



## Zahn Cup-Type Viscosimeter Operating Instructions

The Zahn Cup-Type Viscosimeter is a portable device for quickly measuring the viscosity of such fluids as paint, lacquer, varnish, syrup, creams and oil. The viscosity of a liquid measured by this device is expressed in Zahn numbers, that is, the time in seconds required for a definite volume (44ml) of liquid to flow through the viscosimeter. Five models are available to measure viscosities for 18 to 1725+ centistokes. The models differ only in the size of the orifice in the bottom of the cup.

The Zahn Cup-Type Viscosimeter offers many advantages

- Simplicity of use; no special skill is required
- Convenience; unit is small and lightweight
- Fast operation: measurements can usually be made in less than a minute
- Durability: cup is of one-piece construction

Overall length: 13  $\frac{3}{4}$  in, cup depth 2  $\frac{3}{8}$  in, cup capacity- 44 ml

Catalog No.	Cup No.	Orifice, inch	Liquid type	Zahn range, seconds (250°C)	Range, Centistokes
3410-01	1	0.078	Very thin	45-80	18-56
3401-02	2	0.108	Thin	25-80	40-230
3401-03	3	0.148	Medium	20-75	150-790
3401-04	4	0.168	Heavy-thick	20-80	220-1100
3401-05	5	0.208	Very heavy-thick	20-75	460-1725+

### Operation:

Procure a stopwatch and a dial thermometer with a spike stem for use with the Zahn Viscosimeter.

1. Insert the thermometer into the holes of the bracket of the viscosimeter
2. Stir the liquid thoroughly, dip the cup into the liquid and record the temperature
3. Raise the bracket so the thermometer stem is out of the cup
4. Place a finger in the ring, lift the viscosimeter completely out of the liquid and start the stop watch when the top of the edge of the cup breaks the surface.
5. Stop the watch when the steady flow of the liquid from the orifice suddenly breaks.
6. Repeat steps 2 through 5 until consistent results are obtained.
7. Express viscosity in Zahn seconds
8. Clean the viscosimeter with an appropriate solvent and dry with soft, lint-free tissue.

For quality control purposes a viscosity-temperature curve is useful. To prepare such a curve first obtain a sample of the liquid to be controlled when the liquid is at optimum viscosity. Then determine the viscosity, in Zahn seconds, in 5-degree or 10-degree steps bracketing the temperature range which will be encountered in control measurements.

**Maintenance:**

The Zahn Cup-Type Viscosimeter requires no special maintenance other than taking precautions to avoid damage to the orifice. After use, clean the device with the appropriate solvent and dry with soft, lint-free tissue.

**Method for Converting Zahn seconds to Centistokes (cSt)****GENERAL FORMULA**

$$V = K (T - C) \quad \text{where: } V \text{ is Kinematic Viscosity (cSt)}$$

$T$  is Efflux time (Zahn seconds)  
 $K + C$  are constants (Ref. # 1)

**SPECIFIC FORMULAS**

<u>Zahn cup #</u>	<u>Formula</u>	<u>"T range seconds"</u>
1	$V = 1.1 (T-29)$	45-80
2	$V = 3.5 (T-14)$	25-80
3	$V = 11.7 (T-7.5)$	20-75
4	$V = 14.8 (T-5)$	20-80
5	$V = 23 (T-0)$	20-75

**Notes:**

1. All measurements at liquid temperature of 77°F ( 25°C)
2. For accuracy each cup should have a correction factor determined by comparing the measured viscosity to a certified viscosity standard appropriate to the size cup being used.

**Reference:**

1. ASTM #D 4212: Viscosity by dip-type viscosity cups.