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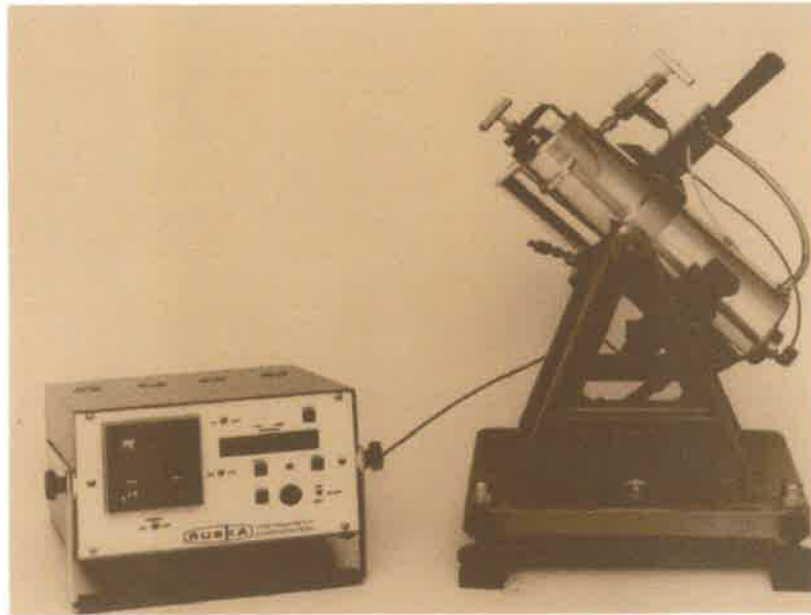
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FLUID

TECHNOLOGY - PHASE BEHAVIOR

LABORATORY INSTRUMENT SOLUTIONS

MODEL 1602 ROLLING BALL VISCOMETER



The Model 1602 Viscometer is a high-pressure precision instrument for determining the relative viscosity of hydrocarbon and related liquid samples at elevated temperatures.

The instrument is commonly known as a "Rolling Ball" viscometer. The principle of operation is to measure the time it takes for a metal ball to fall through a fluid medium. The resistance to the gravitational pull on the ball is due to the fluid density and viscosity. By measuring roll times of several known viscosity standard fluids, the user can develop calibration curves relating viscosity to roll time (corrected for fluid density). The relative viscosity of the unknown fluid is then determined from the graph.

The Model 1602 Viscometer is integrated into the Model 2370 Console along with the Model 2353 Flash Separator, Model 2331 Gasometer, vacuum pump and fluid flow manifold as a comprehensive test bench apparatus. The Model 1602 may also be configured as an individual test system.

For limited ranges of viscosities, this relationship is linear and can be expressed in the following form

$$\mu = Kt(\rho_b - \rho_f)$$

where:

μ	=	absolute viscosity
K	=	proportionality constant
ρ_b	=	density of stainless steel ball
ρ_f	=	density of the fluid
t	=	roll time

An insulated heating jacket surrounds the actual fluid cavity so the user can make viscosity measurements at elevated temperatures. The fluid cavity is roughly 70 cc but the actual test chamber (barrel interior) is only about 20 cc of the total fluid cavity. The purpose for a larger fluid cavity is to accommodate a gas phase that is generated during reservoir fluid studies.

A special valve allows the operator to isolate the barrel volume (at the bottom of the fluid cavity) from the rest of the fluid cavity. This insures the measurement will be made on a homogeneous liquid sample.

This special valve can also be magnetically energized to hold the test ball at the top of the barrel. The operator can then de-energize the valve and simultaneously start the roll-time clock. The clock is stopped when the test ball reaches the bottom and makes contact with the barrel wall and the so-called contact point. The system senses contact when electrical continuity is made from the contact point to the barrel wall via the metal test ball. It is important to note this instrument cannot be used with electrically conducting fluids (e.g. aqueous fluids).

Specifications

Pressure Rating:	10,000 psi
Volume:	70 cc (test chamber is 20 cc)
Temperature:	300 °F (150 °C)
Roll Angles:	23°, 45°, 70°
Power:	220 V, 60 Hz

NOTES

- Sample may be introduced to the Model 1602 Rolling Ball Viscometer by a Model 2250 manual pump or select from any of the Model 2200 Positive Displacement Pumps available from Chandler Engineering .
- Floating piston accumulators are available for pure component, product or sample introduction to the Model 1602 Rolling Ball Viscometer.



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