

Name Muhammad Bilal Khan.

Id 16434

Subject Thermodynamics.

Assignment

Teacher Mr. Mujtaba Akbar

Question Number 1

Given Data:-

$$V_1 = 6 \text{ L}$$

$$P_1 = 4 \text{ atm}$$

$$V_2 = 2.5 \text{ L}$$

Required:-

Find pressure = $P_2 = ?$

Solution:-

According to Boyle's Law

$$P_1 V_1 = P_2 V_2$$

$$P_2 = \frac{P_1 V_1}{V_2}$$

$$P_2 = \frac{(4 \text{ atm})(6 \text{ L})}{(2.5 \text{ L})}$$

$$P_2 = 9.6 \text{ atm}$$

Converting into mmHg

$$9.6 \text{ atm} \left(\frac{760 \text{ mmHg}}{1 \text{ atm}} \right)$$

$$P_2 = 7.2 \times 10^3 \text{ mmHg}$$

Converting into psi

$$9.6 \text{ atm} \left(\frac{14.7 \text{ psi}}{1 \text{ atm}} \right)$$

$$P_2 = 141.12$$

Q NO 2

Ans/- This statement is false.

Atmospheric pressure reduces with altitude for two reasons.

① The gravitational attraction between the earth and air molecules is greater for those molecules nearer to earth than those further away. They have more weight.

② When molecules lower down have to support more molecules above them are further compressed (Pressurised) in the process.

Question Number 3

Ans:- Given Data:-

$$\text{Volume} = V_1 = 87 \text{ ft}^3$$

$$\text{Pressure} = P_1 = 100 \text{ lb-ft/in}^2$$

$$\text{pressure} = P_2 = 18.3 \text{ lb-ft/in}^2$$

$$\text{Work done} = W = ?$$

Solution:

According to Boyle's law:-

$$P_1 V_1 = P_2 V_2$$

$$V_2 = \frac{P_1 V_1}{P_2}$$

$$V_2 = \frac{100 \times 87}{18.3}$$

$$V_2 = 475.35 \text{ ft}^3$$

Work done = $PV = \text{Constant}$
as the process is hyperbolic
 So,

$$W = P_1 V_1 = P_2 V_2$$

$$W = P_1 V_1 = 87 \times 100 = 8700 \text{ J}$$

$$W = P_2 V_2$$

$$W = 18.3 \times 475.35$$

$$W = 8700.075 \text{ J}$$

Q4: Difference between work and

Heat:

work and heat are two most important concept in thermodynamics.

work and heat are highly interrelated but they are not quite the same.

Heat

work

- | | |
|---|---|
| * Heat is energy interaction due to temperature diff. | work is energy interaction by reasons. |
| * Heat is low grade energy. | work is high grade energy. |
| * Heat is function of state. | work is the function of path. |
| * Efficiency of work to heat is higher. | but efficiency of transfer of heat to work. |

(4) - (b)

First Law of Thermodynamics :-

Energy can neither be created nor be destroyed but can only be transferred from one form to another.

$$\Delta U = \Delta Q + \Delta W$$

The change in internal energy of the system is equal to the heat supplied to it plus the work performed on the system.

That's why
 $\Delta W = \Delta Q$