CHEMISTRY

BOOKS - PEARSON IIT JEE FOUNDATION

MOLE CONCEPT, STOICHIOMETRY AND BEHAVIOUR OF GASES

Example

1. The formula of a metal phosphide is M_3P_2. Identify formulae of the

(i) metal oxide (ii) metal nitrite (iii) metal bicarbonate

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2. Metal M forms two oxides A and B in which the ratio of the number of ozygen atoms to the total number of atoms present in the molecule

is $3:5$ and $1:2$, respectively. Determine the formiulae of A and B.

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3. 5 L of methane gas at 2 atm pressure is compressed to 1.6 L at contant temperature. Calculate the final pressure.

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4. The pressure of a certain volume of a gas is reduced to half of its initial pressure at contant temperature. Calculate its new volume.

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5. At a certain pressure , the volume occupied by a given mass of a gas is 10 L at $0^\circ C$, calculate the volume occupied by the gas at $91^\circ C$ at the same pressure.

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6. Calculate the temperature at which the volume of a given mass of gas gets reduced to 3/5th of original volume at $10^{\circ}C$ without any change in pressure.

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7. Gas laws are universally applicable for all gases whereas such universal laws could not be established for solids and liquids. Comment on this statement.

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8. Boyle's law states that at constant temperature, If pressure is Increased on a gas, volume decreases and vice-versa. But when we fill air in a balloon, volume as well as pressure Increase. Why ?

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9. Why is Kelvin temperature always positive ?

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10. A certain mass of a gas taken in 1 L cylinder exerts a pressure of 500 mm Hg at a certain temperature. If the gas is transferred to another cylinder where it exerts 20 per cent more pressure, calculate the volume of the cylinder at the same temperature.

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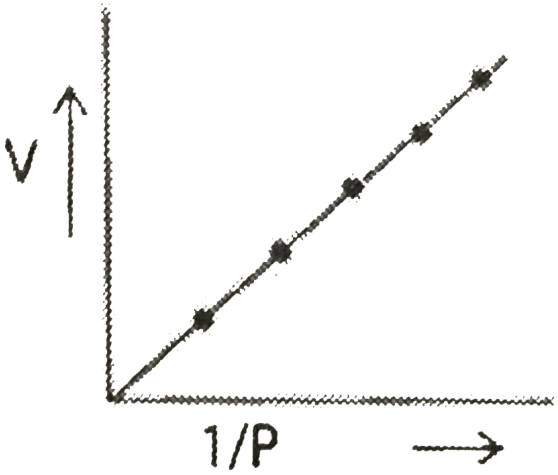
11. The slope of a given straight lime graph with constant temperature is found to be 0.2 L atm at 5 atm pressure. Calculate the volume of gas

at that pressure.



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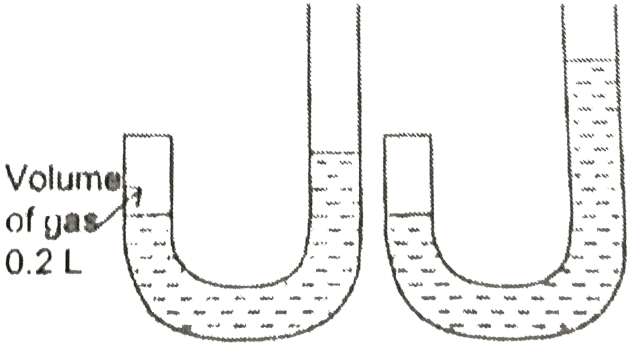
12. J-shped tube closed at one end was used by Boyle to study the relationship between the pressure of the trapped gas and its volume. Such a set up is given here. Initially some amount of gas is taken in the tube and mercury is poured in it. The volume of the gas is 0.2 L and the difference in the height of the mercury column is 760 mm of Hg. Now, some more amount of mercury is poured and the difference in the height of the mercury column is found to be 1140 mm of Hg. Calculate

the new volume of the gas considering the temperature constant.



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13. A cylinder was filled with a gas at 2 atm pressure at $27^{\circ} C$ and can withstand a pressure of 12 atm. At what temperature the cyliner bursts when the building catches fire?

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14. After usage for a certain period, a cooking gas cylinder gas cylinder was considered to be empty, as no gas was coming out of it. Is the cylinder empty in its true sense? Explain what happens if the cylinder is

kept in hot water or shaken vigorously. Explain by applying kinetic molecular theory.

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15. Calculate the number of moles of sodium (Na) atoms present in 11.5 g of sodium.

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16. Calculate the number of moles of water (H_2O) present in 4.5 g of water.

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17. Calculate the number of molecule present in 16.8 L of gas 'X' at STP. Also determine its gram molecular weight if the above sample weighs 26.625 g.

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18. Calculate the volume occupied by 200 g of SO_3 gas at STP and the number of molecules present in it.

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19. What is the volume occupied by 301×10^{23} molecules of carbon dioxide gas at STP? Calculate the mass of this gas.

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20. Volume occupied by 16 g of oxygen is same as that occupied by 1 of hydrogen under similar conditions of temperature and pressure. Explain.

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21. X' grams each of nitrogen and carbon monoxide are considered. Draw a compartion with respect to number of moles.

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22. A ges at a pressure of 2.0 atm is heated from 0 to $273^{\circ}C$ and the volume compressed to 1/4th of its original volume. Find the final pressure.

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23. If a gas occupies 30 L at $27^{\circ}C$ and 1 atm, what volume would it occupy at $227^{\circ}C$ and 5 atm?

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24. What is the volume occupied by 30 g of neon gas at $67^{\circ} C$ and 750 mm of Hg?

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25. A 2 L flask contains 22 g of carbon dioxide and 1 g of helium at $20^{\circ} C$. Calculate the partial pressure exerted by CO_2 and He if the total pressure is 3 atm.

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26. What is the ratio of the rate of diffusion of helium gas to that of oxygen under identical conditions?

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27. A gas with molecular formula C_nH_{2n+2} diffuses through a porous plug at a rate $1/6th$ of the rate of diffusion of hydrogen gas under similar condtition. The formula of the gas is:

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28. A certain amount of oxygen is prepared by the thermal decomposition of potassium chlorate and is collected by downward displacement of water. The pressure of the gas collected is measured with the help of a manometer. The pressure recorded is found to be more than the pressure recorded for the same volume of oxygen cylinder containing same amount of oxygen under the same conditions. How do you account for this deviation?

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29. What is the molarity of a solution containing 15 g of NaOH dissolved in 500 mL of solution?

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30. A solution is prepared by dissolving 9.8 g of H_2SO_4 in 54 g of water. What is the mole fraction of H_2SO_4?

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31. What is the percentage by weight of sulphuric acid, if 13 g of H_2SO_4 is dissolved to make 78 g of solution?

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32. If 40 g of ethyl alcohol is dissolved in 50 mL of water, then calculate the weight/volume percentage of ethyl alcohol present in the solution.

(density of ethyl alcohol = 0.8 g/mL)

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33. What is the molarity of $25\ \%\ \left(\frac{w}{v}\right)$ solution of HCl?

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34. Specific grabvity of 84% (w/w) pure HNO_3 is 1.54. What volume of HNO_3 is required to prepare one litre of 0.5 M HNO_3 solutions?

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35. The empirical formula of a compound is CH_2O. If its vapour density is 90, find out the molecular formula of the compound.

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36. Most jewellary is made of 22 carat gold. What is the percentage of golid in it ?

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37. Calculate the weight of zinc required for the liberation of 10 g of hydrogen gas on reaction with H_2SO_4.

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38. Calculate the weight of sodium bicarbonate to be dissociated to give 0.56 L of CO_2 gas.

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39. Calculate the volume of carbon monoxide gas required to react with oxygen to give 11.2 L of CO_2 gas.

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40. Calculate the weight of 80% pure limestone required to produce 11 g of CO_2 gas.

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41. Calculate the amount of sodium oxide formed when 2.3 g of sodium reacts with 3.2 g of oxygen.

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42. A mixture of sodium carbonate and sodium bicarbonate was subjected to heating. Some loss in weight was found. How does this information help us to find out the composition of mixture?

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43. In an apparatus, 16.8 g of sodium bicarbonate was subjected to heating till it underwent complete decomposition, what is the expected loss in weight? When the same apparatus was fitted to a condenser, the loss in weight was different from the earlier loss in weight. Justify the difference.

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44. At STP, a certain amount of hydrogen is produced by the reaction of 550 g of impure zinc with excess amount of HCl. The same volume of hydrogen at STP reduces Fe_3O_4 and produces 336 g of iron. Find the percentage of zinc. (Atomic mass of Zn is 65)

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Very Short Answer Type Questions

1. What is an ideal gas? Under what conditions does a real gas behave ideally?

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2. The volume occupied by 7 g of nitrogen gas at STP is _____ .

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3. Why do the gases exert pressure?

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4. What is critical temperature?

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5. Find out the number of molecules in 2.5 moles of water.

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6. 2 moles of CO_2 gas contain the same number of atoms as _____ moles of CO.

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7. Calculate the volume occupied by 0.01 moles of helium gas at STP.

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8. What is the amount of H_2SO_4 (in grams) present in 0.2 moles of sulphuric acid?

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9. The percentage of sulphur in SO_2 is _____ and _____ in SO_3.

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10. What is the molarity of HCl solution containing 0.4 moles in 200 mL of the solution?

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11. Calculate the volume occupied by 11 g of CO_2 gas at STP.

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12. The vapour density of SO_2 gas is _____ the vapour density of O_2 gas.

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13. If the mole fraction of a solute in a binary solution is 0.3, what could be the mole fraction of the solvent in the solution?

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14. Calculate the ratio of the rate of diffusion of sulphur dioxide gas to helium gas.

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15. Find out the number of moles constituted by 1.4 g of carbon monoxide.

Number of moles $= \frac{\text{Weight}}{\text{GMW}}$

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16. The empirical formula of a compound is CH_2O.If the vapour density is 60, what would be the molecular formula of the compound?

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17. When 4 L of nitrogen completely reacts with hydrogen, what would be the volume of ammonia gas formed?

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18. The molecular formula of a gas with vapour density 15 and empirical formula CH_3 is _____ .

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19. What is the amount of calcium oxide formed by the dissociation of 25 g of calcium carbonate?

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20. State Avogadro's law.

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21. Define amu.

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22. The vapour density of a substance is 24. What is the gram molecular weight of the substance?

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23. Calculate the weight of CO_2, which occupies a volume of 11.2 dm^3 at STP.

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24. The mass of N molecules of helium is the same as the mass of _____ molecules of methane.

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25. Percentage of calcium in calcium carbonate is _____ .

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26. Calculate the percentage of chlorine present in calcium chloride.

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27. MOLARITY

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28. Graham's Law of Diffusion

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29. How many litres of oxygen at STP are required for the combustion of 4 g of methane gas? Also calculate the volume of CO_2 gas produced at STP.

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Short Answer Type Questions

1. State and explain Charles'law.

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2. Explain the significance of absolute zero.

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3. (a) Define molarity.

(b) Calculate the molarity of sodium carbonate solution, containing 0.53 g of sodium carbonate dissolved in 200 mL of the solution.

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4. Calculate the weight of

(a) single atom of nitrogen

(b) single atom of carbon

(c) 1.5×10^{21} atoms of sodium

(d) single molecule of carbon monoxide

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5. What is the volume of oxygen at STP liberated when 12.25 g of potassium chlorate is subjected to heating?

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6. Calculate the total number of atoms present in 0.49 grams of H_2SO_4 .

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7. What is meant by mole fraction? Find out the mole fraction of sodium hydroxide solution containing 4 g of solute in 90 g of water.

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8. Calculate the percentage compound of glucose.

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9. Empirical formula of a compound is CH_3N. If the empieical formula weight is equal to one-fourth of its vapour density, find out the molecular formula of the compound.

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10. Calculate the number of atoms in

(a) 4.5 g atoms of potassium

(b) 0.2 g atoms of chlorine

(c) 1.2 g molecules of nitrogen

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11. How many litres of oxygen at STP are required for the combustion of 4 g of methane gas? Also, calculate the volume of CO_2 gas produced at STP.

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12. Find out the relative rates of diffusion of methane and sulphur dioxide under similar conditions of temperature and pressure.

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13. 1.8 g of oxalic acid $(H_2C_2O_4)$ is dissolved in 200 mL of a solution. Find out the molarity of the resultant solution.

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14. A gaseous hydrocarbon with a vapour density of 14 contains 85.2% carbon. Calculate its molecular formula.

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Essay Type Questions

1. State and explain

(a) Boyle's law

(b) Charles' law with graphical representation

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2. Explain the relation between vapour density and molecular mass.

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Level 1 True Or False

1. Doubling the pressure of a gas at constant temperature, doubles the volume occupied the gas.

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2. When a 200 mL gas, in a closed vessel, is heated to $50^{\circ}C$ from $25^{\circ}C$, the volume becomes doubled.

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3. The rate of diffusion of methane is double the rate of diffusion of sulphur dioxide gas.

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4. 1 g atom of nitrogen contains 6.023×10^{23} atoms of nitrogen.

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5. The greater the critical temperature of a gas, the easier is the liquefaction of the gas.

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Level 1 Fill In The Blanks

1. The ratio of the volumes of 11 g of CO_2 and 28 g of CO at STP is _____ .

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2. The number of oxygen molecules required for the complete combustion of 5 moles of methane is _____ .

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3. The volume of CO_2 liberated at STP is _____ , on thermal decomposition of 84 g of sodium bicarbonate.

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4. ous' acid of a non-metal 'X' has 2 'O' atoms. Per acid of the same non-metal has the formula _____ .

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5. The ratio of the gram atomic weight of nitrogen and oxygen is _____ .

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6. Pressure exerted by water vapour in moist gas is called _____ .

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7. Mole fraction of NaOH in an aqueous solution is 0.3. Mole fraction of water is _____ .

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Level 1 Match The Following

1.

Column A		Column B
A. Empirical formula of glucose	( )	a. Less intermolecular forces
B. Percentage of carbon in methane	( )	b. 75%
C. Ideal gas	( )	c. 17.6%
D. High critical temperature	( )	d. Large intermolecular forces of attraction
E. Percentage of hydrogen in ammonia	( )	e. CH_2O
F. Empirical formula of oxalic acid	( )	f. CHO_2

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Level 1 Multiple Choice Questions

1. The number of oxygen atoms present in 2 moles of a compound, which consists of a bivalent metal and a perchorate ion is

A. 4 N

B. 6 N

C. 8 N

D. 16 N

Answer: D

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2. When one mole each of CO and O_2 are made to react at STP, the total number of moles at the end of the reactions is

A. 1.5 moles

B. 1 mole

C. 4 mole

D. 2 moles

Answer: A

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3. When 180 g of glucose is subjected to combusion, the volume of CO_2 liberated at STP is

A. 22.4 L

B. 67.2 L

C. 44 L

D. 134.4 L

Answer: D

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4. 20 cc of a hydrocarbon, on complete combustion, gave 80 cc of CO_2 and cc of H_2O at STP.

The empirical formula of that compound is

A. C_2H_5

B. C_2H_6

C. C_3H_8

D. C_4H_{10}

Answer: A

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5. How many moleculs would be there in 0.01 moles of sodium hydroxide?

A. 6.023×10^{23}

B. 6.023×10^{21}

C. 6.023×10^{22}

D. 6.023×10^{20}

Answer: B

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6. 44 g of CO_2 contains

A. 2 moles of oxygen atoms

B. 1 mole of oxygen atoms

C. 1.5 moles of oxygen atoms

D. 2 moles of oxygen moleculs

Answer: A

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7. 0.1225 g of potassium chlorate decomposes completely. Write the possible chemical equation and the amount of oxygen liberated.

A. $4KClO_3 \rightarrow 4KCl + 6O_2, 0.048$ g

B. $4KClO_3 \rightarrow 4KCl + 5O_2, 0.48$ g

C. $2KClO_3 \rightarrow 2KCl + 3O_2, 0.048$ g

D. $2KClO_3 \rightarrow 2KCl + 3O_2, 0.48$ g

Answer: C

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8. The ratio by mass of sulphur and oxygen in SO_2 is

A. $1:2$

B. $2:1$

C. $1:1$

D. $1:4$

Answer: C

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9. Critical temperatures of the gases A, B, C and D are

(a) 5.2K (b) 33.2 K

(c)126.3 K (d) 191.1 K

Arrange them in the ascending order of intermolecular forces of attraction.

A. C,B,D,A

B. A,B, C,D

C. D,C,B,A

D. A,C,B,D

Answer: B

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10. Which of the following pairs of gases corresponds to the ratio of the rates of diffusion as $\sqrt{2}:1$?

A. H_2 and He

B. He and CH_4

C. H_2 and CH_4

D. CH_4 and SO_2

Answer: A

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11. When ammonia gas is subjected to sudden expansion from a region of high pressure into a region of low pressure, which of the following changes is expected to take place?

A. decrease in kinetic energy and potential energy

B. conversion of kinetic energy to potential energy

C. conversion of potential energy to kinetic energy

D. increase in kinetic energy and potential energy

Answer: B

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12. Dalton's law of partial pressures cannot hold good for

A. $NO_2 + O_2$

B. $H_2 + Cl_2$

C. $CO_2 + O_2$

D. $NH_3 + He$

Answer: B

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13. A 600 mL vessel containing oxygen at 800 mm and a 400 mL vessel containing nitrogen at 600 mm, at the same temperature, are joined to each other . The final pressure of the mixture is

A. 1400 mm

B. 1000 mm

C. 720 mm

D. 700 mm

Answer: C

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14. It is found that with an increase in temperature by 40%, the volume decreases by 20% with change in pressure. Find the percentage change in pressure.

A. $40\ \%$ decrease

B. $60\ \%$ decrease

C. $75\ \%$ increase

D. $80\ \%$ increase

Answer: C

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15. 23 g of NO_2 contains same number of molecules as

A. 8 g of oxygen

B. 28 g of carbon monoxide

C. 16 g of SO_2

D. 22 g of CO_2

Answer: D

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Level 1

1. Which of the following is in the correct order according to metal reactivity series?

A. $Al < Fe < Na < Ca$

B. $Fe < Ca < Al < Na$

C. $Fe < Al < Ca < Na$

D. $Na < Ca < Al < Fe$

Answer: C

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2. Arrange the following compounds in the correct order of percentage of metallic element.

(a) potassium hydroxide

(b) potassium carbonate

(c) potassium bicarbonate

(d) potassium sulphide

A. $a > b > c > d$

B. $b > a > c > d$

C. $c > b > a > d$

D. $d > a > b > c$

Answer:

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3. Empirical formula of a compound is A_2B_4. If its empirical formula weight is half of its vapour density, determine the molecular formula of the compound.

A. A_4B_8

B. A_8B_{16}

C. A_2B_4

D. A_3B_6

Answer:

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4. The number of oxygen atoms present in 2 moles of a compound, which consists of a bivalent metal and a perchlorate ion is

A. 4 N

B. 6 N

C. 8 N

D. 16 N

Answer:

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5.

$KMnO_4 + H_2SO_4 + FeSO_4 \rightarrow K_2SO_4 + MnSO_4 + Fe_2(SO_4)_3 + H_2o$

Coefficients of sulphuric acid and ferric sulphate in the balanced equation of above reaction are _____ and _____ , respectively

A. 8, 4

B. 5,8

C. 4,3

D. 8,5

Answer:

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6. A certain mass of a gas occupies a volume of 600 mL at a certain temperature and perssure. If the temperature is increased by $80\,\%$

what will be the volume occupied by the same mass of gas at the same pressure?

A. 1080 mL

B. 108 mL

C. 120 mL

D. 102 mL

Answer:

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7. The weight of an empty china dish is 39 g and when a saturated solution of potassium nitrate is poured into it, its weight is 108 g at $50^{\circ}C$. After evaporating the solution to dryness, if the weight of the dish along with the crystals is 72 g them the solubility of potassium nitrate at $50^{\circ}C$ is _____ .

A. 83.9

B. 95.6

C. 91.6

D. 87.4

Answer:

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8. If 15 mg of N_2O_3 is added to 4.82×10^{20} molecules of N_2O_3, the total volume occupied by the gas at STP is

A. 0.044 L

B. 0.022 L

C. 0.22 L

D. 0.44 L

Answer:

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9. In a 2.5 L flask at $27^{\circ} C$ temperature, the pressure of a gas was found to be 8 atm. If 41×10^{23} molecules of the same gas are introduced into the container, the temperature changed to T_2. The pressure of gas is found to be 10 atm. Find out the value of T_2.

A. 253 K

B. 347 K

C. 230 K

D. 370 K

Answer:

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10. A certain mass of a gas occupies a volume of 600 mL at a certain temperature and pressure. If pressure is decreased by $40\,\%$ what will

be the volume occupied by the same mass of the gas at the same temperature ?

A. 240 mL

B. 1000 mL

C. 300 mL

D. 120 mL

Answer:

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11. Calculate the molarity of a solution obtained by mixing 250 mL of 0.5 M HCl with 750 mL of 2 M HCl.

A. 1.8

B. 2.0

C. 1.6

D. 0.8

Answer:

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12. $40\ \%$ w/W $Ca(OH)_2$ solution has a molarity of 7.8 M. Calculate the density of the solution.

A. 1.03 g/cc

B. 1.04 g/cc

C. 1.54 g/cc

D. $1.\ 44$ g/cc

Answer:

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13. Which one of the following is defferent from the others with respect to valency ?

A. potassium

B. ammonium

C. barium

D. lithium

Answer:

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14. Plumbous ion is represented as

A. Pb^{+2}

B. Pb^{+4}

C. Pb^{+3}

D. Pb^{+1}

Answer:

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15. 0.5 moles of a salt contains '3N' oxygen atoms. Identify the formula of the salt.

A. MXO_3

B. MX_2O_3

C. M_2XO_3

D. $M(XO_3)_2$

Answer:

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Level 2

1. Balloons of 2 L capaicty are to be filled with hydrogen, at a pressure of 1 atm and $27^{\circ}C$ temperature, from an 8 L cylinder containing hydrogen at 10 atm, at the same temperature . Calculate the number of balloons that can be filled.

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2. When both pressure and temperature of a given mass of a gas are increased by 'n' times , the volume occupied by the same mass of the gas remains the same. Justify with respect to kinetic molecular theory.

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3. A gas cylinder is filled with helium at 2000 mm. Due to leakage, the pressure dropped to 1500 torr in 40 min. When the same cylinder is

filled with another gas at the same pressure, the pressure dropped from 2000 mm to 1500 mm in 200 min. What is the molecular weight of the gas?

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4. A cation A^{+4x} and an anion B^{-2x} combine to form a compound. Similarly, C^{+2x} and D^{-4x} also combine to form a compound. When the molten compounds are subjected to electrolysis, the gaseous products obtained are in equimolar amounts. What should be the mole ratio of the compounds taken respectively?

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5. A sample of a mixture of Na_2CO_3 and $NaHCO_3$ is subjected to heating till there is no further loss in weight. Assuming, that the loss in weight of the sample is $22\ \%$ of the initial weight of the mixture due to

the evolution of CO_2, find out the relative percentages of the two components in the mixture.

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6. Calculate the mass of aluminium oxide which contains double the number of oxygen atoms in 192 g of oxygen gas.

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7. A vessel contains equal number of moles of helium and methane. Due to a hole in the vessel, half of the gaseous mixture effused out. What is the ratio of the number of moles of helium and methane remaining in the vessel?

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8. A vessel contains double the number of moles of hydrogen than oxygen. Due to a hole in the vessel, one-fouth of the gaseous mixture is effused out. What is the ratio of the number of moles of hydrogen and oxygen remaining in the vessel ?

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9. A salt is formed between a bivalent metal cation and an oxyacid of a non-metal. The $-ous$ acid of the non-metal has two oxygen atoms per molecule. If the salt contains a radical of per acid of the same non-metal, calculate the number of atoms of various elements present in 0.5 moles of the salt.

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10. The percentage of oxygen in a metallic oxide of a bivalent metal is 20.1%. The molecular weight of the compound is 79.5. Write the

molecular formular of the compound, considering the symbol of the metal as M and find out the atomic weight of the metal.

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11. A hydrocarbon on combustion gives CO_2 and H_2O in a volume ratio of $2:1$, under similar conditions of temperature and pressure. What is the emperical formula of the hydrocarbon?

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12. An aqueous solution is prepared by dissolving 90 g of acetic acid in water to make a 1000 mL solution. Density of solution and mole fraction of solute in the solution.

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13. A vessel contains equal masses of hydrogen, helium and methane. Find out the fractions of the partial pressures in the mixture.

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14. The molecular mass of a salt of oxyacid of chlorine of a divalent metal, which contains more number of oxygen atoms than its corresponding `-ic' acid is 239. What will be the molecular masses of its

(a) phosphate (b) iodide

(c) bisulphate be?

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15. Represent the following chemical changes in the form of chemical equations and balance them.

(a) A copper coin is placed in a solution of corrosive sublimate, mercuric chloride. The products obtained are cupric chloride and mercury.

(b) A piece of (a) sulphur, (b) charcoal burns vigorously when dropped in molten potassium nitrate, because potassium nitrate decomposes to form potassium nitrite and oxygen, and this oxygen helps to burn charcoal and sulphur giving out carbon dioxide and sulphur dioxide, respectively.

(c) Aqueous ammonium hydroxide solution is made to react with aqueous copper sulphate solution and a bluish white precipitate of cupric hydroxide, and ammonium sulphate are formed.

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16. The percentage of metal in two metal oxides, A and B is 74.2% and 59%, respectively. Show that the law of multiple proportions is obeyed.

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17. A sample of air contains nitrogen and oxygen saturated with water vapour.The total pressure is 640 mm. The vapour pressure of water vapour is 40 mm and molar ratio of nitrogen and oxygen is $4:1$. Find out the partial pressures of N_2 and O_2.

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18. Calculate the partial pressures of each gas present in a mixture of 8 g of oxygen and 6 g of hydrogen, present in 2 L container at $27^\circ C$.

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19. A particular compound contains only nitrogen and hydrogen. The percentage of nitrogen in The compound is 87.5%. Further, 96 g of the compound contains 18×10^{23} molecular of the substance. Find out the molecular formula of the compound.

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20. When a sample of KNO_3 is subjected to heating, the volume of oxygen liberated was sufficient for the combustion of one mole of ethylene. For giving same amount of oxygen, what is the amount of lead nitrate required ot be decomposed? Also, find out the volume occupied by the gaseous products at STP during this decomposition.

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21. Brass is an alloy of copper and zinc. A sample of brass weighing 5.793 g, when treated with excess of dil. H_2SO_4 gave 336 mL of hydrogen gas at 136.5 K and 785 mm pressure. If the hydrogen gas is collected over water and pressure of water vapour under the given conditions is 25 mm, find out the percentage weight of copper in the alloy.

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22. 50 mL of a gaseous hydrocarbon is mixed with excess of oxygen and burnt and cooled to the laboratory temperature. The reduction in volume was found to be 150 mL. The gas is then passed into caustic potash, when there is a further reduction in the volume of 150 mL. Provide all the volumes are measured at the same conditions of temperature and pressure, find out the molecular formula of the hydrocarbon.

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23. X g of CO_2 is prepared by the reaction of $CaCO_3$ and HCl. How many grams of oxygen will be liberated, if X grams of CO_2 completely take part in the process of photosynthesis ? 144 g of water is produced in the first reaction.

Equation for photosynthesis is $CO_2 + H_2O \rightarrow C_6H_{12}O_6 + O_2$

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Level 3

1. When a fully blown balloon is subjected to sudden bursting. What do you observe? Justify your observation.

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2. Under what conditions, gases deviate to a large extent from ideal behaviour? Justify with respect to kinetic molecular theory.

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3. The vapour pressure of a solution is always less than of the pure solvent, when the temperature of both the solution and solvent are the same, with the same external pressure acting over them. Explain.

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4. The experimental values of the mass (in grams) of 1 L of CO_2, NH_3 and CH_3Cl, at STP are given below:

$CO_2 \rightarrow 1.9767$ g

$NH_3 \rightarrow 0.7712$ g

$CH_3Cl \rightarrow 2.3076$ g

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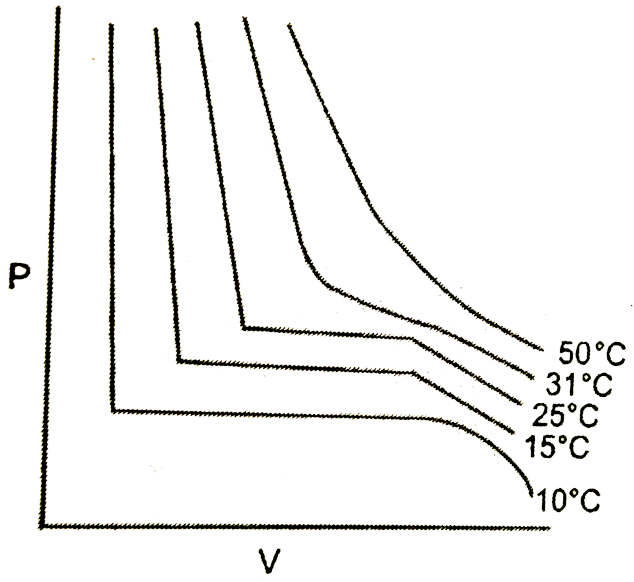
5. In the P vs V graph of CO_2 gas given below, account for the reduction in the horizontal portion of the graph with increase in

temperature.



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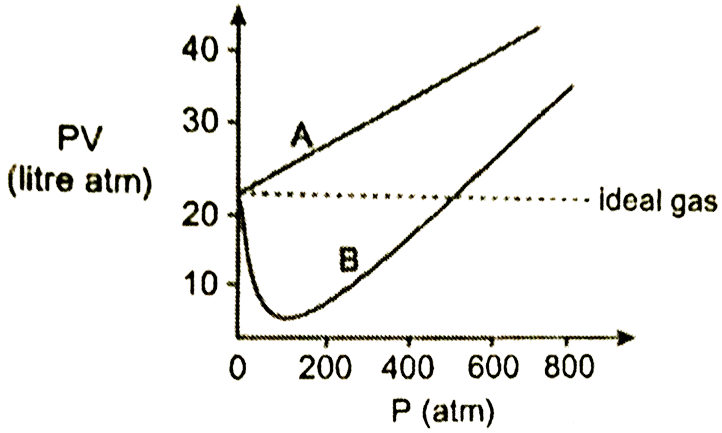
6. From the graph given below compare the intermolecular forces of attraction in A and B.



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7. The various conditions required for the liquefaction of gases A, B, C and D are given below:

Gas	Temperature	Pressure
A	–4°C	10 atm
B	–4°C	5 atm
C	25°C	5 atm
D	25°C	4 atm

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8. The reduction of acidified solution of ferric ions by hydrogen gas takes place in the presence of zinc. Explain.

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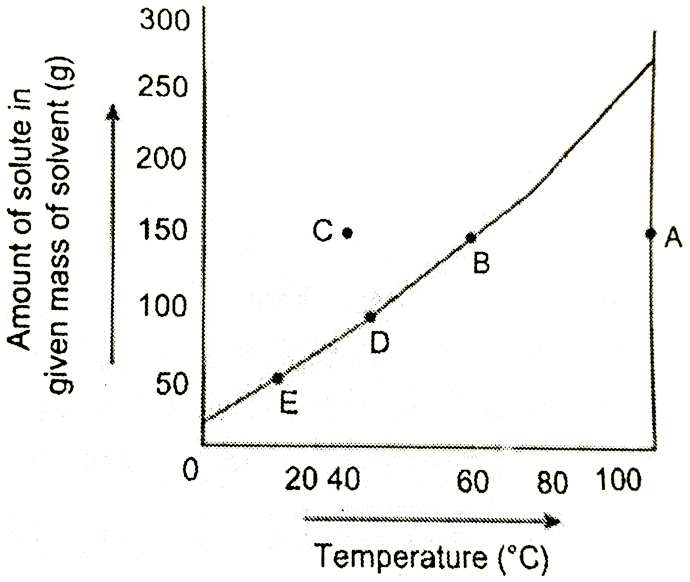
9. In the fraph given below, identify the states of solution at the various points A, B, C and E.If the solution is cooled from point 'A' at which temperature, precipitation normally starts ? Also, find out the amount of solute precipitated at $40^{\circ}C$ at A and the amount of solute in the solution at point 'E'. What would be the maximum amount of solute

that can be precipitated in the process?



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