

Aniline point and diesel index

Objective:

The objective of this experiment is to determine the aniline point and the diesel index of diesel oil samples.

Introduction:

Aniline point is the lowest temperature at which equal volumes of anhydrous aniline and hydrocarbon sample are completely miscible. Aniline point determination is useful in characterizing pure hydrocarbons. Aromatic hydrocarbons exhibit the lowest aniline points and paraffinic hydrocarbons exhibit the highest values. Cycloparaffins and olefins exhibit values that lie between those of paraffins and aromatics. In a homologous series, the aniline point increases with increasing molecular weight. The aniline point for mixtures of hydrocarbons, such as diesel oils and mineral oils serves as a guideline for judging the aromatic hydrocarbon content in the oil. For diesel oil, a low aniline point indicates low diesel index (because of high percentage of aromatics). The diesel index can be calculated using the following equation:

$$\text{Diesel index} = \frac{\text{Aniline point} \times \text{API gravity}}{100}$$

Diesel index is a measure of ignition quality of the fuel. A high diesel index is also not desirable as a fuel rich in aromatics gives rise to a better calorific value than paraffin rich fuel for equal weights. The aniline point can also predict the amount of carbon present in a molecule.

Experimental procedure:

- 1- Clean and dry the apparatus.
- 2- Put 10 ml of anhydrous aniline and 10 ml of tested diesel oil sample accurately inside the glass tube.
- 3- Mix the mixture, using a proper mixer with moderate speed.
- 4- If the mixture is not miscible at room temperature, heat the mixture using water bath with continuous mixing.
- 5- Record the complete miscible temperature, and report it as the aniline point.
- 6- Cool the mixture with stirring device until the two separate layers start to form.
- 7- Record the temperature and be regarded as the aniline point.
- 8- Compare the two temperatures.
- 9- Clean and dry the glass tube.
- 10- The specific gravity of diesel oil sample can be determined according to the specific gravity experiment.