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## India's Number 1 Education App

## CHEMISTRY

# NCERT - NCERT CHEMISTRY(HINGLISH) 

## STATES OF MATTER

Solved Example

1. A ballon is filled with hydrogen at room
temperature. It will burst if pressure exceeds
0.2 bar. If at $I$ bar pressure, the gas occupies
$2.27 L$ 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 ballon is filled with
2.0 L of ship reaches Indian Ocean where temperature is $26.1^{\circ} \mathrm{C}$ ?
3. At $25^{\circ} \mathrm{C}$ and 760 mm of Hg pressure a gas occupies 600 mL volume. What will be its pressure at a height where temperature is $10^{\circ} \mathrm{C}$ 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 $500 \mathrm{dm}^{3}$ of air at 1 bar to 200 $d m^{3}$ at $30^{\circ} C$ ?

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

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3. Using the equation of state $p V=n R T$, show that at a given temperature the density of gas is proportional to gas pressure $p$.
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 $1 g$ of an ideal gas $A$ at $27^{\circ} C$ is
found to be 2 bar when $2 g$ 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 $20^{\circ} C$ and one bar will be released when $0.15 g$ of aluminium reacts ? .
7. What will be the pressure exerted by a mixture of $3.2 g$ of methane and $4.4 g$ of carbon dioxide contained in a $9 d m^{3}$ flask at $27^{\circ} C$ ?.

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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 $27^{\circ} C$
?
9. Density of a gas is found to be $5.46 / d m^{3}$ at
$27^{\circ} \mathrm{C}$ at 2 bar pressure What will be its density at $S T P$ ?.

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10. 34.05 mL of phosphorus vapours weighs
$0.0625 g$ at $546^{\circ} \mathrm{C}$ 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
$27^{\circ} \mathrm{C}$ 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 $\mathrm{d} \mathrm{dm}^{3}$ at 3.32 bar. ( $\mathrm{R}=0.083$ bar
$\left.d m^{3} K^{-1} \mathrm{~mol}^{-1}\right)$.

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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 $8 g$ of oxygen and $4 g$ hydrogen confined in a vessel of $1 d m^{3}$ at $27^{\circ} C$.
$\left(R=0.083 \mathrm{bar} d \mathrm{~m}^{3} \mathrm{~K}^{-1} \mathrm{~mol}^{-1}\right)$

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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 10 m mass 100 kg is filled with helium at 1.66 bar at $27^{\circ} C$ (Density of air $=1.2 \mathrm{kgm}^{-3}$ and $R=0.083$ nar $\left.d m^{-3} K^{-1} m o 1^{-1}\right)$.

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17. Calculate the volume occupied by 8.8 g of
$\mathrm{CO}_{2}$ at $31.1^{\circ} \mathrm{C}$ and 1 bar pressure. $\mathrm{R}=0.083$ bar L $K^{-1}$ mol $^{-1}$.

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18. 2.9 g of a gas at $95^{\circ} \mathrm{C}$ occupied the same volume as 0.184 g of hydrogen at $17^{\circ} \mathrm{C}$ 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.
20. What would be the $S I$ unit for the quantity $p V^{2} T^{2} / n$ ?

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

## 22. The critical temperatures of carbon dioxide

 and methane are $31.1^{\circ} \mathrm{C}$ and $-81.9^{\circ} \mathrm{C}$, 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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