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16314

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ANSWER #01:-

Given data:-

Initial pressure, $P_1 = 4 \text{ atm}$

Initial volume, $V_1 = 6 \text{ L}$

final volume, $V_2 = 2.50 \text{ L}$

Required data:-

find the final pressure $P_2 = ?$

Solution:-

As we know that

$$P_1 V_1 = P_2 V_2$$

$$P_1 / V_2 = P_2 V_2 / V_1$$

$$P_2 = P_1 V_1 / V_2$$

Putting the values in formula.

$$= \frac{(4)(6)}{2.50}$$

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

Now, for mmHg

$$1 \text{ atm} = 760 \text{ mmHg} \quad \text{and} \quad 29.9 \text{ mmHg} = 260 \text{ mmHg}$$

$$9.60 \text{ atm} = 7296 \text{ mmHg}$$

Now for Psi:-

$$1 \text{ atm} = 14.7 \text{ Psi}$$

$$9.60 \text{ atm} = 14.12 \text{ Psi}$$

ANSWER #02:-

The above statement is false because they both have an inverse relationship.

Reasons:-

When altitude increases, the air pressure decreases. This is due to the amount of air on top of you at your current altitude. At lower altitude, you have more air above you and thus more pressure and at higher altitude, you have less air above you, and thus less pressure.

Therefore at high altitude, food takes longer time to cook due to low pressure.

ANSWER #03:-

Given data:-

$$\text{Volume } V_1 = 8 \text{ ft}^3$$

$$\text{Initial pressure, } P_1 = 100 \text{ lb-f/in}^2$$

$$\text{Final pressure, } P_2 = 18.3 \text{ lb-f/in}^2$$

Required data:

calculate value of work done.
 $\Rightarrow w = ?$

Solution:-

As we know that

$$P_1 V_1 = P_2 V_2$$

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

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

$$= \frac{(100)(8)}{(18.3)}$$

$$= \frac{800}{18.3}$$

$$V_2 = 43.71 \text{ ft}^2$$

Now,

$$\text{work done, } w = P_1 V_1 \ln \left(\frac{V_2}{V_1} \right)$$

$$= (100)(8)(18.3) \ln \left(\frac{43.71}{8} \right)$$

$$= 14.640 \ln \left(\frac{43.71}{8} \right)$$

$$\boxed{\text{work done} = 24860.70 \text{ ft-lbs}}$$

QUESTION #04

Answer #04

work and heat are the two most important theories in thermodynamics. work and heat are highly related but they are not the same.

Heat

- 1) Heat is form of energy
- 2) Requires temperature difference.
- 3) Heat is low-grade energy.
- 4) The efficiency of the transfer of heat to work is lower.

Work

- 1) work is the amount of energy transferred by a force acting through a distance
- 2) Requires forces and Displacement
- 3) work is high-grade energy.
- 4) The efficiency of the transfer of work to heat is higher.

Answer #04

Part (B):-

As according to the first law of thermodynamic Q is the net heat transferred into the system. That is Q is the sum of all heat transfer into and out of the system. W is the net work done by the system. That is W is the sum of all the work done on or by the system.
