

TESTS FOR THE ACTIVITY OF THE GALVANIC BATTERY.

After the elements have been immersed in the fluid, and the electrodes moistened (best with hot water, to which a little table salt may be added), we are ready for the demonstration of the tests, which are as follows:

1. *Taste and sensation:*

(a) Taste.—A weak current is used, of a few cells only. One electrode being held in the hand, the other placed on the tongue, a coppery taste is experienced.

(b) Sensation.—With a stronger current, one electrode in the palm of the hand, the other sponge electrode touching the dorsum of the same hand will cause contraction of the muscles and a prickling sensation.

2. *Spark test:*

Touching for a moment the two electrodes, a spark will be seen distinctly, if the battery is in working order. The best materials to illustrate this experiment are a platinum needle for one pole, and carbon for the other, as you will observe we have here.

3. *Galvanoscope:*

If the electrodes touch each other the needle will show a deflection.

4. *Mille-ampère meter:*

Needle will move if an electrolyte is brought into the circuit.

5. *Water test:*

If the two electrodes in the shape of platinum needles are immersed in water, bubbles will arise, particularly around one pole.

The action of the poles is very different in electrolysis, hence each has its own function.

The *positive* pole attracts the acids, and the oxygen from the tissues coagulates blood.

The *negative* pole attracts the alkalies, hydrogen, and the base of the salt, dissolves blood (but forms a plug from froth of the hydrogen), coagulates albumen and causes absorption.

Hence the positive pole acts like an acid, and burns like fire, which is not only exceedingly painful but may leave a hard resilient cicatrix. On the other hand the negative pole acts more like a caustic alkali, which does not hurt so severely during the application, and leaves, if carried to excess, a cicatrix which is soft and not retractile. From this it is evident that for the immediate destruction of tumors and for

strictures the negative pole should be selected. Electrolysis requires the presence of water, and that you will find in every tissue.

As it is most important to distinguish the poles, and as we cannot trust to the marks of the instrument maker, we must always ascertain which is the positive and which the negative pole.

TESTS FOR THE IDENTITY OF EACH POLE.

We have five principal tests which we will now demonstrate with Dr. Dickson's kind assistance.

1. *Water test.*—The simplest and best method is to repeat the last experiment which we made for testing the battery. Immerse two electrodes in the form of platinum needles in water, and you will see the hydrogen at the negative pole, which shows itself in distinct bubbles like pearls around and above the needle, sparkling almost like carbonic acid in an effervescent.

2. *Meat test.*—The poles of the battery in the shape of two needles (platinum are best) are inserted in a piece of raw fresh meat. After the electrolytic action has been allowed to take place for a while, the difference in pole action can readily be observed. To save time we have electrolysed a piece of meat a few hours ago, in different places, with a variety of current strengths, the result of which is here for your inspection. On this side you will find the result of a current of five mille-ampères, with four cells of the battery for five, ten, and twenty minutes respectively. On the other side of the meat a current of fifty-five mille-ampères was used for five seconds, five, and twenty minutes. The insertion of each pole is labelled, so that you can see and study the effect of the current and of the pole. You will find an effect from a current of even five seconds duration; you will see that the positive pole has made the meat black around the needle, almost charred and destroyed it, while at the negative pole you will observe the color different, nearly white, as also again the bubbles of the hydrogen.

Let us try now the same experiment before you, and here again you can see the bubbles of the hydrogen, observe a white color, and even hear a hissing sound all around the negative pole, while the positive pole is noiseless, blackens the color, and the litmus paper applied to it shows an acid reaction.