

Short Report

March 2022

Comparative study pH-Fix test strips

1. Summary / Abstract

In the following study, the pH-Fix 0-14 test strips from MACHEREY-NAGEL (REF 92110) and the MQuant® pH 0-14 test strips from Merck (REF 1.09535.0001) were tested for their usability and compared with each other. The subjects (with and without laboratory experience) carried out comparative tests with buffer solutions and evaluated the design, handling and general user-friendliness of the product. After evaluating the results, the test subjects were able to correctly reproduce the pH value of the test solutions with the product pH-Fix 0-14 test strips (MN) with a rate of 88 %. For the MQuant® pH 0-14 test strips (Merck), this rate was 80 %. The usability of the pH-Fix 0-14 test strips (MN) averaged 4.65 (scale 1 (very poor) - 5 (very good)). The MQuant® pH 0-14 test strips (Merck) scored an average of 4.09.

2. Study design

Products

- pH-Fix 0-14 from MACHEREY-NAGEL, REF 92110 (LOT: 10D0121)
- MQuant® pH 0-14 from Merck, REF 1.09535.0001 (LOT: HC151257).



Subjects

- 15 (w = 8, m = 7) persons between the age of 20 - 50 years
- of which 4 - persons with laboratory experience in the field of pH value determination of buffer solutions with pH test strips

3. Results

3.1. Comparison of pH value determination - pH-Fix 0-14 (MN) vs. MQuant® pH 0-14 (Merck)

The correctly determined pH values of the two different pH test strips (see Appendix) were set in the ratio of all comparative measurements performed and expressed in %:

Product	pH-Fix 0-14 (MN)	MQuant® pH 0-14 (Merck)
Total number of measurements (m)	225	225
Correctly determined values (m _k)	198	180
Correctness (m_k / m x 100)	88 %	80 %

Table 1: Comparison of correct pH value determinations with the test strips pH-Fix 0-14 (MN) and MQuant® pH 0-14 (Merck).

3.2. Comparison of fitness for use - pH-Fix 0-14 (MN) vs. MQuant® pH 0-14 (Merck)

The average usability scores obtained (see Appendix) show that MACHEREY-NAGEL's pH-Fix 0-14 test strips, with a score of 4.65, performed better than Merck's MQuant® pH 0-14, with a score of 4.09:

Product	pH-Fix 0-14 (MN)	MQuant® pH 0-14 (Merck)
Average score (scale 1 to 5)	4,65	4,09

Table 2: Comparison of the test strip usability of pH-Fix 0-14 (MN) and MQuant® pH 0-14 (Merck).

4. Appendix

Total	Target pH value														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Measured pH value	0	9	10	-	-	-	-	-	-	-	-	-	-	-	-
	1	6	5	1	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	14	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	15	-	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	15	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	15	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	15	-	-	-	-	-	-	-
	7	-	-	-	-	-	-	-	15	-	-	-	-	-	-
	8	-	-	-	-	-	-	-	-	15	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-	15	-	-	-	-
	10	-	-	-	-	-	-	-	-	-	-	15	-	1	-
	11	-	-	-	-	-	-	-	-	-	-	-	14	2	-
	12	-	-	-	-	-	-	-	-	-	-	1	12	1	-
	13	-	-	-	-	-	-	-	-	-	-	-	-	-	9
	14	-	-	-	-	-	-	-	-	-	-	-	-	5	11

Table 1: Comparison of the nominal and actual pH value determinations with the test strips pH-Fix 0-14 from MACHEREY-NAGEL.

Total	Target pH value														
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Measured pH value	0	12	-	1	-	-	-	-	-	-	-	-	-	-	-
	1	3	12	2	-	-	-	-	-	-	-	-	-	-	-
	2	-	2	12	-	-	-	-	-	-	-	-	-	-	-
	3	-	-	-	15	-	1	-	-	-	-	-	-	-	-
	4	-	-	-	-	14	-	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	12	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	2	14	5	-	-	-	-	1	-
	7	-	-	-	-	-	-	1	10	9	-	-	1	-	-
	8	-	-	-	-	1	-	-	-	7	-	-	-	-	-
	9	-	-	-	-	-	-	-	-	-	10	1	-	-	-
	10	-	-	-	-	-	-	-	-	-	5	12	1	-	-
	11	-	-	-	-	-	-	-	-	-	-	2	11	-	-
	12	-	-	-	-	-	-	-	-	-	-	-	2	14	-
	13	-	-	-	-	-	-	-	-	-	-	-	-	-	14
	14	-	-	-	-	-	-	-	-	-	-	-	-	-	1

Table 2: Comparison of target and actual pH values determinations with Merck's MQuant® pH 0-14 test strips.

Question	Scale	Comments
Is the experimental procedure clearly described on the plug-in box?	4,61	Immersion time not clearly defined
Is it clear how long the test strips are to be used?	4,50	
Was the removal of the test strip practical?	4,50	
Do you see an advantage in removing the test strips through the "smart corner"?	4,15	More practical when removing than when closing
Does the test strip length agree with you when dipping into the sample?	4,85	
Is stopping the test strip at the comparison scale clearly understandable?	4,62	Reading direction not directly clear
Could the corresponding pH value of the sample be easily determined by comparing the color of the test patches with the color scale?	4,38	
Did the division and the colors of the color scale allow a simple assessment of the pH value?	4,38	Differentiation pH 0 and pH 1 difficult
Were you able to complete the testing without help from others?	4,92	Differentiation pH 0 and pH 1 difficult
Would you rate the use of the test strip as unproblematic?	4,85	
Is the use of the test strip intuitive and easy to understand?	5,00	
Did the test strip meet your expectations?	5,00	
Overall score	4,65	

Table 3: Results of the usability questionnaires of pH-Fix 0-14 (MN).

Question	Scale	Comments
Is the experimental procedure clearly described on the plug-in box?	4,29	Instructions not intuitively recognizable
Is it clear how long the test strips are to be used?	2,79	No MHD available
Was the removal of the test strip practical?	3,43	Difficulties with wide fingers
Does the test strip length agree with you when dipping into the sample?	3,54	Test strip too short
Is stopping the test strip at the comparison scale clearly understandable?	4,23	Alignment of the scale not practical
Could the corresponding pH value of the sample be easily determined by comparing the color of the test patches with the color scale?	3,85	Difficulties at pH 6 - 8
Did the division and the colors of the color scale allow a simple assessment of the pH value?	3,96	
Were you able to complete the testing without help from others?	5,00	
Would you rate the use of the test strip as unproblematic?	4,31	
Is the use of the test strip intuitive and easy to understand?	4,65	
Did the test strip meet your expectations?	4,92	
Overall score	4,09	

Table 4: Results of the usability questionnaires of MQuant® pH 0-14 (Merck).