PHYSICS

BOOKS - BHARATI BHAWAN PHYSICS (HINGLISH)

SATURATED AND UNSATURATED VAPOUR

Others

1. A jar contains a gas and a few drops of water at TK The pressure in the jar is $830mm$ of Hg The temperature of the jar is reduced by 1% The vapour pressure of water at two temperatures are 300 and 25 mm of Hg Calculate the new pressure in the jar .

2. On a particular day when the atmpspheric temperature is $18.5°C$ the dew point is found

oo be $8.6°C$. Determine the relative humidity of the air if the maximum vapour pressure of water be 8.04, 8.61, 15.46 and 16.46mm at $8°, 9°, 18°$ and $19°$ respectively.

3. If the temperature of air whose relative humitity is 60% falls $20°$ to $5°C$ calculate the fraction of the mass of water vapour contained in the air which will condense into

drops. (Saturated vapour pressure of water at $20°C = 17.5mm$ and at $5°C = 6.5mm$)

4. The temperature of the atmosphere is observed to be $27°C$ and the dew point $18°C$. If the temperature falls to $22°C$ what will be the new dew point? The saturated vapour pressure at $18°C = 15.46mm$ of mercury, at $22°C = 20.88mm$ and at $17°C = 14.78mm$ of mercury.

5. Saturated water vapour is enclosed in a cylinder undr a piston and occupies volume $V_0 = 5$ litre at temperature $t = 100° C$. Find the mass of water formed after the volume under the piston is decreased isthermally to $V = 2$ litres. Saturated vapour pressure at $100° C = 10^5 Nm^{-2}$.

6. A mas of air is saturated with water vapour at $100°C$. Onl raising the temperature to $200°C$ without change of volume, the mixture exerts a pressure of 2×10^5 pascals (Pa). What was the pressure of air alone in the ilnitial conditions? (Saturated vapour pressure of water at $100°C = 10^5 Pa$)

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7. The temperature of air in closed space is observed to be $15°C$ and the dew point is $8°C$. If the temperature falls to $10°C$ how will the dew point be affected? (Saturated vapour pressure at $7°C = 7.49mm$ of mercury and that at $8°C = 8.02mm$)

8. On a certain day the temperature of the air is s$30°C$ and relative humidity 50%. What

fraction of the mass of water vapour would condense if the temperature fell to $10°C$?

[Saturated vapour pressure at $30°C = 31.7mm$ and $10°C = 9.2mm$]

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9. Find the massof 1 cubicmetre of moist air at $27°C$s and $759.2mm$ pressure, the dew point being $10°C$. (Saturated vapour pressure at $10°C = 9.2mm$. Density of dry air at STP $= 1.293kgm^{-3}$. Density of moisture at any

temperature and pressure $= \dfrac{5}{8}$ of density of dry air at the same temperature and pressure.)

10. Water is introduced into the vacuum in a Fortin's barometer at $20°C$. What mass of vapour will collect in the space? (Volume of the space $= 50 \times 10^{-6}m^3$, Saturated vapour pressure at $20°C = 2.2 \times 10^3 Nm^{-2}$, $R = 8.3 mol^{-1}K^{-1}$ and molecular weight of vapour $= 18$

11. A certain quantity of vapour of a liquid mixed with air is containe din a vessel of constant volume. The pressure shown at $20°C$ and $80cm$ of mercury and at $40°C$ it is $100cm$. The vapour pressure of the liquid at $20°C$ is $15cm$ of mercury. Calculate the same at $40°C$.

12. Calculate the mass of 1 liter of moist air at $27°C$ when the barometer reads $753.6mm$ of mercury and the dew point is $16.1°C$. (Saturated vapour pressure of water at $16.1°C + 13.6mm$ of mercury, densityb of aire at $NTP = 1.293kgm^{-3}$ and density of saturated water vapour at $NTP = 0.808kgm^{-3}$

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13. Two chambers containing m_1 and m_2 kg of gas at pressure p_1 and p_2 are later connected. What will be pressure of the mixture.

14. Two gases which are at pressure p_1 volume V_1 and temperature T_1 and pressure p_2 volume V_2 and temperature T_2, respectively are forced into a vessel of volume V at

temperature T. Calculate pressure of the mixture.

15. Two vessels of equal capacity are connected together by a narrow tube of negligible volume. The contai a gas at atmospheric pressure and $27°C$. One is cooled to $0°C$ and the other is heated to $100°C$. Calculate the resulting pressure, assuming that the volume of the vessels remains unchanged.

16. One gram of saturated vapour is enclosed in a thermally insulated cylinder under a weightless piston. The outside pressure is standard $m = 1g$ of water is introduced into the cylinder at a temperature $t_0 = 22°C$. Neglecting the heat capacity of the cylinder and piston and friction, find the work done by the force of the atmosphere during the lowering of the piston. $T =$ temperature of

saturated vapour $= 373K$, L sp. heat latent heat $= 12250/kJ/kg$

17. Ten litres of dry ailr at atmospheric pressure and $0°C$ are contained in a closed vessel. Three grams of water are added and the system is heated to $100°C$. Find the pressure in the vessel.

18. The saturated water vapour is enclosed in a cylinder under a piston and occupies a volume of 5 litres at $100°\,C$. Find the mass oif th water formed after the volume under the piston is decreased to 1.6litres at the same temperature.

19. A volume occupied by a saturated vapour is reducd n times at a constant temperature. What fraction η of the final volume is occupied

by the liquid if the specific volume of saturated vapour be N times greatr than the specific volume of the corresponding liquid?

20. A certain mass of saturated water vapour is contained in a cylindrical vessel under a weightless piston at one atmosphric pressure. The piston is slowly lowered till $0.7g$ of vapour gets condensed. The volume under thepiston is now only $\dfrac{1}{5}$ th of the original volume. Find

the original mass of the vapour. Neglect volume of the liquid formed. What is the temperature of the vapour?