Volumetric Expansion

Created: Monday, 29 August 2011 10:42 | Published: Monday, 29 August 2011 10:42 | Written by Super User | Print

Volumetric Expansion

Volume expansion works almost exactly like linear expansion. If an object or substance of initial volume Vi undergoes a change in temperature ?T, then its volume will change by an amount

?V = ?Vi?T

What is volumetric expansion?

"**Volumetric expansion**" or "**cubical expansion**" is the increase in the volume of a body when it is heated.
Consider a metallic body of volume =**V1**. Let its temperature be raised by**?T**. Experiments will then show that its increase in volume (**?V**) will be directly proportional to its initial volume (**V1**) and the rise in temperature (**?T**).

?V V1---------(1)

?V T---------(2)

combining (1) and (2)

?V V1?T
OR
?V = ?V1?T

Where ? is a constant known as the material's "coefficient of volumetric expansion"

Expression for Final Volume

We know that

Final volume = Initial volume + increase in volume

V2 = V1 +?V

Which makes the value of ?V

V2 = V1 + ?V1?T
V2 = V1(1+ ??T)

Coefficient of Volumetric Expansion

A material's coefficient of volumetric expansion (**?**) is defined as its increase in volume per unit original volume per Kelvin rise in temperature.

Unit:1K OR K^{-1}

?= 3?

For example, the value of a for a solid object does not depend on whether we are talking about its length or width. Such an object is called an isotropic solid. In this case, the volume expansion coefficient b is simply given by

?= 3?. (Isotropic solid)

Unless stated otherwise, we shall assume that any solid material that we are working with can be treated as an isotropic solid. Want to know more about volumetric expansion? Click here to schedule live help with an etutor!

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Reference links

- http://www.en.wikipedia.org/wiki/Temperature
- http://www.en.wikipedia.org/wiki/volume
- http:// www. scienceworld.wolfram.com/physics/VolumeExpansion.html

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