

A magnetic susceptibility balance for use in the

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Magnetic Susceptibility Balance**

Definition: Magnetic susceptibility balance is a device used to measure the magnetic susceptibility of materials.

Principle: The magnetic susceptibility of a material is a measure of its ability to be magnetized when exposed to an external magnetic field. A magnetic balance measures the force exerted on a sample material by a magnetic field. This force is proportional to the magnetic susceptibility of the material.

Johnson Matthey Magnetic Susceptibility Balance: The Johnson Matthey magnetic susceptibility balance is a widely used type of magnetic balance. It uses a beam balance to measure the force exerted on a sample material by a magnetic field.

Gouy Balance: A Gouy balance is another type of magnetic balance that uses a vertical sample holder suspended from a torsion wire. The sample is placed in a uniform magnetic field, and the force exerted on the sample is balanced by the torque exerted by the torsion wire.

Types of Magnetic Susceptibility:

- **Diamagnetic:** Materials with a negative magnetic susceptibility, meaning they repel magnetic fields.
- **Paramagnetic:** Materials with a positive magnetic susceptibility, meaning they weakly attract magnetic fields.

- **Ferromagnetic:** Materials with a high positive magnetic susceptibility, meaning they strongly attract magnetic fields.

Significance of Magnetic Susceptibility: Magnetic susceptibility is important in understanding the magnetic properties of materials and is used in various applications, including:

- Characterizing materials for scientific and industrial purposes
- Identifying materials in forensic investigations
- Studying geological formations
- Analyzing archaeological artifacts

Factors Affecting Magnetic Susceptibility: The magnetic susceptibility of a material depends on factors such as its electronic structure, temperature, and crystal structure.

Measurement Techniques: Magnetic susceptibility can be measured using various methods, including:

- Magnetic balance (e.g., Gouy balance, Johnson Matthey balance)
- Faraday method
- Vibrating sample magnetometer (VSM)

Analysis of Magnetic Susceptibility: The analysis of magnetic susceptibility data provides insights into the magnetic properties, composition, and structure of materials.

Susceptibility Testing: Susceptibility testing is used to determine the magnetic properties of materials for various applications, such as:

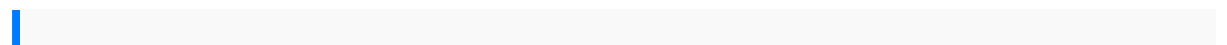
- Detecting magnetic minerals in ores
- Identifying materials in recycling processes
- Assessing the suitability of materials for specific uses

Specific Magnetic Susceptibility: Specific magnetic susceptibility is the magnetic susceptibility of a material per unit mass.

Materials with High Magnetic Susceptibility: Materials with high magnetic susceptibility include ferromagnetic materials such as iron, nickel, and cobalt.

Negative Magnetic Susceptibility: Diamagnetic materials have a negative magnetic susceptibility, meaning they repel magnetic fields.

Purpose of Susceptibility: Susceptibility, including magnetic susceptibility, is a measure of a material's response to various external stimuli, such as electric fields or magnetic fields.



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