Electrical Conductivity
&
Salinity

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Electrical Conductivity of Water

Definition:

- Ability of water to conduct electricity
- Inverse of resistance

Electrical conductivity of water depends on:

1.Concentration of dissolved substances

2.Valency of dissolved ions

3. Temperature of the water

Materials with good electrical conductivity in water:

Acids, bases, and inorganic salts dissolved in water.

Materials with poor electrical conductivity in water:

Organic acids and salts because they ionize weakly in water.

Units

- mho/cm, µmho/cm
- Siemens/m (S/m)
- 1mS/m = 10 µmhos/cm
- 1µS/cm = 1µmho/cm

Importance of electrical conductivity:

1. Used as an approximate measure of the concentration of dissolved salts in water (mg/L).
2. Used to determine the purity of distilled water.
3. Used to detect differences in dissolved salt concentration in raw water or wastewater.

Methods of measuring electrical

conductivity: Using an electrical conductivity meter, which is connected to a cell or sensor. Readings are taken directly from the device, then adjusted to a temperature of 25°C if the device does not have automatic temperature compensation.

Chemical substances

1. Distilled water, which is completely free of ions, has an electrical conductivity of less than 1 µS/cm.

2. Potassium chloride solution (KCl): Prepared by dissolving 745.6 mg per liter of distilled water. This gives a conductivity of 1413 µS/cm at 25°C.

طريقة العمل

1. يغسل القطب أو الخلية جيداً بالماء المقطر
2. تقاس درجة حرارة المحلول القياسي والتوصيل الكهربائي له.
3 تقاس درجة حرارة النموذج والتوصيل الكهربائي له
4 -أذا كانت درجة حرارة النموذج مساوية لدرجة حرارة المحلول 25 القياسي يكون التوصيل الكهربائي للنموذج عند 25م تساوي

التوصيل الكهربائي للمحلول القياسي من الجدول × التوصيل الكهربائي لنموذج قراءة الجهاز عند(25م)

التوصيل الكهربائي للمحلول القياسي من قراءة الجهاز

أما اذا اختلفت درجات الحرارة وكانت درجة حرارة النموذج لا تساوي 25 م فتصحح النتائج للحصول على قيمة التوصيل الكهربائي المكافئة للقيمة عند درجة حرارة 25م وذلك مل بضرب قيمة التوصيل الكهربائي عند اي درجة بالمعامل المشار اليه في المخطط البياني في الكتاب **ص٦٤**

Salinity

Introduction:

- It is one of the important properties of natural and industrial waters. It represents the amount of dissolved salts in a given weight of solution.

Methods for Measuring Salinity:

Direct Method:

1. Evaporating a specific volume of the sample and calculating the weight of the residue relative to the sample volume.
2. Chemical analysis of the sample.

Indirect Methods:

1. Using electrical conductivity (Electrical conductivity).
2. Using density (Density).
3. Using sound speed (Sound speed).
4. Using refractive index (Refractive index).

Electrical Conductivity Method:

Multiply the electrical conductivity value of the sample by a factor (0.5 – 0.9).

This factor depends on the type of dissolved salts and the temperature at the time of measurement.

The factor (0.9) is used for saline waters and boiler waters.

The factor (0.5) is used for waters containing hydroxides or acids.The result is expressed in mg/L.