

Testing of Heavy Brines

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Contents

Page

1	Scope	3
2	Normative References	3
3	Terms, Definitions, Acronyms, Abbreviations, and Symbols	4
3.1	Terms and Definitions	4
3.2	Acronyms and Abbreviations	5
3.3	Symbols	5
4	Requirements	7
4.1	Quality Control Instructions	7
4.2	Records Retention	7
5	Calibration of Equipment	7
5.1	General Requirements	7
5.2	Reagents and Materials for Calibration and Verification	8
5.3	General Requirements for Calibration of Particular Apparatus	8
5.4	Frequency of Calibration Verification	9
5.5	Calibration Verification	9
6	Density	11
6.1	General	11
6.2	Apparatus	13
6.3	Measurement of Specific Gravity or Density Using a Hydrometer	15
6.4	Density Corrections for Hydrometers and Brines	16
6.5	Calculation of Density in Units Other Than kg/m³	23
6.6	Calculation for Pressure and Temperature Compensation	24
7	Crystallization Temperature	28
7.1	Principle	28
7.2	Apparatus	33
7.3	Determination of Crystallization Point	35
7.4	Calculation of Crystallization Point	35
8	Brine Clarity	36
8.1	Principle	36
8.2	Apparatus	36
8.3	Determination of Brine Clarity	37
9	Solids Evaluation by Gravimetric Procedure	37
9.1	Principle	37
9.2	Apparatus	38
9.3	Preparation of Glass fiber Filter Disk	38
9.4	Selection of Sample Volume	39
9.5	Determination of Total Suspended Solids	39
9.6	Calculation of Total Suspended Solids	40
9.7	Calculation of Precision and Bias	40
9.8	Determination of Volatile and Nonvolatile Solids	41
9.9	Calculation of Nonvolatile and Volatile Solids	41
10	pH	41
10.1	Principle	41
10.2	Reagents and Materials	42

Contents

	Page
10.3 Apparatus	43
10.4 Measurement of pH	44
10.5 Precision Statement	45
10.6 Care of the Electrode	45
11 Iron Contamination	45
11.1 Principle	45
11.2 Reagents and Materials	46
11.3 Apparatus	46
11.4 Preparation of Colorimetric Standards	46
11.5 Measurement of Iron Contamination	47
11.6 Precision Statement	48
12 Daily Completion Fluid Test Report	48
12.1 Principle	48
12.2 Well identification, Geometry, and Zone Data	49
12.3 System Properties	49
12.4 Fluids Accounting	50
12.5 Cost Accounting	50
12.6 Daily Commentary	50
12.7 Vendor Representative Identification	51
13 Buffering Capacity of Brines	51
13.1 Principle	51
13.2 Equipment	52
13.3 Reagents and Materials	53
13.4 Procedure-Determination of Buffer Concentration	53
13.5 Calculation-First Endpoint or Target pH	55
13.6 Calculation-Second Endpoint or Target pH	56
Annex A (informative) Completion Fluids Report Form	58
Annex B (informative) Gas Hydrates	59
Annex C (informative) Pressure Crystallization of Brines	61
Annex D (informative) Brine Viscosity	63
Annex E (informative) Principle of Corrosion Testing	64
Bibliography	77
Figures	
1 Pressurized Mud Balance	10
2 Atmospheric Mud Balance	10
3 Reading at Bottom of Meniscus	13
4 Calcium Chloride Crystallization Temperature	26
5 Typical Crystallization Curve for Brine	30
6 Typical Crystallization Temperature Measurement Setup	31
7 Example of pH versus Volume of HCl Acid Added	51
8 Example of $\Delta\text{pH}/\Delta V_{\text{HCl}}$ versus Volume of HCl Acid Added, for More Accurate Determination of Titration Endpoint	51
A.1 Daily Brine Report	55

Contents

Page

Tables

1	Temperature Correction Factors for Hydrometers due to Glass Expansion and Contraction.	15
2	Estimated Brine Thermal Expansion/Contraction Factors (Conversion Factors).	18
3	Temperature Compensation Factor in SI	22
4	Pressure Compensation Factor in SI	23
5	Temperature Compensation Factors in USC Units	24
6	Pressure Compensation Factors in USC Units	24
7	Calcium Chloride Solutions—Crystallization Temperature	27
8	Sodium Chloride Solutions—Crystallization Temperature.	28
E.1	Mechanical Properties of Selected Oil Country Tubular Goods	64

Introduction

API 13J covers the testing of heavy brines commonly used in petroleum and natural gas completion, fracturing, workover, and drill-in fluids. These brines can be purchased or rented from multiple sources and are available worldwide. No single source or limited source of supply is included, either by inference or reference.

Annexes A to E are given for information.

In this standard, quantities are expressed in the International System (SI) of units and are also, where practical, expressed in U.S. Customary (USC) units in parentheses for information.

NOTE The units do not necessarily represent a direct conversion of SI units to USC units, or of USC units to SI units.

This document uses a format for numbers that follows the examples given in *API Document Format and Style Manual*, First Edition, June 2007 (Editorial Revision, January 2009). This numbering format is different than that used in API 13J, Fourth Edition. In this document, the decimal mark is a period and separates the whole part from the fractional part of a number. No spaces are used in the numbering format. The thousands separator is a comma and is only used for numbers greater than 10,000 (i.e. 5000 items, 12,500 bags).

Consideration has been given to the precision of the instrument making the measurement. For example, thermometers are typically marked in one degree increments, thus temperature values have been rounded to the nearest degree. However, for certain critical measurements such as brine crystallization, thermometers are typically calibrated and used to 0.05 °C (0.1 °F).

Calibrating an instrument refers to assuring the accuracy of the measurement. Accuracy is the degree of conformity of a measurement of a quantity to its actual or true value. Accuracy is related to precision, or reproducibility of a measurement. Precision is the degree to which further measurements or calculations will show the same or similar results. Precision is characterized in terms of the standard deviation of the measurement. The results of calculations or a measurement can be accurate but not precise, precise but not accurate, neither, or both. A result is valid if it is both accurate and precise.

Testing of Heavy Brines

1 Scope

API 13J covers the physical properties, potential contaminants, and test procedures for heavy brine fluids manufactured for use in oil and gas well drilling, completion, fracturing, and workover fluids.

API 13J provides methods for assessing the performance and physical characteristics of heavy brines for use in field operations. It includes procedures for evaluating the density or specific gravity, the clarity or amount of particulate matter carried in the brines, the crystallization point or the temperature (both ambient and under pressure) at which the brines make the transition between liquid and solid, the pH, and iron contamination.

It also contains a discussion of gas hydrate formation and mitigation, brine viscosity, corrosion testing, buffering capacity, and a standardized reporting form (see Figure A.1).

API 13J is intended for the use of manufacturers, service companies, and end users of heavy brines.

2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

API Recommended Practice 13B-1, *Recommended Practice for Field Testing Water-based Drilling Fluids*

ASTM E77¹, *Standard Test Method for Inspection and Verification of Thermometers*

NBS (NIST) Circular 555², *Testing of Hydrometers*, October 22, 1954

NIST SRM 185h, *Potassium Hydrogen Phthalate, pH Standard*

NIST SRM 186g, *Potassium Dihydrogen Phosphate, pH Standard*

NIST SRM 191C, *pH Standards*

3 Terms, Definitions, Acronyms, Abbreviations, and Symbols

3.1 Terms and Definitions

For the purposes of this document, the following terms and definitions apply.

3.1.1

ACS reagent grade

Grade of chemical that meets purity standards as specified by the American Chemical Society (ACS).

¹ ASTM International, 100 Barr Harbor Drive, West Conshohocken, Pennsylvania 19428. www.astm.org.

² National Institute of Standards and Technology, 100 Bureau Drive, Stop 3460, Gaithersburg, Maryland 20899. www.nist.gov.