Answer on Question #63924, Physics / Optics

A tank truck was filled with 45,725 L of gasoline in Peshawar where the temperature was 28.0°C. The gasoline was delivered to Swat where the temperature was -12°C. Volume expansion coefficient of Gasoline is 950×10-6 °C-1. Find out the amount of gasoline delivered in litres. Infer the volume of the gasoline due to changed temperature

Find: V_2 - ? ΔV- ?

Given:

V_1=45.725 L

t_1=28.0°C

t_2=-12°C

$\beta=950\times10^{-6}$ °C^{-1}

Solution:

Increase of the volume:

$V_1 = V_0(1 + \beta t_1)$ (1),

where V_0 is volume of gasoline at temperature t=0°C,

V_1 is volume of gasoline at temperature t_1

Of (1) $\Rightarrow$ $V_0 = \frac{V_1}{1+\beta t_1}$ (2)

Of (2) $\Rightarrow$ V_0=44.5403 L (3)

Reduction of the volume:

$V_2 = V_0(1 + \beta t_2)$ (4),

where V_0 is volume of gasoline at temperature t=0°C,

V_2 is volume of gasoline at temperature t_2

(3) in (4): V_2=44.0326 L (5)

Change of volume:

$\Delta V = V_2 - V_1$ (6),

where V_1=45.725 L

(5) in (6): ΔV=-1.6924 L

Answer:

Find out the amount of gasoline delivered in litres

44.0326 L

Infer the volume of the gasoline due to changed temperature

decreased by 1.6924 L