Kinetic Energy

1. **Assertion (A):** Vibrational energy of molecule at temperature T is kT.
Reason (R): For every molecule, vibrational degree of freedom is 2.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

2. **Assertion (A):** There is no change in internal energy for ideal gas at constant temperature.
Reason (R): Internal energy of an ideal gas is a function of temperature only.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

3. **Assertion (A):** The atoms of a monoatomic gas have less degrees of freedom as compared to molecules of the diatomic gas.
Reason (R): The ratio of $\frac{C_p}{C_v}$ for an ideal diatomic gas is more than that for an ideal monoatomic gas (where C_p and C_v have usual meaning).
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

4. **Assertion (A):** A gas is kept in an insulated cylinder with a movable piston, in compressed state. As the piston is suddenly released, temperature of the gas decreases.
Reason (R): According to the kinetic theory of gas, a molecule colliding with the piston must rebound with less speed than it had before the collision. Hence average speed of the molecules is reduced.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

5. **Assertion (A):** At 0K, pressure of an ideal gas becomes zero.
Reason (R): At 0K, according to ideal gas equation PV = 0, volume cannot be zero hence pressure should be zero to satisfy this equation.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

6. **Assertion (A):** Molar heat capacity of an ideal monoatomic gas at constant volume is a constant at all temperatures.
Reason (R): As the temperature of an monoatomic ideal gas is increased, number of degrees of freedom of gas molecules remains constant.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

Get More Learning Materials Here : CLICK HERE www.studentbro.in

7. **Assertion (A):** According to kinetic theory of gases the internal energy of a given sample of an ideal gas is only kinetic.
Reason (R): The ideal gas molecules exert force on each other only when they collide.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

8. **Assertion (A):** Internal energy of an ideal gas $U = nC_VT$ is due to random motion of gas molecules.
Reason (R): A container is moving with speed v. It is suddenly stopped by a force, temperature of gas increases.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

9. **Assertion (A):** Experimental results indicate that the molar specific heat of hydrogen gas at constant volume below 50 K is equal to 5/2 R, where R is the universal gas constant.
Reason (R): A diatomic hydrogen molecule possesses three translational and two rotational degrees of freedom at all temperatures.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

10. **Assertion (A):** When an ideal gas is heated in a rigid non conducting container then pressure becomes double if the temperature is doubled.
Reason (R): Both the frequency of collisions and momentum transferred per collision becomes $\sqrt{2}$ times.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

11. **Assertion (A):** The total translational kinetic energy of all the molecules of a given mass of an ideal gas is 1.5 times the product of its pressure and its volume
Reason (R): The molecules of a gas collide with each other and the velocities of the molecules change due to the collision.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

12. **Assertion (A):** Molar heat capacity at constant pressure can be less than molar heat capacity at constant volume.
Reason (R): $C_p - C_v = R$ is valid only for ideal monoatomic gas.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

13. **Assertion (A):** An ideal gas is enclosed within a container fitted with a piston when volume of this enclosed gas is increased at constant temperature. The pressure exerted by the gas on the piston decreases.
Reason (R): In the above situation the rate of molecules striking the piston decreases. Therefore pressure exerted by gas on piston decreases.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

Get More Learning Materials Here : CLICK HERE www.studentbro.in

14. **Assertion (A):** Gas is suddenly compressed, its temperature rises.
Reason (R): Work done in compression of gas increases internal energy of the gas.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

15. **Assertion (A):** If temperature of gas in a closed container in increased, its mean free path remains unchanged.
Reason (R): Mean free path is inversely proportional to number of molecules per unit volume.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

16. **Assertion (A):** The average translational kinetic energy per molecule of a gas for various gases at the same temperature is the same.
Reason (R): if a given temperature, all molecules move with nearly the same speed.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

17. **Assertion (A):** When temperature rises the coefficient of viscosity of gases decreases.
Reason (R): Gases behave more like ideal gases at lower temperature.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

18. **Assertion (A):** Maxwell speed distribution graph is symmetric about most probable speed
Reason (R): rms speed of ideal gas, depends upon it's type (monoatomic, diatomic and polyatomic)
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

19. **Assertion (A):** Internal energy of an ideal gas does not depend upon volume of the gas
Reason (R): Internal energy of ideal gas depends on temperature of gas.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

20. **Assertion (A):** An ideal gas has infinitely many molar specific heats.
Reason (R): Molar specific heat is amount of heat needed to raise the temperature of 1 mole of gas by 1 K.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

Get More Learning Materials Here : CLICK HERE www.studentbro.in

21. **Assertion (A):** The specific heat of a monatomic gas may have value between 0 and ∞.

Reason (R): $C_P = \frac{5}{2}R$ and $C_V = \frac{3}{2}R$ for a monoatomic gas.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

22. **Assertion (A):** A real gas behaves as an ideal gas at high temperature and low pressure.

Reason (R): At low pressure and high temperature intermolecular forces vanish away and volume of gas molecules is negligible.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

23. **Assertion (A):** P-T graph of all gases at low density meet at 0 K.

Reason (R): Absolute zero kelvin is less than 0°C in celsius scale.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

24. **Assertion (A):** An ideal gas has infinitely many molar specific heats.

Reason (R): Specific heat is amount of heat needed to raise the temperature of 1 mole of gas by 1K.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

25. **Assertion (A):** On increasing the temperature, the height of the peak of the Maxwell's velocity distribution curve increases.

Reason (R): The height of the peak of the Maxwell's velocity distribution curve represents most probable speed.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

26. **Assertion (A):** All molecular motion ceases at –273.15°C.

Reason (R): Temperature 0K cannot be attained.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

27. **Assertion (A):** In Maxwell's speed distribution graph, for a given amount of gas, the area under the graph increases as the temperature of the gas increases.

Reason (R): Decrease in temperature broadening the curve.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

Get More Learning Materials Here : CLICK HERE www.studentbro.in

28. **Assertion (A):** The pressure exerted by an enclosed ideal gas does not depend on the shape of the container.

Reason (R): The pressure of an ideal gas depends on the number of moles, temperature and volume of the enclosure.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

29. **Assertion (A):** The ratio $\frac{C_P}{C_V}$ is more for helium gas than for hydrogen gas.

Reason (R): Atomic mass of helium is more than that of hydrogen.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

30. **Assertion (A):** On a V-T graph, the slope of an isobar increases with pressure.

Reason (R): At constant temperature, for an ideal gas its volume is directly proportional to its pressure.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

31. **Assertion (A):** Internal energy of real gas is always negative at absolute zero temperature.

Reason (R): Potential energy of a bounded system is negative.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

32. **Assertion (A):** The average translational kinetic energy of the molecules in one mole of all ideal gases, at the same temperature is the same.

Reason (R): The average kinetic energy of one mole of any ideal gas at temperature T is given by $< E >= \frac{3}{2}RT$.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

33. **Assertion (A):** For an ideal gas, at constant temperature, the product of the pressure and volume is constant.

Reason (R): The mean square velocity of gas molecules is inversely proportional to mass of molecule.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

Get More Learning Materials Here : CLICK HERE www.studentbro.in

ANSWER KEY																			
Que.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Ans.	1	1	3	1	3	1	1	2	4	1	2	3	1	1	1	3	4	4	2	2
Que.	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**							
Ans.	2	1	2	2	4	2	4	1	2	4	1	3	2							

Get More Learning Materials Here : CLICK HERE www.studentbro.in