

CHEMISTRY

NCERT - NCERT CHEMISTRY(ENGLISH)

STATES OF MATTER

Solved Example

1. A balloon is filled with hydrogen at room temperature. It will burst if pressure exceeds 0.2bar. If at I bar pressure, the gas occupies

2.27L volume, up to what volume can the balloon be expanded?



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2. when a ship is sailing in Pacific Ocean where temperature is $23.4^{\circ}C$, a balloon is filled with 2.0 L of gas. When the ship reaches Indian Ocean where temperature is $26.1^{\circ}C$?



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3. At $25^{\circ}C$ and 760 mm of Hg pressure a gas occupies 600 mL volume. What will be its pressure at a height where temperature is $10^{\circ}C$ and volume of the gas is 640 mL.



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4. A neon-dioxygen mixture contains 70.6 g dioxygen and 167.5 g neon. If pressure of the mixture of gases in the cylinder is 25 bar. What

is the partial pressure of dioxygen and neon in the mixture ?



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5. Gases possess characteristic critical temperature which depends upon the magnitude of intermolecular forces between the gas particles. Critical temperatures of ammonia and carbon dioxide are 405.5 K and 304.10 K respectively. Which of these gases will

liquify first when you start cooling from 500 K to their critical temperature ?



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Exercise

1. What will be the minimum pressure required to compress 500 dm^3 of air at 1 bar to 200 dm^3 at 30°C ?



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2. A vessel of 120 mL capacity contains a certain amount of gas at 1.2 bar pressure and $35^{\circ}C$. The gas is transferred to another vessel of volume 180 mL at $35^{\circ}C$. What would be its pressure?



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3. Using the equation of state $pV = nRT$, show that at a given temperature the density of gas is proportional to gas pressure p .



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4. At $0^{\circ}C$ the density of a gaseous oxide at 2 bar is same as that of nitrogen at 5 bar What is the molecular mass of the oxide ? .



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5. Pressure of $1g$ of an ideal gas A at $27^{\circ}C$ is found to be 2 bar when $2g$ of another ideal gas B is introduced in the same flask at same temperature the pressure becomes 3 bar. Find

a relationship between their molecular masses

.



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6. The drain cleaner Drainex contains small bits of aluminium which react with caustic soda to produce hydrogen. What volume of hydrogen at 20°C and one bar will be released when 0.15g of aluminium reacts ? .



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7. What will be the pressure of the gas mixture of 3.2 g methane and 4.4 g carbon dioxide contained in a 9 dm^3 flask at $27.^\circ \text{ C}$?



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8. What will be the pressure of the gas mixture when 0.5 L of H_2 at 0.8 bar 2.0 L of oxygen at 0.7 bar are introduced in a 1 L vessel at 27° C ?



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9. Density of a gas is found to be $5.46 / dm^3$ at $27^\circ C$ at 2 bar pressure What will be its density at *STP* ? .



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10. $34.05 mL$ of phosphorus vapours weighs $0.0625g$ at $546^\circ C$ and 0.1 bar pressure. What is the molar mass of phosphorus ?



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11. A student forgot to add the reaction mixture to the round bottomed open flask at $27^{\circ}C$ and put it on the flame After a lapse of time he realized his mistake using a pyrometer he found the temperature of the flask was $477^{\circ}C$ What fraction of air would have been expelled out ? .



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12. Calculate the temperature of 4.0 mol of a gas occupying $d \text{ dm}^3$ at 3.32 bar. ($R=0.083 \text{ bar}$

$dm^3 K^{-1} mol^{-1}$).



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13. Calculate the total number of electrons present 1.4 g of dinitrogen gas.



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14. How much time would it take to distribute one Avogadro number of wheat grains, if 10^{10} grains are distributed each second?



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15. Calculate the total pressure in a mixture of 8g of oxygen and 4g hydrogen confined in a vessel of $1dm^3$ at $27^\circ C$.
($R = 0.083 \text{ bar dm}^3 K^{-1} \text{ mol}^{-1}$)



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16. Pay load is defined as the difference between the mass of displaced air and the

mass of the balloon Calculate the pay-load when a balloon of radius $10m$ mass $100kg$ is filled with helium at 1.66 bar at $27^\circ C$ (Density of air $= 1.2kgm^{-3}$ and $R = 0.083 \text{ bar } dm^3 K^{-1}mol^{-1}$).



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17. Calculate the volume occupied by 8.8 g of CO_2 at $31.1^\circ C$ and 1 bar pressure. $R = 0.083 \text{ bar L } K^{-1}mol^{-1}$.



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18. $2.9g$ of a gas at $95^{\circ}C$ occupied the same volume as $0.184g$ of hydrogen at $17^{\circ}C$ at same pressure What is the molar mass of the gas ? .



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19. A mixture of hydrogen and oxygen at 1 bar pressure contains 20% of hydrogen by weight. Calculate the partial pressure of hydrogen.



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20. What would be the *SI* unit for the quantity pV^2T^2/n ?



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21. In terms of Charles' law, explain why $-273^\circ C$ is the lowest possible temperature?



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22. The critical temperatures of carbon dioxide and methane are 31.1°C and -81.9°C , respectively. Which of them has stronger intermolecular forces and why?



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23. Explain the physical significance of vanderWaals parameters.



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