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Brine Crystallization Test Kit

#146-20: 115 Volt

#146-20-230: 230 Volt

Instruction Manual

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Ver. 1.2

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Intro

The crystallization temperature of a brine is the temperature at which salt crystals begin to form. Salt crystals can cause many problems, including filtration plugging, density changes, and an increase in viscosity. Therefore, it is necessary to utilize brines that have a crystallization temperature below the lowest possible operating temperature.

The crystallization properties of a brine include three crystallization temperatures:

- First Crystal to Appear (FCTA) - the temperature where visible crystals first begin to form
- True Crystallization Temperature (TCT) - the maximum temperature reached after crystallization begins
- Last Crystal to Dissolve (LCTD) - the temperature where crystals dissolve

Components

- #130-60-2 Carrying Case with Pluck Foam Insert, Retractable Handle, and Wheels, 20" × 11" × 7" ID
- #146-20-1 PVC Tubing, ¼" ID × ⅜" OD × ⅙" Wall, 6 Feet
- #146-20-2 Digital Cold Plate, 115 Volt
- #146-20-3 Digital Cold Plate, 230 Volt
- #153-51-3 Glass Beaker, 50 mL
- #153-53-1 Magnetic Stirring Bar, 1" × ⅝"
- #154-06 Traceable Full-Scale Thermometer, -58° - 500°F (-50° - 250°C)
- #207-00 Ethylene Glycol, 2 oz
- #285-00-1 Calcium Carbonate, 100 g
- #300-004 High-Intensity Flashlight with Xenon Bulb

Procedure

1. Connect one end of a piece of Tygon tubing to one of the tubing nipples on the back of the cooling plate. Connect the other end to a tap water source. Connect one end of the other piece of Tygon tubing to the other nipple and place the other end in a suitable drain. Turn on the tap water and maintain a flowrate of about 1 liter per minute.
2. Add 25 mL of test sample and about 3 mg Calcium Carbonate to the empty beaker.
3. Place the beaker on the cooling plate and add the stirring bar.
4. Insert the thermometer probe into the sample. Make sure the stirring bar can turn freely without hitting the probe.
5. Turn on the stirrer.
6. Observe the brine closely while the temperature decreases. Record the temperature every few seconds. Watch for crystals to form.
7. Record the minimum temperature before crystallization occurs. This is the First Crystal to Appear (FCTA) temperature.
8. When the crystallization process starts, the temperature will quickly begin to rise. Continue recording the temperature every two or three seconds.
9. The rising temperature will eventually reach a maximum and start falling again. This maximum is the True Crystallization Temperature (TCT).
10. Allow the temperature to fall two or three degrees, then turn off the cooling plate.
11. Continue observing the crystallized sample as it warms. When the last crystal dissolves, record the temperature. This is the Last Crystal to Dissolve Temperature (LCTD).
12. Repeat steps 6 - 11 at least three times on the same sample. Each time, make sure the sample temperature is above the LCTD but not by more than 8°F (4°C).
13. Average the readings from three or more tests. Report the FCTA, TCT, and LCTD temperatures.