

The Difference Between Intensive and Extensive Properties

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Intensive Properties



Boiling Point



Color



Temperature



Luster



Hardness

Extensive Properties



Volume



Mass



Size



Weight



Length

Intensive properties and extensive properties are types of physical properties of matter. The terms intensive and extensive were first described by physical chemist and physicist Richard C. Tolman in 1917. Here's a look at what intensive and extensive properties are, examples of them, and how to tell them apart.

Intensive Properties

Intensive properties are bulk properties, which means they do not depend on the amount of matter that is present.

Examples of intensive properties include:

- Boiling Point
- Density
- State of Matter
- Color
- Melting Point
- Odor
- Temperature
- Refractive Index
- Luster
- Hardness
- Ductility

Intensive properties can be used to help identify a sample because these characteristics do not depend on the amount of sample, nor do they change according to conditions.

Extensive Properties

Extensive properties do depend on the amount of matter that is present. An extensive property is considered additive for subsystems. Examples of extensive properties include:

- Volume
- Mass
- Size
- Weight
- Length

The ratio between two extensive properties is an intensive property. For example, mass and volume are extensive properties, but their ratio (density) is an intensive property of matter.

While extensive properties are great for describing a sample, they aren't very helpful in identifying it because they can change according to sample size or conditions.

Way to Tell Intensive and Extensive Properties Apart

One easy way to tell whether a physical property is intensive or extensive is to take two identical samples of a substance and put them together. If this doubles the property (e.g., twice the mass, twice as long), it's an extensive property. If the property is unchanged by altering the sample size, it's an intensive property.