CHEMISTRY

BOOKS - ICSE

STUDY OF GAS LAWS

Topic 1 1 Mark Questions

1. The average kinetic energy of the molecules of a gas is proportional to the .... [absolute temperature/ absolute zero]

2. The temperature on the Kelvin scale at which molecular motion completely ceases is called .... [absolute temperature/ absolute zero]

3. If temperature is reduced to half, ... would, also reduce to half. [pressure/ volume]

4. The graph of PV vs P for a gas is

A. parabolic

B. hyperbolic

C. a straight line parallel to X-axis

D. a straight line passing through origin

Answer: c

5. If the pressure is doubled for a fixed mass of gas, its volume will become

A. 4 times

B. 1/2 times

C. 2 times

D. No change

Answer: b

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6. Which law states that "product of volume and pressure at constant temperature is constant for a dry gas of given mass".

A. Charles.s law
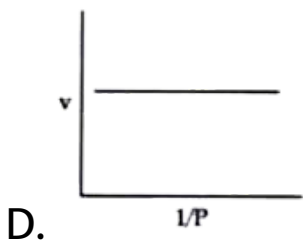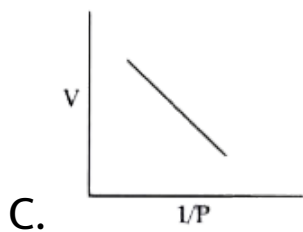
B. Boyle.s law

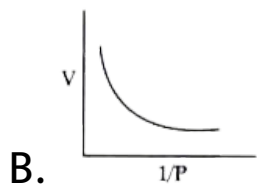C. Henry.s law

D. Dalton.s law

Answer: b

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7. Which is the true graphical representation of V vs 1/P

A.

B.

C.

D.
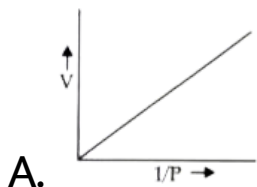
Answer: a

8. The S.I. unit of pressure is

A. atm

B. Pascal

C. Torr

D. mm Hg

Answer: b

9. Boyle.s Law is

A. $P_1 V_1 = P_2 V_2$

B. $P_2 V_1 = P_1 V_2$

C. $\dfrac{V_1}{T_1} = \dfrac{V_2}{T_2}$

D. $V_1 T_1 = V_2 T_2$

Answer: a

10. the values of standard temperature and pressure is :

    A. $1°C$ and 1 atm

    B. $0°C$ and 1 atm

    C. $-273°C$ and 760 mm of Hg

    D. $25°C$ and 76 cm of Hg

Answer: b

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11. The S.I. unit of volume of gas is measured in

A. mL

B. dm^3

C. L

D. m^2

Answer: d

12. Match the following

Column A	Column B
(a) cm^3	(i) pressure
(b) Kelvin	(ii) temperature
(c) Torr.	(iii) Volume
(d) Boyle's Law	(iv) $P_1V_1 = P_2V_2$

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13. What do you understand by gas?

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14. Convert $273° C$ to Kelvin

15. Convert 293 K to $^\circ C$

16. Give the mathematical expression of Boyle.s

law.

17. What is the value of 1 atm in torr. Define atmospheric pressure.

18. Give reasons

Need of mentioning temperature and pressure while stating its volume

19. What is meant by diffusion?

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Topic 1 2 Marks Questions

1. During the practical in the lab when hydrogen sulphide gas having offensive odour is prepared for some test, we can smell the gas even 50 metres away. Explain phenomenon.

2. How is molecular motion related with temperature?

3. What is the relation of molecular motion with temperature?

4. The molecular theory states that the pressure exerted by a gas in closed vessel results from the gas molecules striking against the walls of the vessel. How will the pressure change if : the temperature is doubled keeping the volume constant

5. The molecular theory states that the pressure exerted by a gas in closed vessel results from the gas molecules striking

against the walls of the vessel. How will the pressure change if : the volume is made half of its original value keeping the temperature constant?

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6. Give reasons :Gas fills completely the vessel in which it is kept.

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7. Give reasons :Gases occupies the complete volume of vessels in which it is kept

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8. Give reasons :Mountaineers carry oxygen cylinders with them.

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9. Volume of certain amount of a gas at $25°C$ and 100 cm Hg pressure is 80 mL. The gas is expanded to 160 mL keeping the temperature constant. Calculate the pressure of the expanded gas.

10. At a particular temperature, a certain quantity of gas occupies a volume of $74cm^3$ at a pressure of 760 mm. If the pressure is

decreased to 740 mm, what will be the volume of the gas at the same temperaute ?

11. A vessel of capacity 600cm^3 contains hydrogen gas at a pressure of 304 cm Hg. What will be the pressure of hydrogen gas, when the vessel is connected to another vessel of 300cm^3 capacity ?

12. Calculate the minimum pressure required to compress 250 L of air of 100 L at 1 bar keeping the temperature constant.

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13. Give the graphical representation of Boyle.s law and Charles.s law .

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14. Volume occupied by gas is $700\mathrm{cm}^3$ under 760 mm Hg pressure. Calculate the pressure of gas if gas occupies $400\mathrm{cm}^3$ keeping the temperature constant

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Topic 1 3 Marks Questions

1. State the units of three variables used in gas laws.

2. State Boyle.s Law.

3. Give the mathematical expression for Boyle.s

law

4. Deduce and explain Boyle's law and Charles' law on the basis of kinetic gas equation.

5. Write the value of :

Standard temperature in

(i) $^\circ C$ (ii)K

6. Write the value of :

Standard pressure in (i)atm (ii)mm Hg (iii)cm Hg (iv) torr

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7. Give reasons : Gases have lower density compared to that of solids or liquids.

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8. Give reasons : Gases exert pressure in all directions.

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9. Give reasons : Inflating balloon seems to violate Boyle.s law.

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10. At constant temperature, a gas is at a pressure of 1080 mm Hg. If the volume is decreased by 40%, find the new pressure of the gas.

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11. Internal volume of steel cylinder was 25 litres and filled with hydrogen gas at 30 atmospheric pressure. What will be the volume occupied by hydrogen gas if it is filled

in a balloon at atmospheric pressure of 1.25
atm. pressure. At the same temperature?

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12. Volume occupied by gas under pressure of
740 mm of Hg is 500cm^3. If the volume will be
reduced by 25 percent keeping the
temperature constants, calculate the pressure
of gas.

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13. Correct the statement : Gases do exert pressure in single direction.

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14. Correct the statement : Gases can neither be compressed nor be expanded.

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15. Correct the statement : Two gases cannot be mixed.

16. Volume occupied at pressure of 760 mm of Hg is 500cm^3. Whatis the pressure of gas, if gas occupies half of its original volume? The temperature is kept constant

17. 500cm^3 of a gas at S.T.P is filled in a container of volume 1000cm^3. Keeping the temperature constant, find the required percentage change in pressure.

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Topic 1 5 Marks Questions

1. State five important assumptions of the kinetic theory of matter.

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2. See the given figure below and answer the given questions?

What does the experiment tell about?

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3. See the given figure below and answer the given questions?

Write the observation of the experiment?

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4. See the given figure below and answer the given questions?

What are the conclusions drawn from the experiment ?

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5. Boyle.s Law is

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6. Give the significanceof Boyle.s law

7. A student performed an experiment to measure pressure and volume of a gas at constant temperature and noted the following:

Pressure (mm of Hg)	Volume (cm^3)
100	80
125	x
200	40
y	32

Calculate the value of x and y. Which law was

used in the calculation ? Draw a suitable graph.

8. At constant temperature , the effect of change of pressure on volume of a gas was as given below :

Pressure in atmosphere	Volume in litres
0.20	112
0.25	89.2
0.40	56.25
0.60	37.40
0.80	28.10
1.00	22.4

Plot the following graphs

P vs V

9. At constant temperature , the effect of change of pressure on volume of a gas was as given below :

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0.60	37.40
0.80	28.10
1.00	22.4

Plot the following graphs

P vs V

10. At constant temperature, the effect of change of pressure on volume of a gas was as given below

Pressure in atmospheres	Volume in litres
0.20	112
0.25	89.6
0.40	56
0.80	28
1.00	22.4

Plot the following graphs :

PV vs P.

Topic 2 1 Mark Questions

1. The melting point of ice is .... Kelvin. [273 / 373]

2. Partial pressure of water vapour is also known as .... [aqueous tension/surface tension]

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3. The absolute temperature value that corresponds to $27°C$ is

A. 200 K

B. 300 K

C. 400 K

D. 246 K

Answer: b

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4. Volume : Temperature relationship is given

by

A. Boyle

B. Gay Lussac

C. Dalton

D. Charles

Answer: d

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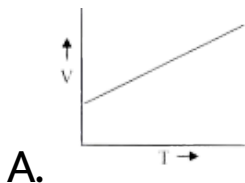**5.** The temperature of $0°$ Celsius on the Kelvin

scale is equal to :

A. -273 K

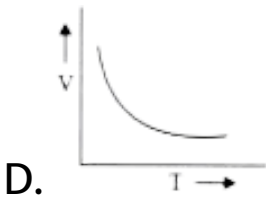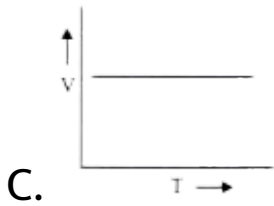B. 273 K

C. 0 K

D. 100 K

Answer: b

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6. The true graphical representation of volume versus temperature relationship at constant pressure is :

A.

B.

C.

D.
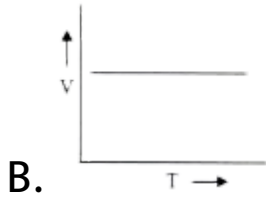
Answer: a

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7. Give reasons

It is necessary to specify the pressure and temperature of gas while stating its volume.

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8. State the variables of gas law.

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9. Write ideal gas equation.

10. Temperature cannot be expressed below $-273.15°C$. This led to the need of Kelvin scale.

Topic 2 2 Marks Questions

1. Explain Charles.s law on the basis of the kinetic theory of matter.

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2. State the following: S.T.P conditions.

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3. Why is it necessary to compare gases at S.T.P.?

4. State the law which are represented by the following graphs.

Temperature °C

$P_1 < P_2 < P_3$
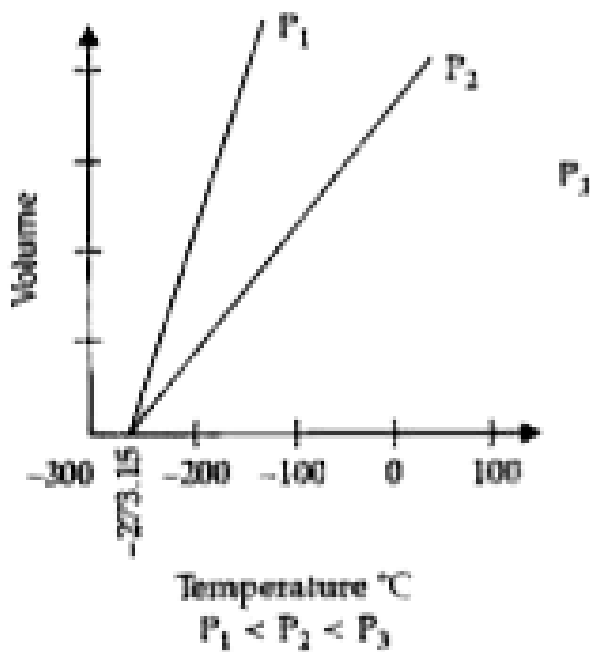
5. State the law which are represented by the following graphs.
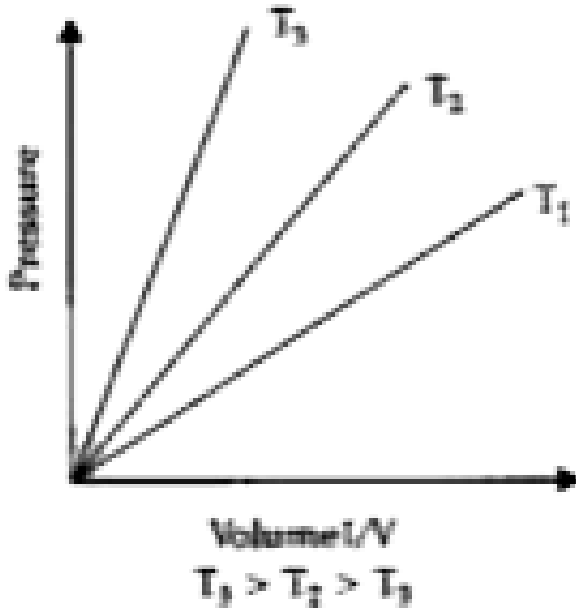
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6. What will be the volume occupied by 2 gm of hydrogen at 300 K and 4 atmospheric pressure if at 273 k and 1 atmospheric pressure the gas occupies 22.4 L.

7. What temperature would be necessary to double the volume of a gas initially at STP if the pressure is decreased to 50%?

8. Convert 37 K to $^\circ C$

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9. Convert $-27^\circ C$ to K

▶ **Watch Video Solution**

10. Convert $27^\circ C$ to K

▶ **Watch Video Solution**

11. Convert 273 K to $^\circ C$

> ▶ **Watch Video Solution**

12. 20 mL of hydrogen gas at $15^\circ C$ is heated to $35^\circ C$ at constant pressure . Find the new volume of hydrogen.

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13. At what temperature in degree centigrade will the volume of a gas, which is originally at $0°C$, double itself, pressure remaining constant.

14. Calculate the volume (in cm^3) of air expelled from a vessel containing 0.4 litres of it at 250 K. when it is heated $27°C$ at the same pressure.

15. To what temperature must a gas at 300 K be cooled down in order to reduce its volume to $1/3^{rd}$ of its original volume, pressure remaining constant ?

16. Calculate the volume of gas X at S.T.P. if it occupies 380 litres at 300 K and 70 cm of mercury.

17. A gas occupies 70 litres at $27°C$ .What volume will it occupy at $273°C$, pressure remaining constant ?

18. In Kelvin scale what is the boiling point of water

19. In Kelvin scale what is the melting point of water

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20. What will be the minimum pressure required to compress 500dm^3 of air at 1 bar to $200 \, dm^3$ temperature remaining constant.

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21. 2 litres of a gas is enclosed in a vessel at a pressure of 760 mm Hg. If temperature remains constant, calculate pressure when volume changes to $4dm^3$

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22. A cylinder of 20 litres capacity contains a gas at 100 atmospheric pressure. How many flasks of $200cm^3$ capacity can be filled from it at 1 atmosphere pressure , temperature remaining constant ?

23. $561 \mathrm{dm}^3$ of a gas at STP is filled in a $748 \mathrm{dm}^3$ container. If temperature is constant , calculate the percentage change in pressure required.

24. Certain amount of a gas occupies a volume of 0.4 litre at $17°C$. To what temperature

should it be heated so that its volume gets
doubled pressure remaining constant ?

25. Certain amount of a gas occupies a volume of 0.4 litre at $17°C$. To what temperature should it be heated so that its volume gets reduced to half pressure remaining constant ?

26. A sample of carbon dioxide occupies 30cm^3 at $15°C$ and 740 mm pressure. Find its volume at STP.

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27. 50cm^3 of hydrogen is collected over water at $17°C$ and 750 mm Hg pressure. Calculate the volume of dry gas at S.T.P. The water vapour pressure at $17°C$ is 14 mm Hg.

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Topic 2 3 Marks Questions

1. State Charles.s law

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2. Which is the true graphical representation of V vs 1/P

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3. Define absolute zero and absolute scale of temperature.

Write the relationship between $^\circ C$ and K.

4. At $0^\circ C$ and 760 mm Hg pressure, a gas occupies a volume of 100cm^3. Kelvin temperature of the gas is increased by one-fifth and the pressure is increased one and a half times. Calculate the final volume of the gas.

5. It is found that on heating a gas its volume increases by 50% and its pressure decreases to 60% of its original value. If the original temperature was $-15^\circ C$, find the temperature to which it was heated.

6. A certain mass of gas occupies 2 litres at $27^\circ C$ and 100 Pa. Find the temperature when

volume and pressure become half of their initial values .

7. A given amount of gas A is confined in a chamber of constant volume. When the chamber is immersed in a bath of melting ice, the pressure of the gas is 100 cm Hg.

What is the temperature when the pressure is 10 cm Hg ?

8. A given amount of gas A is confined in a chamber of constant volume. When the chamber is immersed in a bath of melting ice, the pressure of the gas is 100 cm Hg.

off pressure when the chamber is brought to $100°C$?

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9. A gas is to be filled from a tank of capacity 10,000 litres into cylinders each having

capacity of 10 litres. The condition of the gas in the tank is as follows:

Pressure inside the tank is 800 mm Hg.

Temperature inside the tank is $-3°C$.

When the cylinder is filled, the pressure gauge reads 400 mm of Hg and the temperature is 270 K. Find the number of cylinders required to fill the gas.

10. Which will have greater volume when the following gases are compared at STP : 1.2l N_2 at $25^\circ C$ and 748 mm Hg

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11. Which will have greater volume when the following gases are compared at STP : 1.25L O_2 at STP

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12. Calculate the volume of dry air at STP that occupies 28cm^3 at $14°C$ and 750 mm Hg pressure when saturated with water vapour . The vapour pressure of water of $14°C$ is 12 mm Hg.

13. An LPG cylinder can withstand a pressure of 14.9 atmosphere. The pressure gauge of the cylinder indicates 12 atmosphere at $27°C$. Because of a sudden fire in the building , the

temperature rises. At what temperature will the cylinder explode ?

14. What will be the volume of a gas when 3 litres of it is cooled down from $15°C$ to $-73°C$ at constant pressure.

15. Prove that the volume of a gas at $273^\circ C$ is twice its volume at 273 K , at constant pressure.

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16. State the following: volume of a gas at 0 Kelvin

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17. State the following: Ice point at absolute temperature

18. State the following: S.T.P conditions.

19. At $18°C$, the volume occupied by the gas is 400 ml. To what temperature, it should be

heated so that its volume gets doubled at constant pressure?

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20. What should be the temperature (in $^\circ C$) for a gas with 240 ml volume at $30^\circ C$ to occupy one-third of its volume ? The pressure is kept constant.

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21. 4 g of oxygen gas is enclosed in 1 Litre flask at 298 K. Calculate the pressure exerted by gas, if gas occupies 22.4 Litre at S.T.P.

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22. Make the following conversions

38K to $^\circ C$

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23. Make the following conversions

$28°C$ to K

24. Make the following conversions

$-250°C$ to K

25. Explain what will happen when the temperature of gas is doubled and pressure is raised 4 times . What will be the effect on the volume of the gas.

26. Gas is enclosed in a cylinder at 273 K and 1 atm pressure condition . At what temperature , the volume of enclosed gas is reduced to

$1/8^{th}$ of its initial volume. Pressure is kept constant throughout.

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27. 800cm^3 of gas is collected at 650 mm pressure. At what pressure would the volume of the gas reduce by 40% of its original volume, temperature remaining constant ?

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28. A gas at 240 K is heated to $127°C$. Find the percentage change in the volume of the gas (pressure remaining constant)

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29. A gas occupies $500 cm^3$ at normal temperature. At what temperature will the volume of the gas be reduced by 20% of its original volume , pressure being constant ?

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Topic 2 5 Marks Questions

1. Derive mathematical expression for Charles law Give its Significance.

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2. What is meant by aqueous tension ?

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3. How is the pressure exerted by a gas corrected to account for a aqueous tension ?

4. Give reasons : All temperature is the absolute (Kelvin) scale are in positive figures.

5. State the following: volume of a gas at 0 Kelvin

6. State the following : Absolute temperature

of a gas at $7^\circ C$.

7. State the following : Gas equation

8. State the following: Ice point at absolute temperature

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9. State the following: S.T.P conditions.

▶ **Watch Video Solution**

10. Correct the statements : Volume of a gas is inversely proportional to its pressure at

constant temperature.

11. Correct the statements : Volume of a gas is inversely proportional to its pressure at constant temperature.

12. Correct the statements : $0°C$ is equal to zero Kelvin.

13. Correct the statements :Standard temperature is $25°C$.

14. Correct the statements : Boiling point of water is 273 K.

15. (a) 2500cm^3 of hydrogen is taken at STP. The pressure of this gas is further increased by two and a half times (temperature remaining constant). What volume will hydrogen occupy now?

(b) Taking the volume of hydrogen as calculated in the question (a), what change must be made in Kelvin (absolute) temperature to return the volume to 2500cm^3 (pressure remaining constant)?

16. 22.4 litres of a gas weighs 70 g at STP. Calculate the weight of the gas if it occupies a volume of 20 litres at $27°C$ and 700 mm Hg of pressure.

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17. A fixed volume of a gas occupies $228cm^3$ at $27°C$ and 70 cm of mercury what is its volume at STP ?

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18. For meteorological purposes , hot air is filled into balloons.

Solved Examples

1. A gas occupies $800cm^3$ under 760 mm Hg pressure. Find under what pressure the gas will occupy $380cm^3$ the temperature remaining constant.

2. A gas occupies 600 cm^3 under a pressure of 700 mm Hg. Find under what pressure the volume of the gas will be reduced by 20 per cent of its original volume, the temperature remaining constant throughout?

3. The capacity of one cylinder is 4 dm and that of the other is 1 dm^3, the pressure in the firs cylinder is 560 mm Hg and that in the second is 1000 cylinder is 560 mm Hg and that in the second is 1000 dioxide, are connected together by a tube fitted with a tap. What will be the final pressure in either cylinder on opening the tap if the temperature remains constant?

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4. The volume of a given mass of a gas with some pieces of marble in a container at 750 mm Hg pressure is 100 mL. If the pressure is changed to 1000 mm Hg, the new volume is 80 mL. Find the volume occupied by the marble pieces, if the temperature remains constant.

5. 120 cm^3 of a gas is taken at 27.3 K. The temperature is then raised to $0°C$ What is the

new volume of the gas ? The pressure is kept constant.

6. At what temperature will $500 cm^3$ of a gas measured at $20°C$ occupy half its volume ? The pressure is kept constant.

7. The volume of a given mass of a gas at $15°C$ is 100 cm^3 To what temperature should it be To what temperature should it be volume of 125 cm^3

8. At what centigrade temperature will the volume of a gas at $0°C$ triple itself if the pressure remains constant ?

9. A given mass of a gas occupies $572cm^3$ at $13°c$ and 725 mm Hg pressure. What will be its volume at $24°C$ and 792 mm Hg pressure

10. One litre of a gas at $10°C$ is heated till both its volume and pressure are tripled. Find the new temperature.

11. Gas is enclosed in a cylinder under S.T.P. conditions. At what temperature does the volume of the enclosed gas become 1/6th of its initial volume, pressure remaining constant ?

12. Pressure of a gas at S.T.P. is doubled and the temperature is raised to 546 K. What is the final volume of the gas ?

13. 87cm^3 of moist nitrogen is measured at $9°C$ and 659 mm Hg pressure. Find the volume of dry nitrogen at S.T.P. The vapour pressure of water at $9°C$ is 9 mm Hg.

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14. 16 g of oxygen gas is enclosed in a $1dm^3$ flask at $25°C$ Calculate the pressure exerted

by the gas, if the molecular mass (molar mass) of any gas occupies 22.4 litres at S.T.P

Numericals Based On Boyle Law

1. Volume of certain amount of a gas at $25°C$

100 cm Hg pressure is 80 mL. The gas is

expanded to 160 mL keeping the temperature

constant. Calculate the pressure of the ended

gas.

2. At a particular temperature, a certain quantity of gas occupies a volume of $74 cm^3$ at a pressure gas occupies a volume of 74 cm at a pressure 740 mm, what will be the volume of the gas at the same temperature ?

3. A student performed an experiment to measure - pressure and volume of a gas at

constant temperature and noted the following:

Pressure (mm of Hg)	Volume (cm³)
100	80
125	x
200	40
y	32

Calculate the value of x and y. Which law was used in the calculations ? Draw graphs to show:

volume plotted against pressure.

4. A student performed an experiment to measure - pressure and volume of a gas at constant temperature and noted the following:

Pressure (mm of Hg)	Volume (cm³)
100	80
125	x
200	40
y	32

Calculate the value of x and y. Which law was used in the calculations ? Draw graphs to show:

PV plotted against pressure

5. At a constant temperature, volume of a gas was found to be 400 cm^3 at a pressure of 760 mm Hg. If the pressure of the gas is increased by 25%, find the new volume.

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6. A vessel of capacity 600 cm contains hydrogen A vessel of capacity 600 cm^3 contains hydrogen be the pressure of

hydrogen gas, when the vessel is connected to another vessel of 300 cm^3

7. At constant temperature, a gas is at a pressure of 1080 mm Hg. If the volume is decreased by 40%, find the new pressure of the gas.

Numericals Based On Charles Law

1. Convert 37 K to $^\circ C$

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2. Convert 273 K to $^\circ C$

▶ **Watch Video Solution**

3. Convert the following:

$-27°C$ to K

> ▶ **Watch Video Solution**

4. Convert the following:

$27°C$ to K

> ▶ **Watch Video Solution**

5. 20 mL of hydrogen gas at $13°C$ is heated to $117°C$ at constant pressure. Find the new volume of hydrogen.

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6. At what temperature in degree centigrade will the volume of a gas, which is originally at $0°C$, double itself, pressure remaining constant.

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7. Calculate the volume (in cm^3) of air expelled from a vessel containing 0.4 litres of it at 250 K. when it is heated $27°C$ at the same pressure.

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8. What will be the volume of a gas when 3 litres of it is cooled down from $27°C$ to $-73°C$ at constant pressure.

▶ **Watch Video Solution**

9. To what temperature must a gas at 300 K be cooled down in order to reduce its volume to $1/3^{rd}$ of its original volume, pressure remaining constant ?

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10. Prove that the volume of a gas at $273°C$ is twice its volume at 273 K , at constant pressure.

11. A gas occupies 3 litres at $0^\circ C$ What volume will it occupy at $-20^\circ C$, pressure remaining constant

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Exercise 7

1. What do you understand by gas?

2. State five important assumptions of the kinetic theory of matter.

3. During the practical in the lab when hydrogen sulphide gas having offensive odour is prepared for some test, we can smell the gas even 50 metres away. Explain phenomenon.

4. What is diffusion ? Give an example to illustrate it.

5. How is molecular motion related with temperature?

6. State the variables of gas law.

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7. State the units of three variables used in gas

laws.

▶ **Watch Video Solution**

8. State Boyle.s Law.

▶ **Watch Video Solution**

9. Define Boyle's law and give its mathematical expression,

▶ **Watch Video Solution**

10. Deduce and explain Boyle's law and Charles' law on the basis of kinetic gas equation.

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11. The molecular theory states that the pressure exerted by a gas in a closed vessel results from the gas molecules striking against the walls of the vessel. How will the pressure change if

the temperature is doubled keeping the volume constant ?

▶ **Watch Video Solution**

12. The molecular theory states that the pressure exerted by a gas in closed vessel results from the gas molecules striking against the walls of the vessel. How will the pressure change if : the volume is made half of its original value keeping the temperature constant?

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13. State Charles.s law

14. Give the mathematical expression for Charles' Law

15. Explain Charles.s law on the basis of the kinetic theory of matter.

16. Define absolute zero and absolute scale of temperature.

Write the relationship between $^\circ C$ and K.

17. What is the Kelvin scale of temperature ?

18. What is the boiling point of water on centigrade scale Convert it into the Kelvin

scale.

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19. Define S.T.P.

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20. Why is it necessary to compare gases at S.T.P.?

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21. Write the value of :

Standard temperature in

(i) $^\circ C$ (ii)K

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22. Write the value of :

Standard temperature in

(i) $^\circ C$ (ii)K

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23. Write the value of :

Standard pressure in (i)atm (ii)mm Hg (iii)cm Hg (iv) torr

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24. Write the value of :

Standard pressure in (i)atm (ii)mm Hg (iii)cm Hg (iv) torr

▶ **Watch Video Solution**

25. Write the value of :

Standard pressure in (i)atm (ii)mm Hg (iii)cm Hg (iv) torr

> ▶ **Watch Video Solution**

26. Write the value of :

Standard pressure in (i)atm (ii)mm Hg (iii)cm Hg (iv) torr

> ▶ **Watch Video Solution**

27. What is the relationship between the Celsius and the Kelvin scales of temperature ?

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28. Convert $273^\circ C$ to Kelvin

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29. Convert 293 K to $^\circ C$

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30. State the laws which are represented by the following graphs.
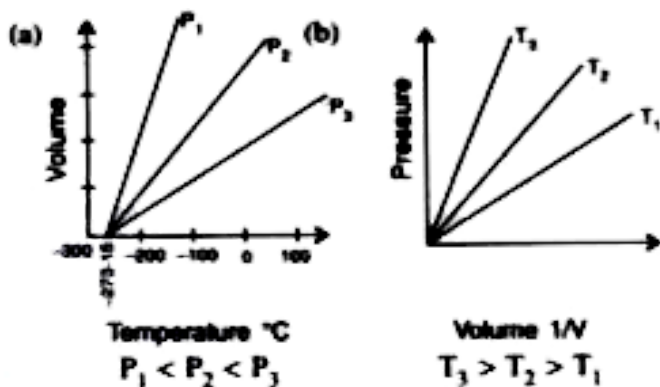
(a) Volume vs Temperature °C
$P_1 < P_2 < P_3$

(b) Pressure vs Volume 1/V
$T_3 > T_2 > T_1$

31. Give reasons : All temperature is the absolute (Kelvin) scale are in positive figures.

32. Give reasons : Gases have lower density compared to that of solids or liquids.

33. Give reasons for the following:

Gases exert pressure in all directions

34. Give reasons

It is necessary to specify the pressure and temperature of gas while stating its volume.

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35. Give reasons : Inflating balloon seems to violate Boyle.s law.

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36. Give reasons for the following:

Mountaineers carry oxygen cylinders with them.

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37. Give reasons for the following:

Gas fils completely the vessel in which it is kept

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38. How did Charles's law lead to the concept of absolute scale of temperature ?

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39. How is the pressure exerted by a gas corrected to account for a aqueous tension ?

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40. State the following: volume of a gas at 0

Kelvin

41. State the following

Absolute temperature of us at $7°C$

42. State the following : Gas equation

43. State the following: Ice point at absolute

temperature

44. State the following: S.T.P conditions.

45. The graph of PV vs P for a gas is

    A. parabolic

    B. hyperbolic

    C. a straight line parallel to X-axis

    D. a straight line passing through origin

Answer:

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46. The absolute temperature value that corresponds to $27° C$ is

A. 200 K

B. 300 K

C. 400 K

D. 246 K

Answer:

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47. Choose the correct answer :

Volume-temperature relationship is given by

A. Boyle

B. Gay Lussac

C. Dalton

D. Charles

Answer:

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48. Choose the correct answer :

If pressure is doubled for a fixed mass of a gas, its volume will become

A. 4 times

B. 1/2 times

C. 2 times

D. No change

Answer:

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49. Match the following

Column A	Column B
(a) Cm^3	(i) pressure
(b) Kelvin	(ii) $PV = P_1V_1$
(c) Torr.	(iii) Volume
(d) Boyle's law	(iv) $\dfrac{V}{T} = \dfrac{V_1}{T_1}$
(e) Charles's law	(v) $\dfrac{PV}{T} = \dfrac{P_1V_1}{T_1}$
	(vi) temperature

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50. Correct the statements : Volume of a gas is inversely proportional to its pressure at constant temperature.

51. Correct the following statements, wherever necessary.

Volume of a fixed mass of a gas is directly proportional to its temperature, pressure remaining constant.

52. Correct the statements : $0°C$ is equal to zero Kelvin.

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53. Correct the statements :Standard temperature is $25°C$.

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54. Correct the statements : Boiling point of water is 273 K.

55. The average kinetic energy of the molecules of a gas is proportional to the ....

[absolute temperature/ absolute zero]

56. The temperature on the Kelvin scale at which molecular motion completely ceases is called .... [absolute temperature/ absolute zero]

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57. If temperature is reduced to half, ... would, also reduce to half. [pressure/ volume]

> ▶ **Watch Video Solution**

58. The melting point of ice is .... Kelvin. [273 / 373]

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Exercise Numericals

1. What will be the minimum pressure required to compress 500dm^3 of air at 1 bar to 200 dm^3 temperature remaining constant.

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2. 2 litres of a gas is enclosed in a vessel at a pressure of 760 mm Hg. If temperature remains constant, calculate pressure when volume changes to 4dm^3

3. At constant temperature, the effect of change of pressure on volume of a gas was as given below

Pressure in atmospheres	Volume in litres
0.20	112
0.25	89.6
0.40	56
0.80	28
1.00	22.4

Plot the following graphs :

P vs V

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4. At constant temperature, the effect of change of pressure on volume of a gas was as given below

Pressure in atmospheres	Volume in litres
0.20	112
0.25	89.6
0.40	56
0.80	28
1.00	22.4

Plot the following graphs :

P vs 1/V

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5. At constant temperature, the effect of change of pressure on volume of a gas was as given below

Pressure in atmospheres	Volume in litres
0.20	112
0.25	89.6
0.40	56
0.80	28
1.00	22.4

Plot the following graphs :

PV vs P.

▶ **Watch Video Solution**

6. At constant temperature, the effect of change of pressure on volume of a gas was as given below

Pressure in atmospheres	Volume in litres
0.20	112
0.25	89.6
0.40	56
0.80	28
1.00	22.4

Assuming that the pressure values given above are correct, find the correct measurement of the volume at 0-60 atmosphere pressure

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7. 800cm^3 of gas is collected at 650 mm pressure. At what pressure would the volume

of the gas reduce by 40% of its original volume, temperature remaining constant ?

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8. A cylinder of 20 litres capacity contains a gas at 100 atmospheric pressure. How many flasks of $200\mathrm{cm}^3$ capacity can be filled from it at 1 atmosphere pressure , temperature remaining constant ?

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9. A steel cylinder of intemal volume 20 litres is filled with hydrogen at 29 atmospheric pressure. If hydrogen is used to fill a balloon at 1.25 atmospheric pressure at the same temperature, what volume will the gas occupy?

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10. $561dm^3$ of a gas at STP is filled in a $748dm^3$ container. If temperature is constant ,

calculate the percentage change in pressure required.

11. $88cm^3$ of nitrogen is at a pressure of 770 mm mercury. If the pressure is raised to 880 mm Hg, find by how much the volume will diminish, temperature remains Constant.

12. A gas at 240 K is heated to $127°C$. Find the percentage change in the volume of the gas (pressure remaining constant)

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13. Certain amount of a gas occupies a volume of 0.4 litre at $17°C$. To what temperature should it be heated so that its volume gets doubled pressure remaining constant ?

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14. Certain amount of a gas occupies a volume of 0.4 litre at $17°C$. To what temperature should it be heated so that its volume gets reduced to half pressure remaining constant ?

15. A given mass of a gas occupies $143cm^3$ at $27°C$ and $700mmHg$ pressure. What will be its volume at 300 K and 280 mm Hg pressure?

16. A gas occupies $500 cm^3$ at S.T.P. At what temperature will the volume of the gas be reduced by 20% of its original volume, pressure being constant ?

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17. Calculate the final volume of a gas 'X', if the original pressure of the gas, at S.T.P. is doubled and its temperature is increased three times.

18. A sample of carbon dioxide occupies $30\mathrm{cm}^3$ at $15°C$ and 740 mm pressure. Find its volume at STP.

19. What temperature would be necessary to double the volume of a gas initially at STP if the pressure is decreased to 50%?

20. At $0°C$ and 760 mm Hg pressure, a gas occupies a volume of 100cm^3. Kelvin temperature of the gas is increased by one-fifth and the pressure is increased one and a half times. Calculate the final volume of the gas.

21. It is found that on heating a gas its volume increases by 50% and its pressure decreases to 60% of its original value. If the original temperature was $-15°C$, find the temperature to which it was heated.

22. A certain mass of gas occupies 2 litres at $27°C$ and 100 Pa. Find the temperature when

volume and pressure become half of their initial values .

23. (a)$2500 \mathrm{cm}^3$ of hydrogen is taken at STP. The pressure of this gas is further increased by two and a half times (temperature remaining constant). What volume will hydrogen occupy now?

(b)Taking the volume of hydrogen as calculated in the question (a), what change

must be made in Kelvin (absolute) temperature to return the volume to 2500cm^3 (pressure remaining constant)?

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24. Taking the volume of hydrogen $\dfrac{5000}{7}cm^3$. What change must be made in Kelvin (absolute) temperature to return the volume to 2500 cm (pressure remaining constant).

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25. A given amount of gas A is confined in a chamber of constant volume. When the chamber is immersed in a bath of melting ice, the pressure of the gas is 100 cm Hg.

What is the temperature when the pressure is 10 cm Hg ?

26. A given amount of gas A is confined in a chamber of constant volume. When the chamber is immersed in a bath of melting ice,

the pressure of the gas is 100 cm Hg.

off pressure when the chamber is brought to

$100°C$?

27. A gas is to be filled from a tank of capacity

10,000 litres into cylinders each having

capacity of 10 litres. The condition of the gas

in the tank is as follows:

Pressure inside the tank is 800 mm Hg.

Temperature inside the tank is $-3°C$.

When the cylinder is filled, the pressure gauge reads 400 mm of Hg and the temperature is 270 K. Find the number of cylinders required to fill the gas.

28. A gas is to be filled from a tank of capacity 10,000 litres into cylinders each having capacity of 10 litres. The condition of the gas in the tank is as follows:

Pressure inside the tank is 800 mm Hg.

Temperature inside the tank is $-3°C$.

When the cylinder is filled, the pressure gauge reads 400 mm of Hg and the temperature is 270 K. Find the number of cylinders required to fill the gas.

29. What will be the volume occupied by 2 gm of hydrogen at 300 K and 4 atmospheric pressure if at 273 k and 1 atmospheric pressure the gas occupies 22.4 L.

30. 50cm^3 of hydrogen is collected over water at $17^\circ C$ and 750 mm Hg pressure. Calculate the volume of dry gas at S.T.P. The water vapour pressure at $17^\circ C$ is 14 mm Hg.

31. Which will have greater volume when the following gases are compared at S.T.P.

(i) $1.2l\,N_2$ at $25^\circ C$ and 748 mm Hg

(ii) $1.25l\,O_2$ at S.T.P?

32. Calculate the volume of dry air at STP that occupies 28cm^3 at $14^\circ C$ and 750 mm Hg pressure when saturated with water vapour . The vapour pressure of water of $14^\circ C$ is 12 mm Hg.

33. An LPG cylinder can withstand a pressure of 14.9 atmosphere. The pressure gauge of the cylinder indicates 12 atmosphere at $27°C$. Because of a sudden fire in the building , the temperature rises. At what temperature will the cylinder explode ?

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34. 22.4 litres of a gas weighs 70 g at STP. Calculate the weight of the gas if it occupies a

volume of 20 litres at $27°C$ and 700 mm Hg of pressure.