

# Kinney County Specific Conductivity Sensors

**Specific Conductivity (SC)** and **Total Dissolved Solids (TDS)** are related but not identical.

"Specific Conductivity is a direct measurement of how well the water conducts electricity. TDS is an estimate of how much dissolved material is in the water. Because different dissolved minerals conduct electricity differently—especially highly charged ions like sulfate, calcium, and magnesium—the same conductivity can represent different TDS values. That's why we prefer reporting Specific Conductivity and use laboratory chemistry when we need actual dissolved solids concentrations."

Edwards-Trinity groundwater typical major ions:

- Calcium ( $\text{Ca}^{2+}$ )
- Magnesium ( $\text{Mg}^{2+}$ )
- Bicarbonate ( $\text{HCO}_3^-$ )
- Sulfate ( $\text{SO}_4^{2-}$ ) (variable)
- Chloride ( $\text{Cl}^-$ ) (usually lower but increases in some areas):

Ion	Charge
Sodium ( $\text{Na}^+$ )	+1
Potassium ( $\text{K}^+$ )	+1
Chloride ( $\text{Cl}^-$ )	-1
Bicarbonate ( $\text{HCO}_3^-$ )	-1
Calcium ( $\text{Ca}^{2+}$ )	+2
Magnesium ( $\text{Mg}^{2+}$ )	+2
Sulfate ( $\text{SO}_4^{2-}$ )	-2

## Why sulfate matters for conductivity

Specific Conductivity measures how well water conducts electricity.

Electricity moves through water via dissolved ions.

Water containing:

- 500 mg/L sodium chloride
- 500 mg/L calcium sulfate

may have similar TDS, but not necessarily identical conductivity because the ions have different charges and mobility dissolutions.

Sulfate ( $\text{SO}_4^{2-}$ ), calcium ( $\text{Ca}^{2+}$ ), and magnesium ( $\text{Mg}^{2+}$ ) are often called **multivalent ions** because they have more than one charge.