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*Chemical Engineering Department*

***Petroleum Products Properties Laboratory  
3<sup>rd</sup>. Stage.***

***Exp. No. 3***

***Smoke Point Test***

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## **Aim:**

- to Determine of smoke point of light petroleum products.
- To evaluate the sooting tendency of fuels.
- To know the ability of kerosene sample to burn at complete combustion and without smoking.

## **Introduction :**

### - Definition

It is a measure of the tendency of a liquid fuel to produce carbon particles known as soot. Generally, it is measured by burning fuel in a special wick lamp in which the flame height is increased slowly till it starts producing smoke. The maximum height in term of millimeters of smokeless flame at which flame starts smoking is termed as smoke point. Hence, higher the smoke point, lower will be the tendency of the fuel to smoke.

Smoke point is related with the aromatic content of the liquid and it is inversely proportional to the aromatic content. Smoke point is used to determination of smoking tendency. Smoking tendency is proportional to the aromatic content .

### - Significance and Use

This test method provides an indication of the relative smoke producing properties of kerosene. The smoke point is related to the hydrocarbon type composition of such fuels. Generally, the more aromatic fuel the smokier the flame. A high smoke point indicates a fuel of low smoke producing tendency. The smoke point is quantitatively related to the potential radiant heat transfer from the combustion products of the fuel.

## **Requirements:**

Smoke point apparatus, beaker, petroleum sample.



Figure1: Important tools

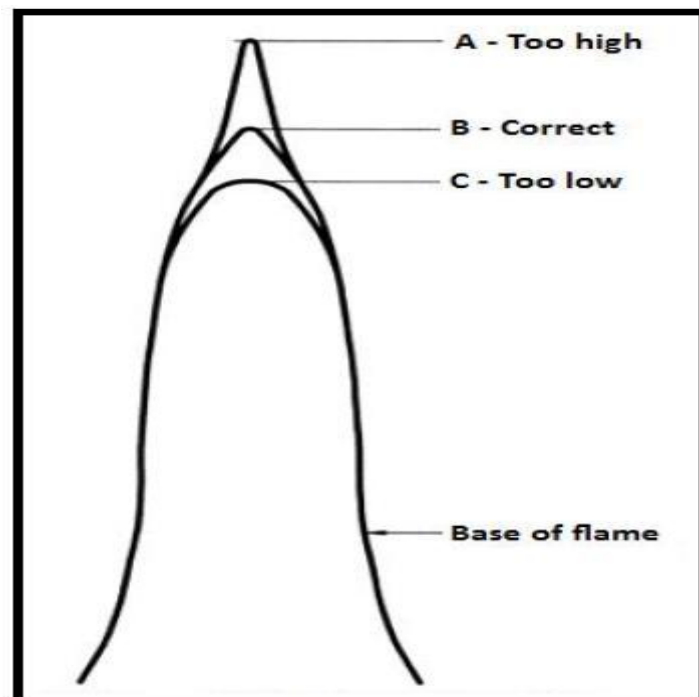


Figure 2: Typical flame appearance.

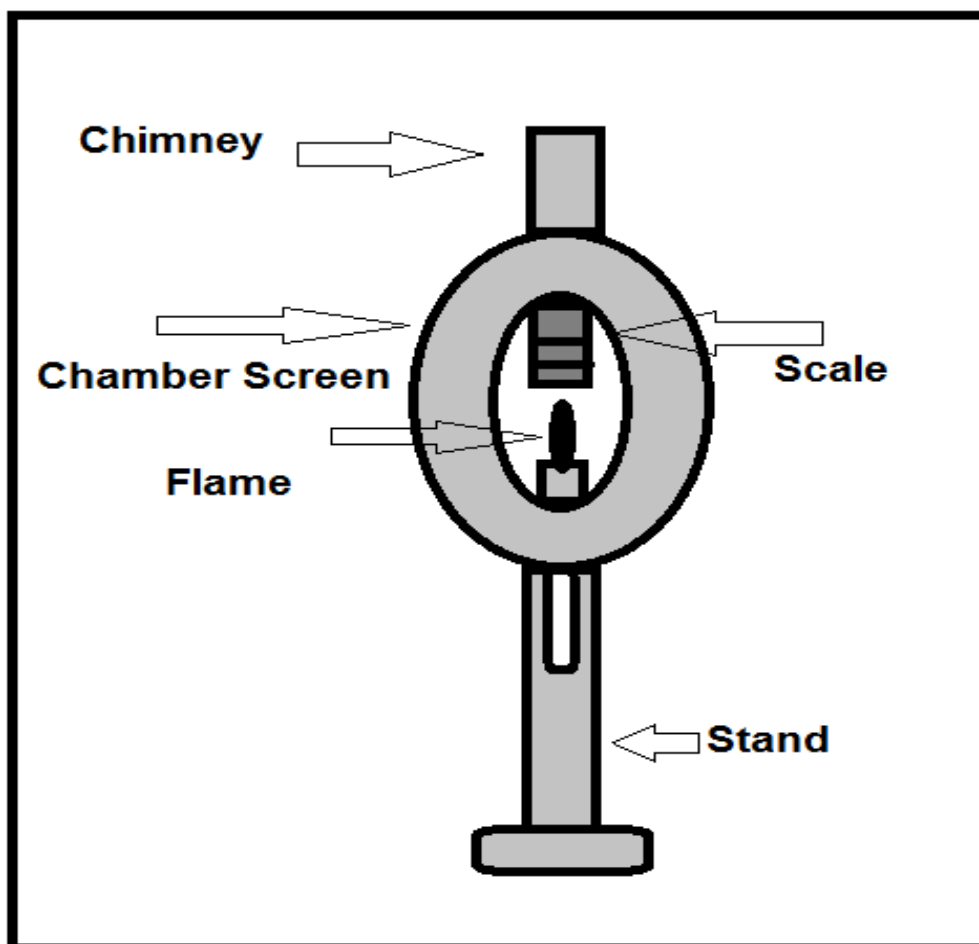


Figure 3: Smoke point device.

### **Theory:**

Smoke Point: It is the max. flame height in mm at which the sample burns without smoke.

Smoke point is related with the aromatic content of the liquid and it is inversely proportional to the aromatic content. Smoke point is used to determination of smoking tendency. Smoking tendency is proportional to the aromatic content and is given by Eq.

Smoking tendency =  $320 / \text{smoke point in mm}$ .

## **Experiment procedure**

- 1- Soak a piece of extracted and dried wick (about 125 mm) long in the sample (Kerosene). Place it in the wick tube of candle.
- 2- Fill the sample container up to desired level (20 ml) and introduce a wick in the container.
- 3- Cut the wick horizontally (6 mm) from the end of the candle.
- 4- Place this assembly in the burning chamber of the device.
- 5- Open the glass door, light the flame and adjust the wick (The flame should be about 10mm height). Allow the lamp to burn for 5 min.
- 6- Raise the candle until smoke appears from from the chimney (Stock).
- 7- Slowly the candle until the smoke disaprear.
- 8- Take the reading from the reflection of the flame image on the scale. This reading represents smoke point of the sample.
- 9- It is quite recommended that to take more than one observation to get right reading.

## **Discussion Section:**

- 1- What is the significance of smoke point test?
- 2- How many observations that you should do to get the right result?
- 3- Draw typical flame appearance.
- 4- Discuss your results and observations. You should also write a brief summary of your work and results.