Transportation Laboratory
Fourth Year
2025-2026

Asphalt Cement Tests

Test No. 6

- **Asphalt Cement Tests**
- Types of asphalt cement in Iraqi specification

TABLE R9/2B

REQUIREMENTS FOR PENETRATION-GRADED ASPHALT CEMENT.

Property	Penetration Grade of Asphalt		
	40/50	50/60	60/70
1. Penetration at 25° C, 100gm, 5sec (1/10mm)	40-50	50-60	60-70
2. Ductility at 25°C, 5cm/min, (cm)	>100	>100	>100
3. Flash point, °C	>232	>232	>232
4. Solubility in trichloroethylene, %	>99	>99	>99
5. Residue from thin-film oven test			
- Retained penetration, % of original	>55	>53	>52
- Ductility at 25°C, 5 cm/min (cm)	>25	>40	>50

- **Penetration Test**
- Specification Item →ASTM D5
- **Definition**

It is the distance in tenths of millimeters that standard needle penetrates vertically into a sample of the material under fixed conditions.

- **Note** This test used for semi-solid and solid bituminous material (Penetration < 350)

AIM OF THE PENETRATION TEST:

- To find out the hardness or softness of bitumen.
- To determine the consistency of bituminous material
- Grade of bitumen.

Apparatus required are

a) penetrometer

b) water bath

c) thermometer

The test carried out with a standard penetrometer with a needle loaded with 100 gms,

- **Test Conditions**

Temperature in ℃	Temperature in ℉	Load, gm	Time, Sec.
Zero	32	200	60
4	39	200	60
25	77	100	5
46.1	115	50	5

- Maximum Allowable Difference

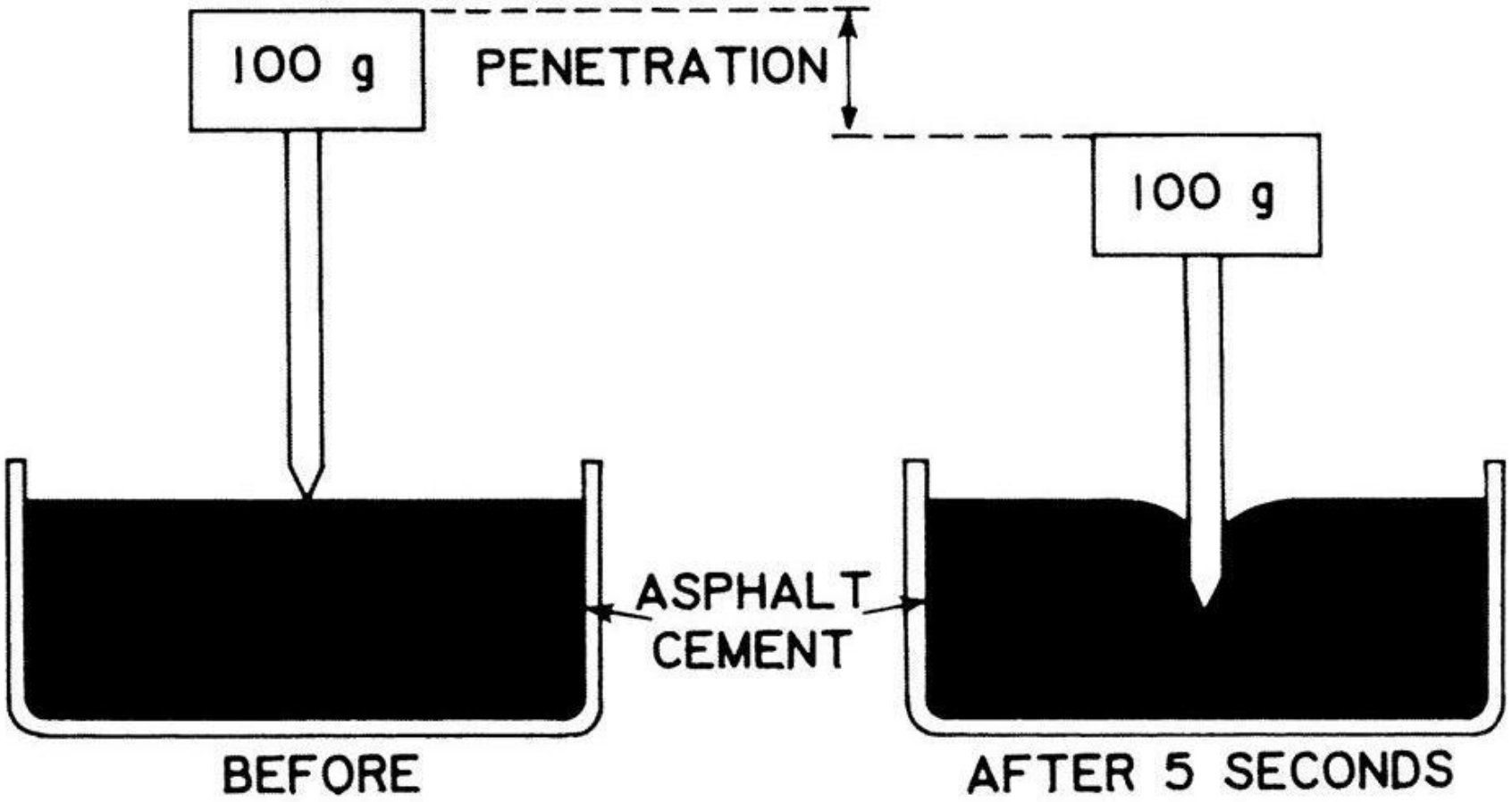
Penetration	Maximum Difference Between Highest and Lowest Determination
0-49	2
50-149	4
150-249	6
250-over	8

PENETROMETER

- Asphalt Sample in Water Path (25 °C) for 30 minutes

- **Start the Test**

Penetration Test



Ductility Test

-Measuring tensile properties of asphalt material

Ductility Mold

Side Clip

Clip

- **Ductility Machine**
- Length 1.5 m, Pull Speed (5.0 ± 0.05) cm/min.

- **Notes**

1. When filling the mold, take care not disarrange the parts of mold.

2. Adjust the specific gravity of the bath by adding sodium chloride so that the bituminous whether comes to the surface nor touches the bottom of the bath.

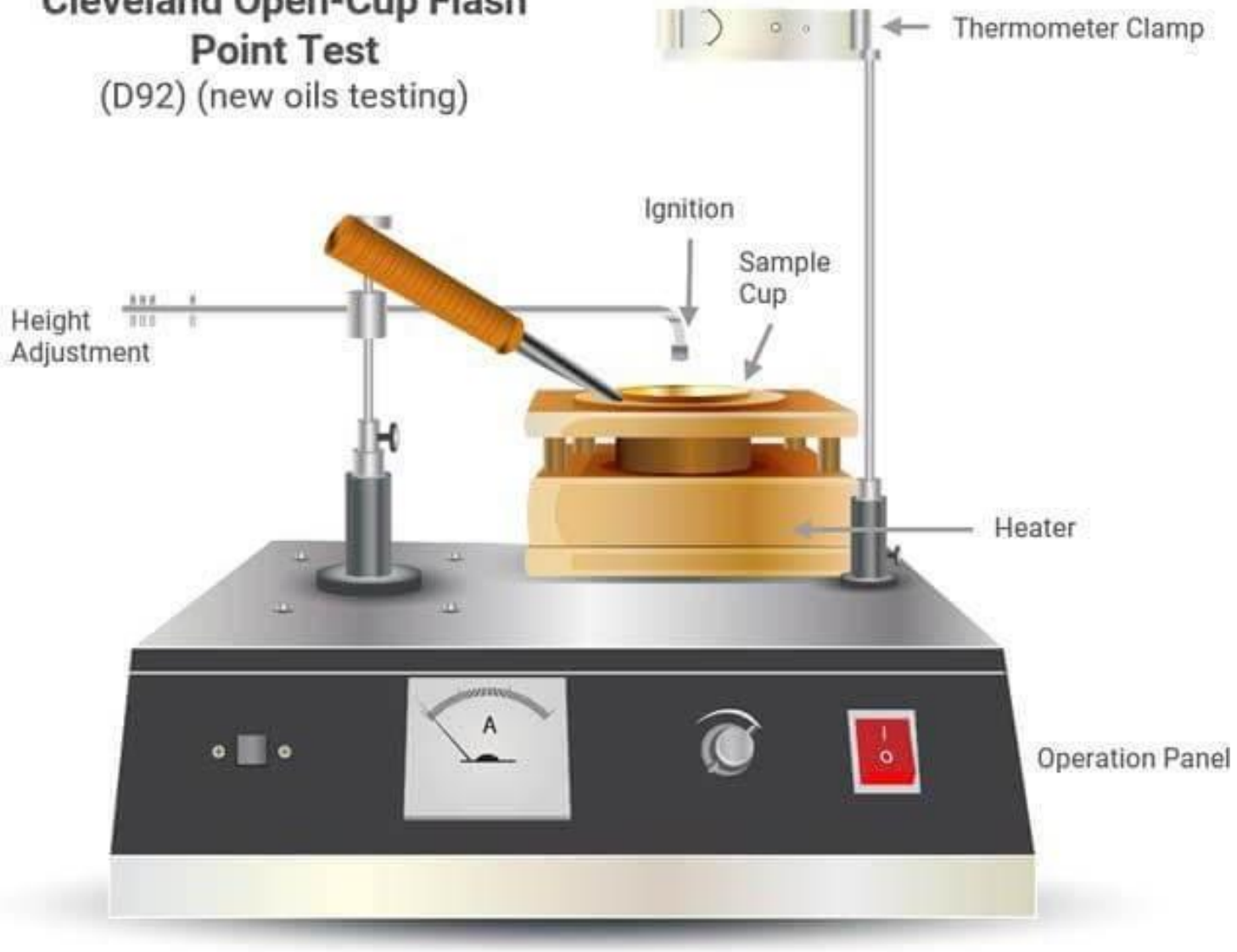
- **Fix the mold in the machine with water path 25 ℃ and start the test**

- **End of test**

- **Flash and Fire Points Test**
- Purpose →For safety

Cleveland Open-Cup Flash Point Test

(D92) (new oils testing)



- **Notes**

1. Support the thermometer vertically 6.4 cm from the bottom of the cup.

2. Fill the cup to the filling level.

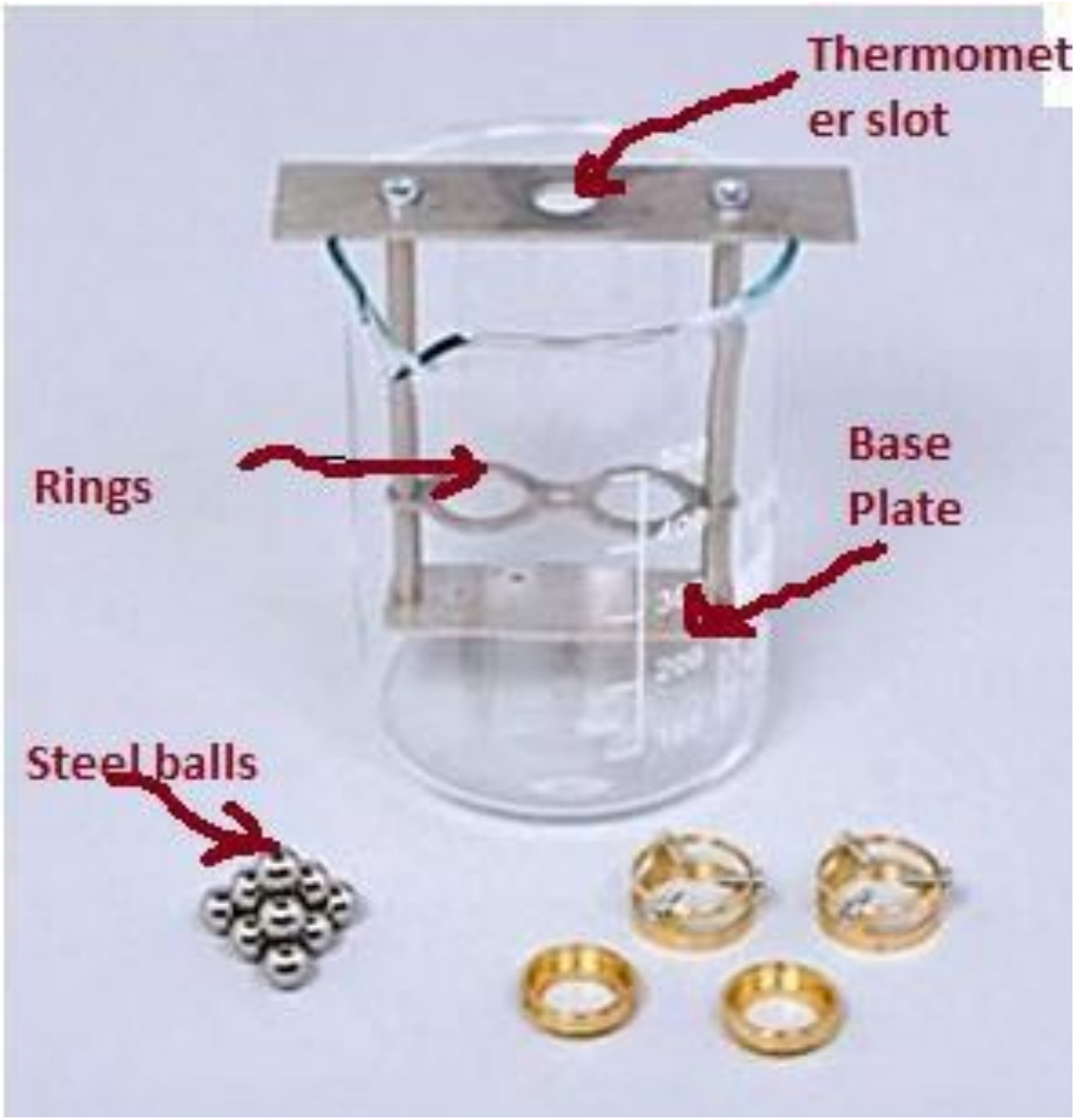
- **Flash Point**
- The lowest temperature at which application of the test flame causes a flash of vapors

- **Fire Point**
- The temperature at which the flame causes the surface burn at least 5 sec.

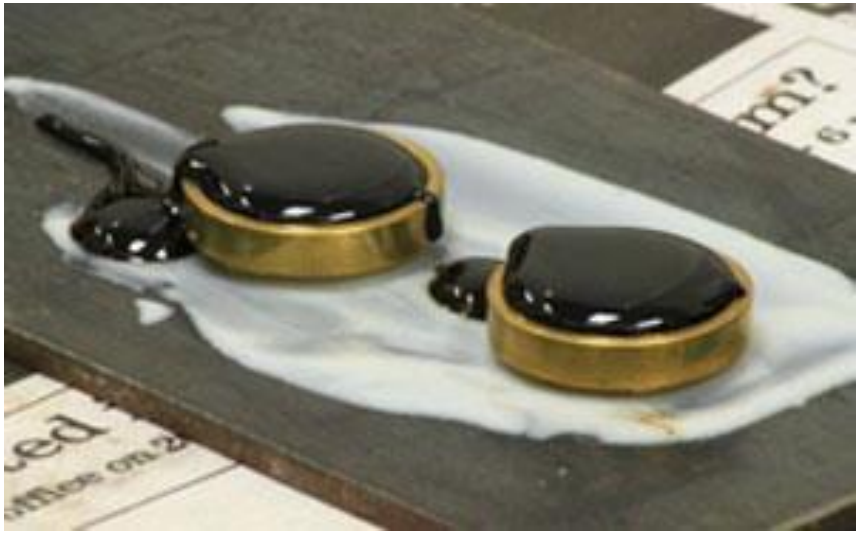
- **Softening Point Test**
- ASTM D-36

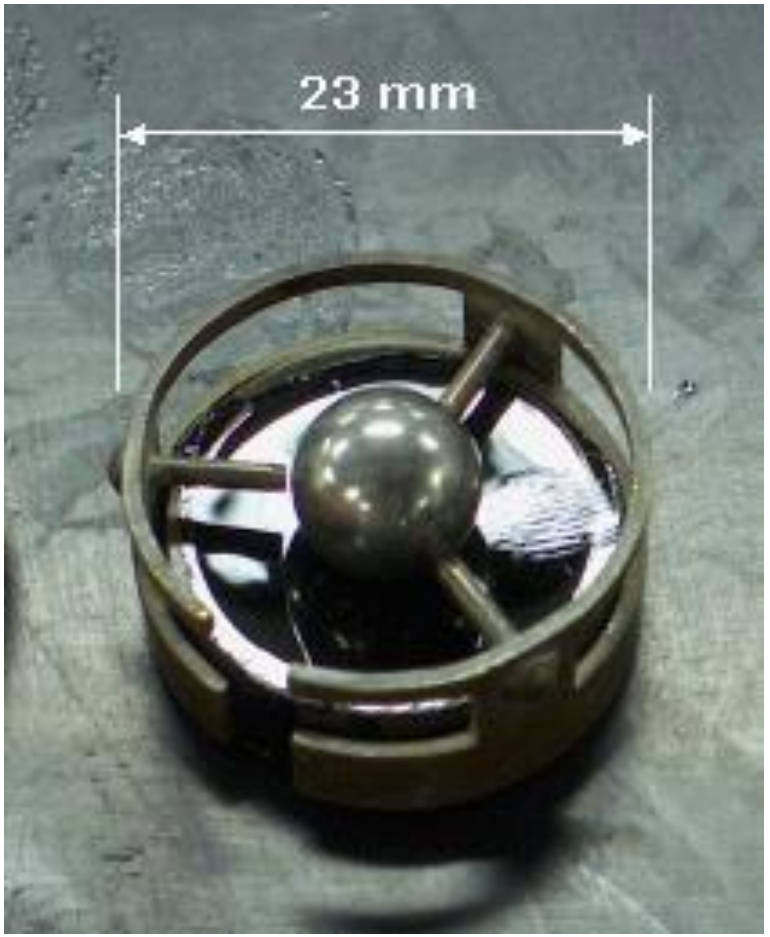
- **Significance**

1. Classification
2. Indication of the material tendency to flow
3. Maximum safe heating temperature


Thermometer slot
Rings
Base Plate
Steel balls

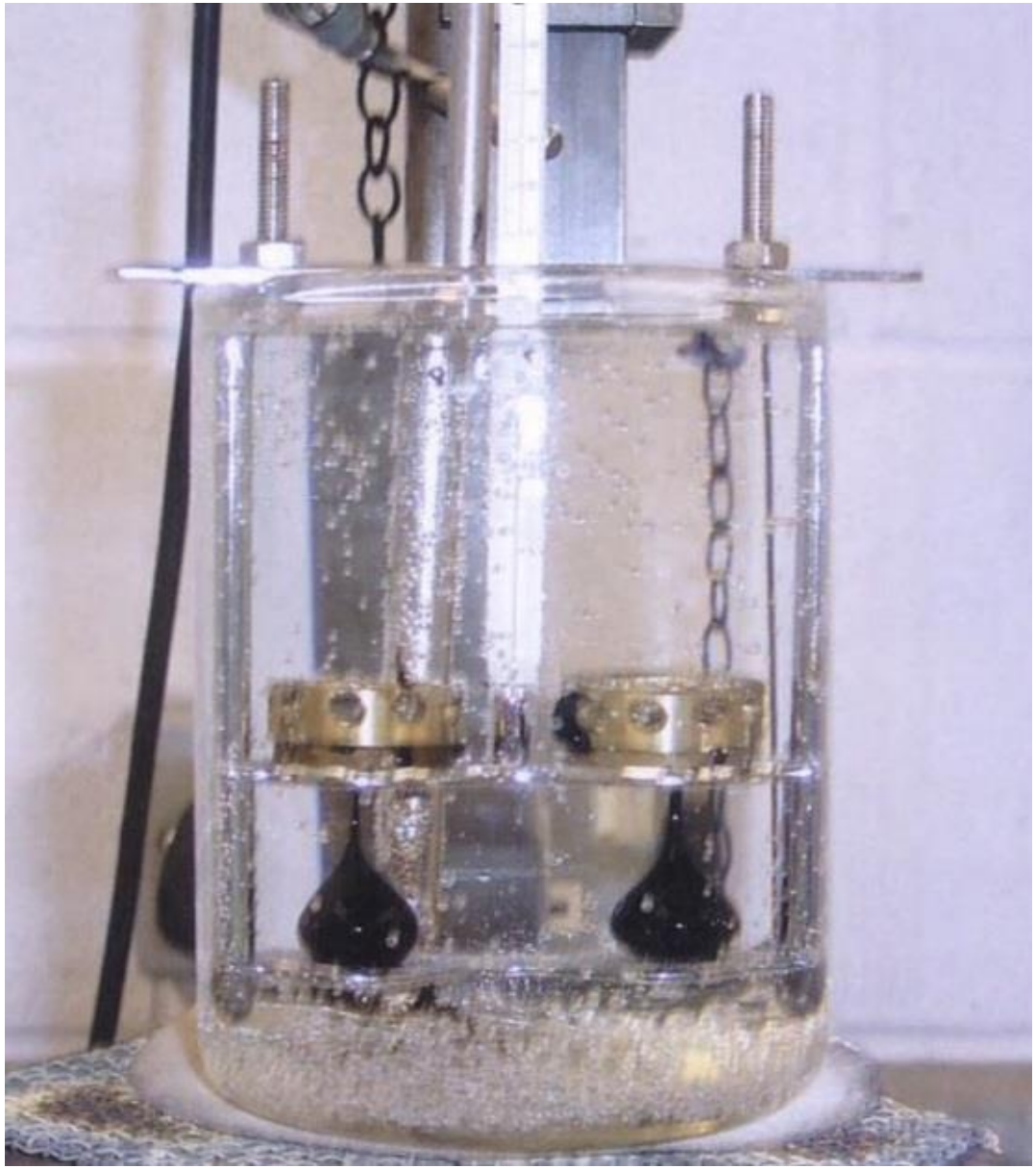
- **Sample Mold**



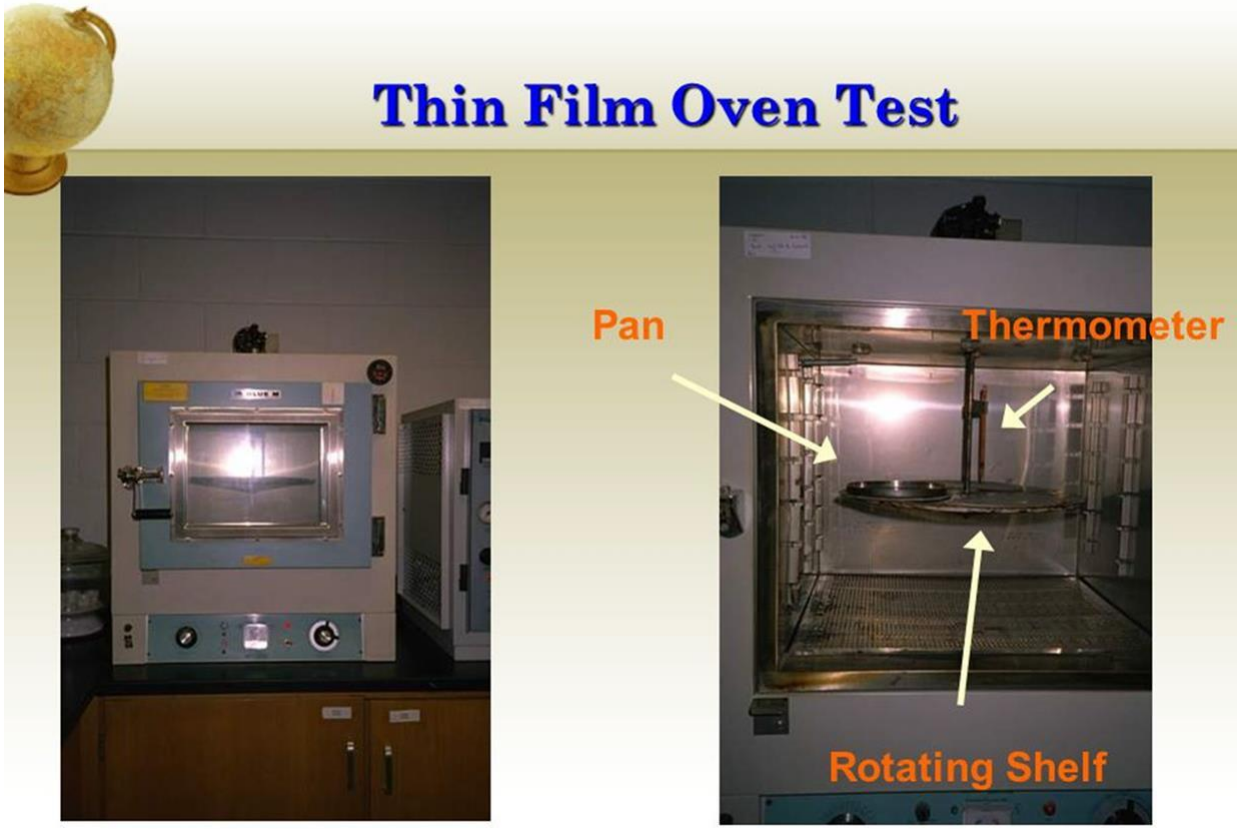


- **Put the sample in the water path start from 4 ℃**

- **End of test**

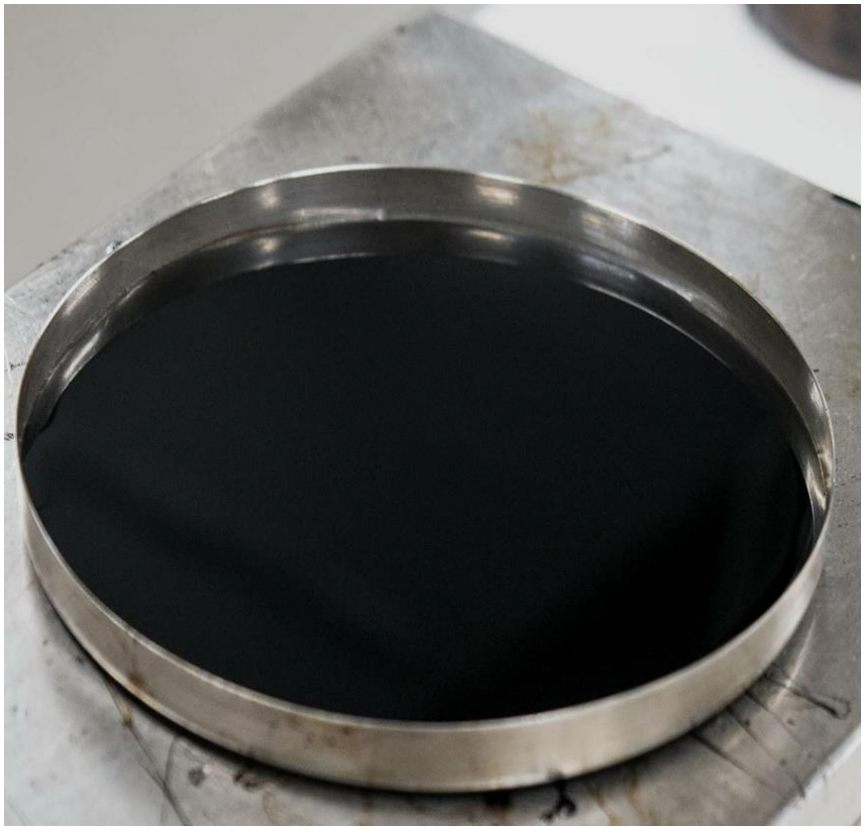


- **Thin Film Oven Test**
- To know the physical properties and its change during mixing.
- ASTM D-1754
- Rotating shelf have a minimum diameter 9.8″ which rotate at a rate of (5.5 ±1.0) rpm



- **Purpose**
- To know the physical properties and its change during mixing.

- **Sample Mold**
- Weight= 50 ± 0.5 gm, put in oven for 5 hrs., Temp.= 163 ℃



Thank You