

11.1. The average velocity of the molecules in a gas is zero but the average of square of velocities is not zero because the motion of gas molecule is random. If it moves towards positive x-axis it may also move towards negative x-axis

$$= \frac{V + (-V)}{2}$$



average velocity = 0

But for the average of square of velocities

$$= \frac{V^2 + (-V)^2}{2}$$

$$= \frac{V^2 + V^2}{2}$$

$$V^2 \neq 0$$

11.2. Because the kinetic energy of gas molecules increases due to friction between road and tyre. Therefore, due to increase in K.E the pressure increases.



11.3

As the temperature is constant, so internal energy will remain same.

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11.4

For the closed paths, ABCDA ABCA and A to A system comes back to its initial point. so, change in internal energy will be zero.

11.5 Because for constant pressure some heat will be used as work done to move the piston. While for constant volume, all the heat provided will appear

as internal energy.

11.6 For an adiabatic process, no heat is transferred or from the system but temperature of system changes.

For example: if a gas expands adiabatically temperature will decrease while for adiabatically compression temperature increases.

11.7 Yes, it is possible to convert internal energy into mechanical energy.

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For example: if a gas expands adiabatically its internal energy is used for work done.

11.8 No, it is not possible to construct a heat engine that will not expell heat into atmosphere. Because it is against 2nd law of thermodynamics.

According to this law, ~

11.9 A thermos flask containing milk as a system is shaken rapidly. Due to friction between molecules, the temperature of milk will rise. But this increase is very small.

11.10 There will no change in the temperature of room when an air conditioner is left unrunning on a table in the middle of the room. Because the heat is absorbed and expelled at same time. However, temperature of room may slightly increase due to friction of moving parts of machine.

11.11 Yes, mechanical energy can be converted completely into heat energy.

For example: For the adiabatic compression gas molecules will come close and their energy will increase due to increase in collision.

11.12 Entropy of a system increases due to friction. Because the internal energy and temperature of system increases due to friction that increases entropy.

11.13 Melting of ice is a natural process that involves an increase in entropy. Because in the melting of ice temperature increases and entropy also increases.

