Salt measurement:

The sodium (ions) present in salt that the body requires in order to perform a variety of essential functions. Salt helps maintain the fluid in our blood cells and is used to transmit information in our nerves and muscles. It is also used in the uptake of certain nutrients from our small intestines. The body cannot make salt and so we are reliant on food to ensure that we get the required intake. The association between salt and blood pressure relates specifically to sodium, however the major dietary source of sodium is sodium chloride i.e. salt. salt (sodium) is essential to our bodies. Normally the kidneys control the level of salt. If there is too much salt, the kidneys pass it into urine. But when our salt intake levels are very high, the kidneys cannot keep up and the salt ends up in our bloodstream. Salt attracts water. When there is too much salt in the blood, the salt draws more water into the blood. More water increases the volume of blood which raises blood pressure.

The technique is used to measure the salt i.e. ion or electrolyte by: A. Electrolyte analyzer

Measurement of electrolytes:

Electrolytes are measured by a process known as potentiometry. This method measures the voltage that develops between the inner and outer surfaces of an ion selective electrode. The electrode (membrane) is made of a material that is selectively permeable to the ion being measured. For example, sodium electrodes are made from a special glass formula that selectively binds sodium ions. The inside of the electrode is filled with a fluid containing sodium ions, and the outside of the glass membrane is immersed in the sample. A potential difference develops across the glass membrane that is dependent upon the difference in sodium concentration (activity) on the inside and outside of the glass membrane. This potential is measured by comparing it to the potential of a reference electrode. Since the potential of the reference electrode is held constant, the difference in voltage between the two electrodes is attributed to the concentration of sodium in the sample.

Medical Corporation's EasyLyte analyzer is a completely automated, microprocessor-controlled electrolyte system that uses ISE (Ion Selective Electrode) technology to make electrolyte measurements. The EasyLyte product line measures combinations of Na+, K+, Cl–, Li+, Ca++, and pH in whole blood, serum, plasma, or urine.

EasyLyte incorporates state-of-the-art electronics and an innovative ergonomic design that differentiates it significantly from competitors. The analyzer also stores quality-control data that is easily accessible. Patient histories are immediately retrievable for evaluation.

which is made of silver wire coated with solid silver chloride, embedded in concentrated potassium chloride solution (filling solution) saturated with silver chloride. This solution also contains the same ions as that to be measured

during the technique of potentiometry, the potential, or voltage, of an electrochemical cell is measured. The cell consists of both an indicator and reference electrode. Since the potential of the reference electrode is constant, it is the potential developed at the indicator electrode that contains information about the amount of analyte in a sample. During the measurement, there is little to no current flow. An electrochemical cell for making a potentiometric measurement with a membrane electrode (also known as an ion-selective electrode, ISE) is shown in Figure 1. As you can see the main difference between an ISE and the direct indicator electrode is in the ISE's composition.

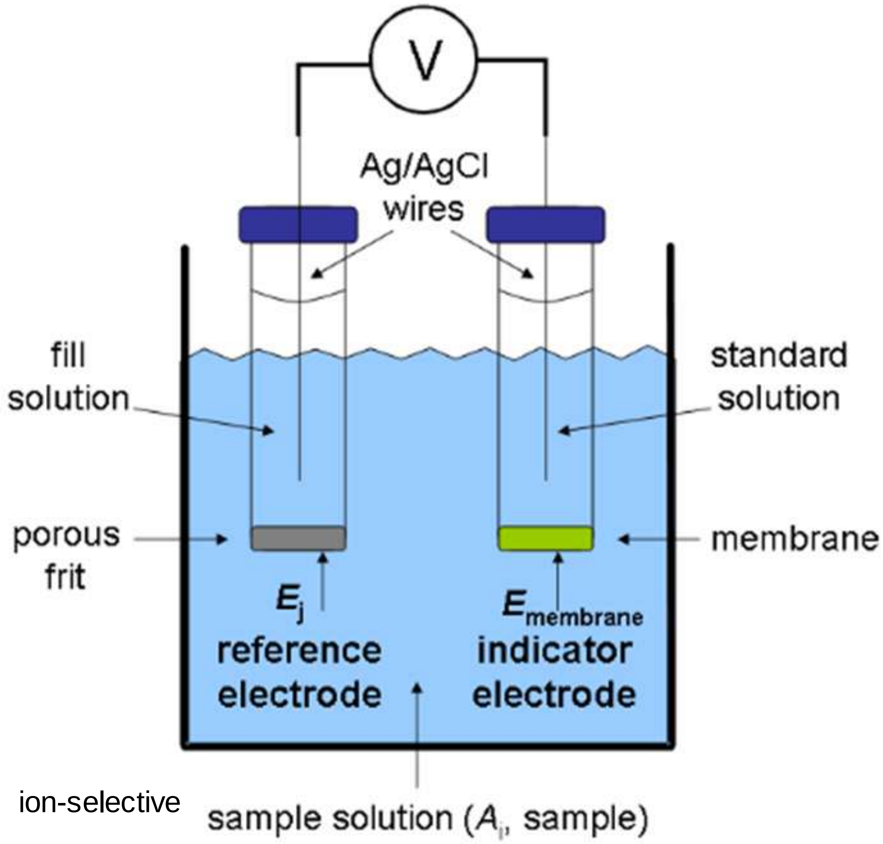

Figure 1. Electrochemical cell for making a potentiometric measurement with an ISE.

Ion-selective electrodes possess a high degree of selectivity. The selectivity of the ISE is determined by the composition of the membrane. Ideally the membrane allows the uptake of only one specific ion into it. The analyte ion may be a cation or an anion. The three main components of making a measurement at an ISE are an inner reference, or standard, solution and an outer analyte, or sample, solution separated by a thin membrane. These components are shown in Figure 1. Redox processes do not occur at ISEs. The potential developed at the membrane is the result of either an ion exchange process or an ion transport process occurring at each interface between the membrane and solution. The basics of ion exchange and ion transport are reviewed in the next sections.

An Ion selective electrode is a sensor which converts the activity of a specific ion (dissolved in a solution) into a voltage (potential), which can be measured by a mV or Ion meter. The voltage is theoretically dependent on the logarithm of the ion activity, as described by the Nernst Equation:

$$E = E^0 +2.303*RT/nF)\log(A)$$