

2021

SEPTEMBER

B.Sc Part - IPhysical ChemistryGaseous state

WK 37 | DAY 249-116

Paper - E

MONDAY

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06

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Postulates of Kinetic theory of gases

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The laws governing the behaviour of gases (e.g Boyle's law, Charles law, etc) were based on the experimental and natural observation. There was no theoretical justification to answer the questions.

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Why do different gases diffuse with different rates in all direction and occupy the entire available space? why do gases obey  $PV = nRT$  expression at ordinary temperature and pressure? etc. The Kinetic Molecular theory (also called Moving particle theory) of gases, first proposed by D. Bernoulli (1730-1782) in 1738 and subsequently developed by Joule (1848), Rankin and Kruizing (1856), Clausius (1857), Maxwell and Boltzmann (1960) provides theoretical interpretation of above questions.

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Postulates.

1. A gas is composed of very large no of tiny similar, perfectly elastic and spherical particles called Molecules which are widely separated from one another in Space.
2. The gas molecules are widely separated from one another so that volume occupied by the collision

OCTOBER 21

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DAY 250-115 | WK 37

TUESDAY

TUESDAY  
Therefore occupied by the  
gas molecules is negligible as compared to the  
total volume of the gas.

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3. Gas Molecules exert no force of attraction or repulsion on each other except through collisions, therefore they travel independently at constant high speed in straight path but in random directions.
  4. During their motion, the molecules collide with each other (Molecular collision) and also with the inert surface of the walls of the container.
  5. Collisions between Molecules or between a molecule and inert surface are perfectly elastic with no change in total kinetic energy of gas molecules during impact.
  6. The Pressure of the gas is due to the continuous bombardment of gas molecules on the walls of the vessel.
  7. The Motion of Molecules in a gas due to the thermal energy possessed by them. and hence the average Kinetic energy of gas molecules is directly proportional to the absolute temperature. At any given temperature the molecules of all gases have the same average Kinetic energy.
  8. Gas Molecules are not affected by gravity during their movement due to continued collision between them.

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