Density Measurement Test Instruction

Introduction

In accordance with the Iranian National Standard No. 1-7090 regarding the determination of the density of non-foamed plastics, three methods have been provided for determining the density of the aforementioned plastics in the form of molded or extruded parts, powder, flakes, or granules. These three methods are: 1- Immersion Method, 2- Liquid Pycnometer Method, 3- Titration Method. This guide only describes the measurement of density using the immersion method.

Method for Determining Density Using the Immersion Method

To measure the density of the desired sample, the density of the immersion liquid must first be determined using the method specified in the Iranian National Standard No. 1-7090. Then, the density of the material in question is determined using the density measurement kit equipment mounted on a balance. For this purpose, the components of the density kit are placed on the balance according to the following steps.

- While the balance is turned off, place the plastic frame pan precisely on the metal pan of the balance (insert this component into the balance chamber through the side or top doors, depending on the type of chamber doors).
- Place the rectangular metal plate on the plastic frame.
- Place a beaker of suitable volume (150 or 200 ml) containing the immersion liquid on the metal plate.
- Attach the component consisting of a mesh basket connected to a thin wire by placing it in the slot located at the top of the plastic frame, ensuring the basket is fully submerged in the immersion liquid inside the beaker (ensure the beaker's position is adjusted so that the mesh does not contact the inner walls of the beaker).
- After turning on the balance to weigh the sample in air, place the sample on the circular part connected to the thin wire. To weigh the sample in the immersed state, place it inside the mesh basket submerged in the immersion liquid.
- Then, the density of the material in question can be calculated using the weight measured in air and the weight measured in the immersed state, based on the formula provided in Standard 1-7090:

$$\rho_S = \frac{m_{SA} \times \rho_{IL}}{m_{SA} - m_{SIL}}$$

  - **m_S,A**: Apparent mass of the sample in air, in grams.
  - **m_S,IL**: Apparent mass of the sample in the immersion liquid, in grams.
  - **ρ_IL**: Density of the immersion liquid at 23°C, in grams per cubic centimeter.

Note: The method and formula provided in this guide are applicable when the density of the sample is greater than that of the immersion liquid.