# CBSE

# KINETIC THEORY WS 1

## Class 11 - Physics

### Section A

1. **Assertion (A):** Molecules attract when they are little distance apart and repels when they come very close to each other. **[1]**

   **Reason (R):** F = $\frac{dU}{dr}$.

   a) Both A and R are true and R is the correct explanation of A.

   b) Both A and R are true but R is not the correct explanation of A.

   c) A is true but R is false.

   d) A is false but R is true.

2. **Assertion (A):** A gas can be liquified at any temperature by increase of pressure alone. **[1]**

   **Reason (R):** On increasing pressure, the temperature of gas increases.

   a) Both A and R are true and R is the correct explanation of A.

   b) Both A and R are true but R is not the correct explanation of A.

   c) A is true but R is false.

   d) A is false but R is true.

3. **Assertion:** P-T graph of all gases at low density meet at 0 K. **[1]**

   **Reason:** Absolute zero kelvin is less than $0^{o}$C in Celsius scale.

   a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

   b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

   c) Assertion is correct statement but reason is wrong statement.

   d) Assertion is wrong statement but reason is correct statement.

4. Name an experimental evidence in support of random motion of gas molecules. **[1]**
5. If a vehicle runs on the road for a long time, then the air pressure in the tyres increases. Explain. **[1]**
6. A liquid is frozen at absolute zero of temperature. What happens to its molecular motion? **[1]**
7. What is the number of degree of freedom of a bee flying in a room? **[1]**
8. The volume of a given mass of a gas at 27°C, 1 atm is 100 cc. What will be its volume at 327°C? **[1]**
9. Calculate the number of atoms in 39.4 g gold. Molar mass of gold is 197g $mole^{-1.}$ **[1]**
10. Who proposed a model for a gas for the kinetic theory of gases? **[1]**
11. According to kinetic theory of gases, explain absolute zero. **[1]**
12. Name the phenomena which give direct experimental evidence in support of the molecular motion. **[1]**

### Section B

13. **Fill in the blanks:** **[2]**

    (a) The phenomenon of _____ provides direct experimental evidence in support of the molecular motion. **[1]**

    (b) With the increase in temperature of the gas, the velocity of gas molecules _____. **[1]**

14. The density of water is 1000 kg $m^{-3}$. The density of water vapour at 100 °C and 1 atm pressure is 0.6 kg $m^{-3}$. The volume of a molecule multiplied by the total number gives, what is called, molecular volume. Estimate the volume of a water molecule. **[2]**

**Section C**

15. **State True or False:** **[3]**

(a) There is no atmosphere on moon. **[1]**

(b) 1 mole of a substance contains $6.023 \times 10^{23}$ atoms or molecules. **[1]**

(c) The volume of the molecules of a real gas is zero. **[1]**

16. Estimate the total number of air molecules (inclusive of oxygen, nitrogen, water vapour and other constituents) in a room of capacity 25.0 $m^3$ at a temperature of 27 °C and 1 atm pressure. **[3]**

**Section D**

17. Uranium has two isotopes of masses 235 and 238 units. If both are present in Uranium hexafluoride gas, which would have the larger average speed? If atomic mass of fluorine is 19 units, estimate the percentage difference in speeds at any temperature. **[5]**

How is the above concept of difference in speeds utilised in the enrichment of uranium needed for nuclear fission?

18. a. Calculate (i) the root mean square speed and (ii) the mean kinetic energy of one gram molecule of hydrogen at S.T.P. Given that the density of hydrogen at S.T.P. is 0.09 kg $m^{-3}$ and R = 8.31 J $mole^{-1}$ $K^{-1}$. **[5]**

b. Given that the mass of a molecule of hydrogen is $3.34 \times 10^{-27}$ kg, calculate Avogadro's number.

c. Calculate Boltzmann's constant.