

Total Hardness H 2

Test kit for the determination of residual hardness in soft water

Method:

Complexometric titration

Contents of test kit (*refill pack):

sufficient for 200 tests with an average hardness of 1.0 °d

15 mL indicator solution H 2*

100 mL titration solution TL H 2*

1 test tube with ring mark

1 titration syringe 0–2.0 °d resp. 0–0.36 mmol/L

(1 graduation mark \triangleq 0.05 °d resp. 0.01 mmol/L)

2 plastic dropping tips

Hazard warning:

Information regarding safety can be found on the box' label and in the safety data sheet. You can download the SDS from www.mn-net.com/SDS.

Procedure:

1. Rinse test tube several times with the test sample and fill to ring mark.
2. Add 2 drops indicator solution H 2 and shake. The test sample turns red. If sample turns green, the hardness is < 0.05 °d.
3. Put dropping tip onto the titration syringe, press down plunger, dip the tip into the titration solution TL H 2 and draw up plunger slowly, until the lower rim of the black plunger O-ring agrees with value 0 on the barrel scale. The small air pocket below the plunger tip does not disturb the determination.
4. Addition of the titration solution: We recommend taking the syringe in the left hand and the test tube in the right hand (see drawing) and adding titration solution drop-wise while smoothly shaking the test tube. As soon as the red color turns lighter, drop more slowly until the solution turns completely green. Read off total hardness in °d or mmol/L from the syringe barrel (lower rim of the black plunger O-ring). Color change is followed easily when holding test tube before a light background (e.g. sheet of white paper). For the expression in °e, multiply the result in German degrees with 1.25.
If the first syringe filling isn't enough to reach color change (hardness > 2 °d), fill syringe once more with titration solution TL H 2 and titrate to color change (as above). Read off total hardness and add for each used syringe filling 2 °d.

°d	°e	°f	mg/L CaO	mg/L CaCO ₃	mmol/L H ⁺
0.20	0.25	0.36	2.00	3.56	0.07
0.40	0.50	0.71	4.00	7.12	0.14
0.60	0.75	1.07	6.00	10.68	0.21
0.80	1.00	1.42	8.00	14.24	0.29
1.00	1.25	1.78	10.00	17.80	0.36
1.20	1.50	2.14	12.00	21.36	0.43
1.40	1.75	2.49	14.00	24.92	0.50
1.60	2.00	2.85	16.00	28.48	0.57
1.80	2.25	3.20	18.00	32.04	0.64
2.00	2.50	3.56	20.00	35.60	0.71

This method cannot be applied for the analysis of sea water.

Disposing of the samples:

Information regarding disposal can be found in the safety data sheet. You can download the SDS from www.mn-net.com/SDS.

Interferences:

Copper(II) ions may delay the indicator change, or even block this change if higher levels are present. Therefore, in the case of copper pipes, let the water run for a sufficient amount of time before taking the sample.

Note:

For the determination of total hardness in the presence of copper ions, please contact MACHEREY-NAGEL for special working instructions.

