Salifert Test Kits instructions:

Ammonia

1. Add with 5ml syringe 1 ml of water in the test vial.

2. Add 6 drops of NH3-1 (watch out caustic!) and swirl gently for 5 seconds.

3. Add 6 drops of NH3-2 (watch out contains Mercury salts, wash hands after use, keep away from food, see additional warning under the heading WARNING). Swirl gently for 5 seconds and allow to stand for 5 minutes.

4. Hold the test vital in front of you and look through the side of the test vial. Keep the color chart behind the test vial. Ensure that a white piece of the color chart is behind the liquid layer. The values on the color chart are in mg/L total ammonia (that is NH3 + NH4+).

Boron

1. Place two empty test vials next to each other on a white background.
2. Add with the syringe 8ml (2 x 4ml) of water in the left test vial.
3. Add 8 drops of B-1 and 1 drop of B-3 to the left test vial and swirl gently for 20 seconds. If the color is yellow then most probably one of the criteria mentioned under IMPORTANT is not met and the test cannot be conducted.
4. With the same (empty) 5ml syringe draw from the left test vial 4ml and put this in the right side test vial.
5. Add one spoon of B-2 powder (spoon inside bottle) to the right side vial and swirl the contents of this test vial gently for 20 seconds.
6. Add to the right side test vial B-3 reagent drop by drop, swirling gently after each drop for 5-10 seconds until the color of the liquid in the right side vial matches (almost) with that of the left side vial. Remember when comparing colors to have a white background.
7. Each drop added of B-3 in step 6 corresponds to 0.5 ppm boron.

Natural Sea water contains approx. 4.4 - 4.8 ppm boron.

Calcium

1. Add with 5 ml syringe 3 ml of water in the test vial. For a low resolution and more tests per kit add 1.5 ml instead of 3 ml.

   2. Add 6 drops of Ca-1 to the water in the test vial. and swirl gently for 10 seconds. For low resolution 3 instead of 6 drops.

   3. Add 1 spoon of Ca-2 (low resolution approx. 1/2 spoon) and swirl for 5 seconds.

   4. Put the plastic tip firmly on the 1 ml syringe. And draw into the syringe the Ca-3 reagent (ensure that the end of the plastic tip is constantly submersed in the Ca-3 reagent) till the lower end of the black part of the pistion is exactly at the 1.00 ml mark. There will be air present just below the piston. This is the air which was present between the end of the plactic tip and the piston. This will not influence the test result.

   5. Add dropwise with the 1 ml syringe the Ca-3 reagent to the water in the test tube. Swirl after each drop a second or

   Continue with this until color changes from pink-red to a clear blue color.

   6. Hold the syringe with the tip facing upward and read the position of the , now the upper end, of the black part of the piston. The syringe has graduations of 0.01 ml. Read the Calcium value from the table or calculate as follows.

   ppm Ca = (1 - reading in step 6) x 500

   If you have chosen for the lower resolution multiply the calculated result by 2.

   Natural sea water contains 425 - 450 ppm calcium. Use salifert`s Coral Calcium for good results.

Calcium Table

Note: If you took 1.5 ml of water in step 1 then multiply the calcium values by 2!

Reading in ml`s (step 6)	Calcium Concentration in ppm
0.00	500
0.02	490
0.04	480
0.06	470
0.08	460
0.10	450
0.12	440
0.14	430
0.16	420
0.18	410
0.20	400
0.22	390
0.24	380
0.26	370
0.28	360
0.30	350
0.32	340
0.34	330
0.36	320
0.38	310
0.40	300
0.42	290
0.44	280
0.46	270
0.48	260
0.50	250
0.52	240
0.54	230
0.56	220
0.58	210
0.60	200
0.62	190

0.64	180
0.66	170
0.68	160
0.70	150
0.72	140
0.74	130
0.76	120
0.78	110
0.80	100
0.82	90
0.84	80
0.86	70
0.88	60
0.90	50
0.92	40
0.94	30
0.96	20
0.98	10

Activated Carbon

1. Add to the test vial the carbon in use until the cone is filled. If you would like to test unused carbon, ensure that you wash it first to avoid carbon dust being introduced. Also follow any other instruction of the manufacturer of the GAC before testing.

2. Add with the syringe 5ml of water in which the carbon is used (e.g., aquarium water) in the test vial.

3. Add to the test vial 1 drop of the C reagent, cap the test vial and invert the vial at least 20 times very slowly (in such a way that the mixing lasts at least 1 minute) to ensure mixing but to avoid that too much carbon dust is produced. If the carbon still has some capacity to absorb organic substances then the blue color will virtually vanish. Continue adding 1 drop at a time followed by mixing in the same way until the color of the water remains practically blue. Use the table given below to obtain an indication of the carbon in use.

Carbon Table

Drops Added	Condition
1	exhausted
2	almost exhausted
3	some capacity left
4	can still be used, test again after 1 week
5	is still good

Copper

1. Fill the syringe with 5ml of water and add with the syringe 1ml of water in the test vial. Leave the remaining 4ml in the syringe.

2. Add to the water in the test vial exactly 1 spoon of the Cu powder (spoon inside bottle). Swirl the contents of the test vial gently for 20 seconds.

3. If the color is clear but faint blue (place test vial on white background) then stop and read the copper concentration from the table.

Otherwise add one more ml of water and swirl for 10 seconds. Continue adding more water until a clear blue color is observed (however light the blue color might be) or a maximum of 20ml water has been added to the test vial.

Add the first 5ml`s in increments of 1ml and then in increments of 5ml`s (See also table)

The amount of water used to make a blue coloration visible is a measure for the copper content. Use the table to obtain the copper concentraion.

If after addition of 20ml still no blue coloration is visible then the free or weakly chelated copper concentration is less than 0.05 ppm.

Copper Table

ml`s Added	Copper Concentration in ppm
1	>=1.0
2	0.50
3	0.33
4	0.25
5	0.20
10	0.10
15	0.07
20	0.05

Iodine

Instructions for Iodide Test:

1. Rinse test vial before use with a little aquarium water and add 2ml of water with the syringe.

2. Add 6 drops of I2-3 and swirl gently for 2-3 seconds after each drop (I-2-2 is omitted in this procedure).

3. After exactly 4 minutes after adding this reagent compare colors with the iodide part of the color chart by holding the test vial with its side firmly against a white piece of the color chart and by looking through the opposite side.

Waiting longer than 4 minutes will cause further darkening of the colors. For color comparison use diffuse daylight. Sometimes the colors can have a more yellow tinge depending on the color temperature of the light.

If the color turns blue, purple or black or a precipitate forms then the iodide concentration is far above 0.2 ppm.

After each test rinse the test vial about ten times with tap or RO water.

Instructions for Iodate and Iodine Test:

1. Rinse test vial before use with a little aquarium water and add 2ml of water with the syringe.

2. Add 1 drop of I2-2 (I2-1 is omitted in this procedure) reagent and swirl gently for 10 seconds.

3. Add 6 drops of I2-3 and swirl gently for 10 seconds. Allow it to stand for 3 minutes.

Now look from the side od the test vial. If the color is dark yellow, green or blue or even has several blue colored particles in it then this suggests that the iodate concentration is far higher than 0.2ppm and a precipitate can form in the next step. This might result in the next step in an almost colorless solution with tiny blue particles.

The next step will allow the measurement if the iodate concentration is not far above 0.2ppm

4. Add 5 drops of I2-2 and swirl gently for 10 seconds. Now compare colors with the iodate part of the color chart by holding the test vial with its side firmly against a white piece of the color shart and by looking through the opposite side.

After each test rinse the test vial about ten times with tap or RO water.

KH/Alkalinity Test

- Calcium is not the only substance needed to form the skeletal material of corals and allow calcareous algae to grow. Carbonate and bicarbonate are also needed and these two substances can have a major effect on stabilizing or buffering pH levels in the aquarium in the correct range of 8.1 to 8.4.
- The total carbonate and bicarbonate concentration is also called alkalinity or carbonate hardness and for a stable system the alkalinity should not fluctuate by more than 5% from the optimum level of approx. 2.8 meq/L i.e. a maximum fluctuation of 0.14 meq/L.
- The Salifert test is sensitive enough to detect small changes in levels of alkalinity, measuring in steps of 0.1 meq/L and demonstrating a very sharp color change.
- Sufficient for 100 to 200 tests.
- The Salifert KH + pH buffer additive makes correction of the alkalinity or carbonate hardness simple and does not upset the pH of the system
- Can be used for marine water, frewshwater and garden pond water

Warning!

The KH/Alkalinity reageant contains a dye. Avoid spilling the dye on fabric and other materials since they may become stained. Keep out of reach of children. Not for consumption.

Instructions:

1. Add with the 5 ml syringe 4 ml of water in the test vial. For a lower resolution and more tests per kit add 2 instead of 4 ml.

2. Shake the KH-Ind dropping bottle a few times and add 2 drops in the test vial (1 drop for the low resolution mode).

3. Put the plastic tip firmly on the 1 ml syringe. And draw into the syringe the KH reagent (ensure that the end of the plastic tip is constantly submersed in the KH reagent) till the lower end of the black part of the piston is exactly at the 1.00 ml mark. There will be some air present just below the piston. This is the air which was present between the end of the plastic tip and the piston. This will not influence the test result.

4. Add dropwise with the 1 ml syringe the KH reagent to the water in the test tube. Swirl after each drop a second or two. Continue with this until the color changes from blue/green to orange-red or pink color (whichever color is observed first).

5. Hold the syringe with the tip facing upward and read the position of the, now the upper end, of the black part of the piston. The syringe has graduations of 0.01 ml. Read the KH or alkalinity value from the table or calculate as follows.

KH in dKH = (1 - reading in step 5) x 16

Alk in meq/L = (1 - reading in step 5) x 5.71

If you have chosen for the lower resolution multiply the calculated result by 2.

Natural sea water has a KH of 8 dKH or alkalinity of 2.9 meq/L

KH and alkalinity are increased safely with Salifert`sKH + pH Buffer.

KH/Alkalinity Table
If you took 2 ml of water in step 1 then multiply the KH and alkalinity values by 2!

Reading in ml`s (step 5)	KH value in dKH	Alkalinity in meq/L
0.00	16.0	5.71
0.02	15.7	5.60
0.04	15.4	5.49
0.06	15.0	5.37
0.08	14.7	5.26
0.10	14.4	5.14
0.12	14.1	5.03
0.14	13.8	4.91
0.16	13.4	4.80
0.18	13.1	4.69
0.20	12.8	4.57
0.22	12.5	4.46
0.24	12.2	4.34
0.26	11.8	4.23
0.28	11.5	4.11
0.30	11.2	4.00
0.32	10.9	3.89
0.34	10.6	3.77

0.36	10.2	3.66
0.38	9.9	3.54
0.40	9.6	3.43
0.42	9.3	3.31
0.44	9.0	3.20
0.46	8.6	3.09
0.48	8.3	2.97
0.50	8.0	2.86
0.52	7.7	2.74
0.54	7.4	2.63
0.56	7.0	2.51
0.58	6.7	2.40
0.60	6.4	2.29
0.62	6.1	2.17
0.64	5.8	2.06
0.66	5.4	1.94
0.68	5.1	1.83
0.70	4.8	1.71
0.72	4.5	1.60
0.74	4.2	1.49
0.76	3.8	1.37
0.78	3.5	1.26
0.80	3.2	1.14
0.82	2.9	1.03
0.84	2.6	0.91
0.86	2.2	0.80
0.88	1.9	0.69
0.90	1.6	0.57
0.92	1.3	0.46
0.94	1.0	0.34
0.96	0.6	0.23
0.98	0.3	0.11

Magnesium

1. Add with the 5 ml syringe 3 ml of water in the test vial.

2. Add 6 drops of Mg-1 and swirl gently for 30 seconds.

3. Add 1 spoon of Mg-2 powder (spoon inside) to test vial and swirl for 10 seconds.

4. Place the plastic tip firmly on the 1 ml syringe and draw into this Mg-3 reagent until the lower end of the black syringe part is at the 1.00 ml mark. Ensure that during this that the plastic tip is submersed in the Mg-3 reagent to avoid that air bubbles are withdrawn instead of liquid. An air layer between the liquid and the piston is normal.

This is air which was present between the end of the tip and the piston, this will not influence the result.

5. Start adding the Mg-3 reagent with the 1 ml syringe to the testvial until the color changes to gray or blue (whichever color is observed first). Do this drop wise and swirl after each drop for a second or two.

6. Hold the syringe with the tip facing upward and read the position of the upper end of the black scringe part. Each division corresponds to 0.01 ml. The magnesium concentration can be obtained from the table or by use of the following equation:

ppm Mg = (1 - reading in step 6) x 1500

Natural sea water has a magnesium concentration of approx. 1300 - 1500 ppm. The concentration varies with salinity.

Too low magnesium concentration makes maintaining correct calcium and alkalinity concentration difficult. Magnesium concentration can be increased with Salifert`s magnesium.

Magnesium Table
Note: If you took 1.5 ml of water in step 1 then multiply the calcium values by 2!

Reading in ml`s (step 6)	Magnesium Concentration in ppm
0.00	1500
0.02	1470
0.04	1440
0.06	1410
0.08	1380
0.10	1350
0.12	1320
0.14	1290
0.16	1260
0.18	1230
0.20	1200
0.22	1170
0.24	1140
0.26	1110
0.28	1080
0.30	1050
0.32	1020
0.34	990
0.36	960
0.38	930
0.40	900
0.42	870
0.44	840
0.46	810
0.48	780
0.50	750
0.52	720
0.54	690
0.56	660
0.58	630
0.60	600
0.62	570
0.64	540
0.66	510
0.68	480

0.70	450
0.72	420
0.74	390
0.76	360
0.78	330
0.80	300
0.82	270
0.84	240
0.86	210
0.88	180
0.90	150
0.92	120
0.94	90
0.96	60
0.98	30

Nitrite

Instructions:

1. Add with the syringe 1ml of water in the test vial.

2. Add to 1 level spoon of the NO2 powder. Swirl the contents of the test tube gently for 20 seconds. Allow to stand for 3 minutes.

3. Place the open test vial on top of the color chart on a part of the chart which is whiteand compare the colors looking from the top. Read the corresponding nitrite content. An intermediate color corresponds to an intermediate nitrite content.

The nitrite values are in ppm nitrite. If you prefer a reading in ppm Nitrite-Nitrogen then multiply the reading by 0.3 or use the table given below.

Higher Sensitivity

After your aquarium or garden pond has cycled you will need a much higher sensitivity. This is easily accomplished by looking through the side when comparing colors. Hole the test tube with its side against a white piece of color chart. The readings have to be divided by 10. In this way you will be able to detect 0.01 ppm as nitrite or 0.003 ppm as nitrite-nitrogen easily.

Nitrite Table

ppm Nitrite	ppm Nitrite-Nitrogen
0.1 (too high)	0.03
0.2	0.06
0.4 (danger)	0.12
1.0	0.30
2.0	0.60
4.0	1.20

Nitrate

Medium Range:

1. Fill test tube with 1 ml of water.

2. Add 1 level scoop NO3-1.

3. Add 1 level scoop NO3-3 (NO3-2 is omitted in this procedure) and swirl gently for 30 seconds.

4. Let it stand for 3 mintues.

5. Place the test tube on a white part of the color chart and compare colors looking from the top.

If the color corresponds to a value significantly lower than 10 mg/L try using the low range procedure to obtain a better resolved value.

Low Range:

1. Fill test tube with 10 ml of water.

2. Add 1 level scoop NO3-1.

3. Add 1 drop of NO3-2 reagent.

4. Add 1 level scoop NO3-3 and swirl gently for 30 seconds.

5. Let it stand for 3 minutes.

6. Place the test tube on a white part of the color chart and compare colors looking from the top. Divide the values on the chart by 10.

Note: A reading, after division, of 10 mg/L (ppm) could imply that the value is higher. Use medium range procedure in such cases.

Values on the chart are in mg/L or ppm NO3.

Oxygen

1. Add to the test cial 5ml of water.

2. Add 5 drops of O2-1 and swirl gently for 20 seconds. Do not shake since this could change the oxygen content of the water too much.

3. Add 6 drops of O2-2 and swirl gently for 15 seconds. Allow to stand for marine water 5 minutes and other types of water for 1 minute.

4. Add 6 drops of O2-3 and swirl for 20 seconds. Allow 30 seconds for color development.

5. Place the test vial on a white part of the color scheme and compare the colors by looking from above. An immediate color corresponds to an intermediate oxygen content. The values on the color chart are in mg/l (ppm) oxygen.

Try to maintain in fresh water (aquarium of garden pond) an oxygen content of 8mg/l or higher. In marine water an oxygen concentration of atleast 7mg/l is advisable. Some fish need higher oxygen concentrations.

Phosphate

1. Add with the syringe 10ml of water in the test vial.

2. Add to this 4 drops of PO4-1 reagent and swirl the test vial gently for 10 seconds.

3. Add to this 1 level scoop of PO4-2 reagent and swirl the contents gently for 30 seconds.

4. Place the open test vial on top of the color shart on a part of the chart which is white and compare the colors looking from the top. Read the corresponding phosphate content. An intermediate color corresponds to an intermediate phosphate content.

The phosphate values are in ppm Phosphate. If you prefer a reading in ppm Phosphate-Phosphor then divide the reading by 3 or use the table given below.

Higher Sensitivity

Should you require an even higher sensitivity then double the water sample and the reagents. The scale should then be divided by 2.

Phosphate Table

ppm Phosphate	ppm Phosphate-Phosphor
0.03 (good)	0.01
0.10 (critical)	0.03
0.25 (coral growth retarded)	0.08
0.50	0.17
1.00	0.33
3.00	1.00

PH

1. Add with syringe 5ml of water in the test tube.

2. Add with the dropping bottle pH 4 drops and swirl gently for 10 seconds.

3. Put the open test tube on the white part of the color chart. View from above and read the corresponding pH value. It might be possible that the color is in between two different ones, then the pH value is as well in between the two corresponding values.

Silicate

1. Add with syringe 10ml of water in the test vial (low resolution mode 1ml)

2. Add to this 4 drops of Si-1 (low resolution 2 drops) reagent and swirl the test vial gently for 10 seconds. Allow to stand for 5 minutes.

3. Add to this 4 drops of Si-2 (low resolution 2 drops) reagent and swirl the contents gently for 30 seconds.

4. Add to this 1 level scoop of Si-3 reagent and swirl the test vial for 20 seconds.

5. Place the open test vial on top of the color chart on a part of the chart which is white and compare the colors looking from above. Read the corresponding dissolved silicon content. An intermediate color corresponds to an intermediate dissolved silicon content.

Note: If the low resolution mode was used then multiply the values on the color chart by 10.

The silicate values are in ppm (mg/l) siliconoxide. To convert the values from ppm siliconoxide to ppm silicon multiply the value by 2.1.

Avoid using tap water or RO water which contains more than 2ppm as dissolved silicon. In marine water the dissolved silicon content should be below the detection limit of this test.

Strontium

1. Fill test vial with 5ml of water (use 5ml syringe).

2. Add 12 drops Sr-1 (caution caustic) and swirl gently for 10 seconds.

3. Add 1 level scoop of Sr-2 and swirl gently for 5 seconds. The color should be red/pink.

4. Fit the 1ml syringe without the yellow label with the small plastic tip. Ensure that the tip is mounted firmly. Fill this syringe with 1ml of Sr-3 (lower end of black rubber ring at 1.00ml mark). Dose this amount in the test vial and swirl gently for 20 seconds. If the color has changed to blue and remains so even after an additional 30 seconds then the calcium concentration is far too low (approx. 300mg/l or less) and should be corrected first before doing strontium testing.

5. Again fill this syringe with 1ml of Sr-3. Add this drop wise to the test vial. Swirl gently for a few seconds after each drop until the color changes to blue. If the color has changed to blue then swirl gently for 15 seconds. It is very likely that the color will revert back and will not be pure blue. In that case add one more drop of Sr-3 and swirl again for 15 seconds. Repeat this until the color remains blue.

6. Hold the syringe with the plastic tip facing upward. Read the value at the upper part of the black rubber ring. Look for this value in the calcium table to get the calcium concentration.

7. Fill the 1ml syringe with the yellow label (no plastic tip needed and is not supplied) with 0.5ml Sr-4 (lower end of black rubber ring at 0.50ml mark). Add this to the test vial and swirl gently for 10 seconds. The color will now be red/pink.

8. Add two levels scoops of Sr-5 and swirl gently until this powder has dissolved. Let it stand for 12-15 minutes (use a clock).

9. Fill the 1ml syringe without the yellow label and fitted with the plastic tip with 1ml of Sr-3 . Add this drop wise to the test vial. Swirl gently for 20 seconds (should definitely not be less that 20 seconds) after each drop until the color changes to blue.

10. Hold the syringe with the syringe with the plastic tip facing upward. Read the value at the upper part of the black rubber ring. Look for this value in the strontium table to obtain the strontium concentration.

Calcium Table

Reading from Step 5	Calcium mg/l
0.96	308
0.92	320
0.88	332
0.84	344
0.80	356
0.76	368
0.72	380
0.68	392
0.64	404
0.60	416
0.56	428
0.52	440
0.48	452
0.44	464
0.40	476
0.36	488
0.32	500
0.28	512
0.24	524
0.20	536
0.16	548
0.12	560
0.08	572
0.04	584
0.00	596

Strontium Table

Reading from Step 10	Strontium mg/l
1.00	40 or higher
0.99	34
0.98	28
0.97	22

0.96	16 good
0.95	10 good
0.94	4
0.93	0-3

Note: Error in strontium measurement is approx. +/- 5mg/l. Error in calcium measurement is approx. 2%.

Organics

1. Add with the 5ml syringe, 4ml water in both small test vials.

2. Put one test vial on the left side and the other on the right side.

3. Add to the vial on the right side 3 drops of Org-1 and swirl for 5 seconds. Allow to stand for at least 15 minutes.

Add to the right side vial one drop of Org-2 and swirl for 10 seconds and wait 20 seconds. Hold both vials in front of you against a white background. Continue adding Org-2 dropwise until the color changes to a faint yellow. Swirl after each drop for 10 seconds.

5. The number of drops needed of Org-2 is a measure for the degree of pollution by many organic compounds. See the table below.

Organics Table

Drops of Org-2	Approx. Pollution
1	very low pollution
2	might become problematic
3	the more drops the worse the water quality is