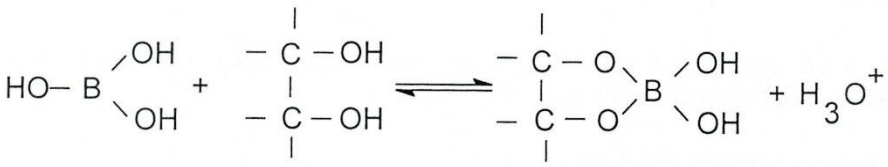
CONCLUSION

(2) THE ACIDITY CHANGE OF BORIC ACID AS A RESULT OF THE FORMATION OF A COMPLEX WITH SUGARS

PRINCIPLE OF THE METHOD

Boric acid is a weak acid. However, its power increases after the formation of a complex with sugars so that it is possible to determine it by lye titration.

The reaction of boric acid with -OH groups of sugars:



MATERIALS AND INSTRUMENTS

a glass beaker, a graduated pipette, a pipette pump, a glass rod, pH tester Checker

CHEMICALS

0,05 mol/l H_3BO_3

0,1 mol/l D-mannose

PROCEDURE

1. Measure pH of boric acid in the beaker.
2. Add 25 ml 0,1 mol/l D-mannose to the beaker with 25 ml of 0,05 mol/l boric acid.
3. Stir and measure pH.

THE MEASURED pH VALUES

SOLUTION	pH
boric acid	
boric acid after the addition of D-mannose	

CONCLUSION