

Chloride In Sweat.

The analysis of sweat electrolytes is performed so that the concentration of salt in sweat can be measured. The collection of sweat is usually made from the arm but occasionally the leg is used. The test is usually performed on children who have had recurrent chest infections, unexplained episodes of loose or pale stools in children who are not gaining weight or growing normally.

This method does not cover the collection of sweat which, in the UK, is performed by iontophoretic introduction of pilocarpine which activates the sweat glands on a localised area of skin. The resultant sweat is collected using pre weighed absorbant paper (Whatman no 42, 43 or 44) and then taken up into solution. Typical weight of sweat collected using this method is up to 100mg.

This method covers the analysis of the collected sample and involves the use of an EDT directION Chloride Ion Selective Electrode (ISE) and Ion meter. The Chloride combination ISE also has the advantage of being able to measure Chloride in sweat directly on the skin to give a rapid indication of deviation from a normal result.

Equipment required.

1. EDT directION Combination Chloride ISE.
2. EDT directION Model DR359TX Ion meter
3. Electronic balance reading to 1mg
4. Clean disposable containers 5-10 ml
5. Pipettor variable volume 10 to 100microlitres with tips. For collected sweat.

Reagents required.

1. Chloride Standard 100mmol/l
2. Deionised water

Method. (for sweat collected directly)

1. Prepare a 10mmol/l Chloride standard solution by dilution of the 100mmol/l standard.
2. Place 10ml of deionised water in three separate containers.
3. Add 100 microlitres of the 10 mmol/l standard to the first container. This is the first calibration solution
4. Add 100 microlitres of the 100 mmol/l standard to the first container. This is the second calibration solution
5. Add 100 microlitres of sweat to the third container. This is the sample.
6. Calibrate the ION meter in concentration mode using the 10 followed by the 100mmol/l standards.
7. Rinse the chloride ISE between measurements usin deionised water.
8. Place the ISE in the sample container and read the concentration of Chloride in sweat mmol/l.

Filter Paper Method.

For sweat that has been collected on paper :

1. Weigh the amount of sweat collected. Ensure gloves are used during any handling of the paper.
2. Place the paper in a 40-60 ml container with a lid.
3. Shake the container vigorously and allow to stand for 5 minutes.
4. Repeat the procedure for calibration above.
5. For sample analysis place the electrode in the container containint the paper ensuring the tip is immersed.
6. To calculate the Chloride concentration multiply the reading X by 100 and divide by the weigh of sweat collected in mg.

The results.

The typical reference ranges are as follows:

Normal < 40 mmol/l Chloride
Equivocal 40 to 60 mmol/l Chloride
Abnormal > 60 mmol/l Chloride

It is often useful to measure Sodium in conjunction with Chloride this can be done using the same method as above using an EDT directION combination Sodium ISE.

Direct indication method.

For indications of any abnormality a rapid test is easily performed by measuring the sweat directly on the arm. This is a qualitative check and will not provide exact concentrations.

Method:

1. Prepare a 40mmol/l Chloride standard by dilution of the 100 mmol/l standard with deionised water.
2. Pipette 30 microlitres of this standard directly on to the patients skin (arm is recommended) in an area that has been thoroughly washed and dried with deionised water.
3. Ensure the DR 359TX Ion meter is in the mV mode.
4. Place the Chloride ISE directly onto the droplet and read the mV value after around 30 seconds.
5. Record the result (mV1)
6. Repeat step 2 on the patients other arm without washing the area at all.
7. Record the mV reading (mV2)

Interpretation of results.

The mV potential of the Chloride ISE reduces as the Chloride concentration rises. Therefore if mV2 is more negative than mV1 then the sweat produced has a higher concentration than 40 mmol/l. At this point a more accurate test will need to be performed.