

Methods for Calculation of Bulk Solution pH Value in Brines Containing Acid Gases and Organic Acids

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Foreword

This AMPP standard describes methods for calculation of bulk solution pH value in brines containing acid gases and organic acids in flowlines, pipelines, and other production environments and provides technical information for the assessment of internal corrosion and hydrogen-induced cracking caused by H₂S.

Scope

The document includes the procedure for pH value determination, the data required to be collected, the proposed methods and requirements of data collection, and the calculation method. The factors taken into consideration include corrosive gas, ions in the water, temperature, and pressure. The effect of oxygen is excluded.

Rationale

This standard provides calculation methods to determine the bulk solution pH value of brines containing acid gases and organic acids, which are mainly based on empirical equations or physical process analysis, including gas dissolve and ionization equilibrium. These calculation methods can be used when in-situ measurements are not available. They can also narrow any discrepancy between the measured pH of a sample in a pipeline and a sample tested in a laboratory that could be induced by condition variations.

Referenced Standards and Other Consensus Documents

Unless specifically dated, the latest edition, revision, or amendment of the documents listed in the table below shall apply.

AMPP/NACE/SSPC, www.ampp.org:

ANSI/NACE MR0175/ISO 15156	Petroleum and Natural Gas Industries—Materials for Use in H ₂ S-containing Environments of Oil and Gas Production
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American Petroleum Institute (API), www.api.org:

API RP 45	Recommended Practice for Analysis of Oilfield Waters
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ASTM International, www.astm.org:

ASTM D4327	Standard Test Method for Anions in Water by Chemically Suppressed Ion Chromatography
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ASTM D513	Standard Test Methods for Total and Dissolved Carbon Dioxide in Water
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ASTM D1945	Standard Test Method for Analysis of Natural Gas by Gas Chromatography
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International Organization for Standardization (ISO), www.iso.org:

ISO 14911	Water quality — Determination of dissolved Li ⁺ , Na ⁺ , NH ₃ ⁺ , K ⁺ , Mn ²⁺ , Ca ²⁺ , Mg ²⁺ , Sr ²⁺ and Ba ²⁺ using ion chromatography — Method for water and waste water
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ISO 19739	Natural gas — Determination of sulfur compounds using gas chromatography
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ISO 6974	Natural gas — Determination of composition with defined uncertainty by gas chromatography
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