TP 2 pH and Conductivity measurement

1. pH measurement

1.1. Apparatus

The pH measuring equipment consists of:

- A WTW 521 pH meter equipped with a combined electrode;

- An integrated thermometer;

- A magnetic stirrer.

1.2. Operating mode

1.2.1. Preparation of the instrumentation

- Check the various connections: mains, electrodes, etc.;
- Remove the electrode from its support;
- Remove the protective cap from the double electrode, place it in place on ;
- If necessary, top up the electrolyte level and rinse the end of the electrode thoroughly with distilled water;
- Wipe the end of the electrode with JOSEPH paper;
- Replace the electrode on its support.

1.2.2. Calibration

ÿ 1st step

Approximately measure the pH of the sample using indicator paper.

ÿ 2nd step

- Introduce a small amount of water into the perfectly clean measuring vessel magnetic bar;
- Rinse the vase and the bar with clean distilled water then with a first buffer whose pH is lower than that of the solution to be studied;
- Insert the tampon into the vase;
- Immerse the electrode, ensuring:
  - that the sinter of the reference electrode is immersed,
  - so that the magnetic bar can rotate freely.

- Turn on the device, wait a few minutes (2 – 5 minutes);
- Measure the temperature of the buffer and display it on the temperature corrector, a certain pH value is displayed;
- Bring this value to that of the buffer by pressing the standardization potentiometer (left button) and wait until the reading is stable;
- Remove the electrode, rinse it and wipe it dry;
- Remove the electrode, rinse it and wipe it dry;
- Return the tampon to its original bottle;
- Rinse the measuring vessel and the electrode with distilled water then with a second buffer with a pH higher than that of the sample.

ÿ 3rd step

- Insert the second tampon into the vase;
- Proceed as above for temperature, immerse the electrode, a new pH value is displayed;
- Bring this value to the one corresponding to the pH of the second buffer using the slope adjustment potentiometer;
- Wait until the reading is stable; •

Replace the second buffer in its bottle and rinse the electrode.

- The device is then calibrated and ready for use.

1.2.3. pH measurement

- Rinse the vase, the magnetic bar, the electrode, with water distilled then with the sample; • Fill

the measuring vessel with the sample;

- Make the temperature correction;
- Immerse the electrode with the usual precautions and shake;
- Read the pH directly when the value has stabilized.

1.3. Work to be done

For each of the samples offered:

- Roughly assess the pH using pH paper,
- Select the buffers best suited for calibration of the device,
- Carry out standardization and adjustment of the slope,
- Measure the pH of the sample.

2. Conductivity Measurement

2.1. Handling

2.1.1. Instrumentation

A field device will be used, either the LF 90 or the LF 91. These two devices are equipped with manual temperature compensation for the LF 90 and automatic for the LF 91.

2.1.2. Operating mode

Whatever device is used:

- Check the cell/conductivity meter connections;
- Rinse the measuring cell thoroughly with distilled water and dry it properly.

A. Verification of the constant

Typically, the value of the constant is printed on the cell. In the cells used here, the constant value is 1. This is the value that needs to be checked.

In a perfectly clean beaker, introduce a volume of standard that allows the cell to be properly immersed.

Note: It is always advisable to "calibrate" the device using a standard whose conductivity is of the same order as that which is to be measured. During all subsequent measurements, the solution should be moderately stirred to ensure homogenization.

*** LF 90 conductivity meter**

- Turn on the device, lower switch;
- Measure the temperature of the standard and place the temperature compensator in the position corresponding to this value;
- From this moment on all the results will be relative to the usual temperature at which C is measured, i.e. 20°C;
- Set the switch to mS/cm, (milli siemens);
- Read the result, i.e. C1.

If there is a discrepancy between the reading value C1 and the actual conductivity of the Cr standard, it is because the cell constant is different from that written on its sheath.

We have: Cr = C1*K (Eq. 9)

Hence: K = Cr / C1 (Eq. 10)

Subsequently, it will be necessary to always multiply the displayed result by K and note this value.

*** LF 91 conductivity meter**

• Turn on the device; • Set the lower switch to X; • Set the upper switch to mS/cm (milli siemens); • Temperature compensation is automatic, the device directly returns the conductivity to 20°C. (The temperature can be known by setting the switch to °C);

• Then proceed as with the LF 90.

B. Measurement of conductivity

• Rinse and dry the cell thoroughly; • Immerse the cell in the unknown solution; • Set the switch to Ms/cm and read the result; • Multiply the result by the K value to get the exact conductivity value.

2. 2. Work to be done

• Determine the cell constant; • Measure the conductivity of the proposed samples (in µS/cm); • Calculate the resistivity of these same samples (in ohm.cm); • Deduce their mineralization from these measurements.