

Q1 Chlorine is prepared in the laboratory by treating manganese dioxide ( $MnO_2$ ) with aqueous hydrochloric acid according to the reaction.



How many grams of HCl react with 5.0g of manganese dioxide? (Atomic mass of Mn=55)

Q2 The following data were obtained when dinitrogen and dioxygen react together to form different compounds:

Mass of $N_2$	+ 14g	14g	28g	28g
Mass of $O_2$	+ 16g	32g	32g	80g

Q3 Which law of chemical combination is obeyed by the above experimental data? Give its statement.

Q4 Calculate the number of atoms in each of the following:

(i) 52 moles of He (ii) 52g of He.

Q5 Identify the limiting reactant in following reaction.



(i) 300 atoms of A + 200 molecules of B

(ii) 2.5 moles of A + 5 mole of B.

Q6 Which one of following will have largest number of atoms?

(i) 1g Au (ii) 1g Li

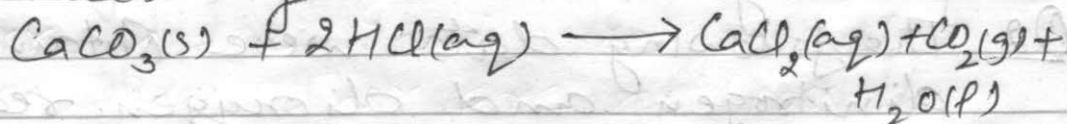
Q7 How much copper can be obtained from 100g of copper sulphate ( $CuSO_4$ )

Q8 What is the concentration of sugar  $C_{12}H_{22}O_{11}$  in  $mol L^{-1}$  if its 20g are dissolved in enough water to make a final volume up to 2L.

Q8 If the density of methanol is  $0.793 \text{ kg L}^{-1}$  what is its volume needed for making 2.5L of its 0.25M solution.

Q9 What will be mass of one  $^{12}\text{C}$  atom in g?

Q10 Calcium carbonate reacts with aqueous HCl according to the reaction.



What mass of  $\text{CaCO}_3$  is required to react completely with 25 ml of 0.75M HCl?

Q11 A solution is prepared by adding 2g of a substance to 18g of water.

Calculate the mass percent of solute.

Q12 Calculate the molarity of NaOH in the solution prepared by dissolving its 4g in enough water from 250 ml of the solution.

Q13 The molarity of sulphuric acid  $\text{H}_2\text{SO}_4$  is 0.8M and its density is  $1.06 \text{ g cm}^{-3}$ . What will be the concentration of solution in term of molarity and mole fraction.

Q14 Calculate the molarity of water if its density is  $1000 \text{ kg m}^{-3}$

Q15 The density of 2 molar aqueous solution of NaOH is  $1.10 \text{ g mL}^{-1}$ . Calculate the molarity of its solution.

Q16 50.0 Kg of  $\text{N}_2(\text{g})$  and 10.0 Kg of  $\text{H}_2(\text{g})$  are mixed to produce  $\text{NH}_3(\text{g})$ . Calculate mass of  $\text{NH}_3(\text{g})$  formed. Identify the limiting reagent in the production of  $\text{NH}_3$  in this situation.

## UNIT-2

- Q1 Calculate the number of protons, neutrons and electrons in  $^{80}_{35}\text{Br}$ ?
- Q2 The number of electron, protons and neutrons in a species are equal to 18, 16 and 16 respectively. Assign the proper symbol of species.
- Q3 Calculate the energy of one mole photons of radiations whose frequency is  $5 \times 10^{10} \text{ s}^{-1}$ ?
- Q4 When electromagnetic radiation of wavelength  $300 \text{ nm}$  falls on the surface of sodium electrons are emitted with kinetic energy of  $1.68 \times 10^{-19} \text{ J mol}^{-1}$ . What is the minimum energy needed to remove an electron from sodium? What is the maximum wavelength that will cause a photoelectron to be emitted.
- Q5 In a hydrogen atom, an electron jumps from third orbit to the first orbit. Find out the frequency of spectral line.
- Q6 What is the wave number for the longest wavelength transition in the Balmer series of atomic hydrogen.
- Q7 Find the wavelength of a  $100 \text{ g}$  particle moving with a velocity of  $100 \text{ m s}^{-1}$ .
- Q8 The kinetic energy of an electron is  $4.55 \times 10^{-25} \text{ J}$ . The mass of electron is  $9.1 \times 10^{-31} \text{ kg}$ . Calculate velocity, momentum and wavelength of electron.
- Q9 A microscope using suitable photons is employed to locate an electron in an atom within a distance of  $0.1 \text{ \AA}$ . What

is the uncertainty involved in the measurement of its velocity?

Q10 A golf ball has a mass of 40g and a speed of 45 m/s. If the speed can be measured within an accuracy of 2% calculate the uncertainty in its position.

Q11 From the following sets of quantum number, state which are possible. Explain why other are not possible.

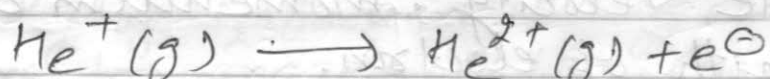
- (i)  $n=0, l=0, m_l=0, s=+1/2$
- (ii)  $n=1, l=0, m_l=0, s=+1/2$
- (iii)  $n=1, l=1, m_l=0, s=+1/2$
- (iv)  $n=1, l=0, m_l=+1, s=+1/2$

Q12 The mass of an electron is  $9.1 \times 10^{-31}$  kg. If its kinetic energy is  $3.0 \times 10^{-25}$  J, calculate its wavelength.

Q13 An element with mass number 81 contains 31.7% more neutrons as compared to protons. Assign the symbol to the element.

Q14 An ion with mass number 37 possesses one unit of negative charge. If the ion contains 11.1% more neutrons than the electrons, find the symbol of ion.

Q15 Calculate the energy required for the process:



The ionisation energy for the H atom in ground state is  $2.18 \times 10^{-18}$  J atom<sup>-1</sup>

UNIT-5 CLASS - +1 CHEMISTRY MARKS - 2003

Q1 A neon-dioxygen mixture contains 70.6g dioxygen and 167.5g 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?

Q2 At  $25^{\circ}\text{C}$  and 760 mm of Hg pressure, a gas occupies 600 ml volume, what will be its pressure at a height when the temperature is  $10^{\circ}\text{C}$  and volume of gas is 640 ml?

Q3 Calculate the mass of  $0.120\text{ dm}^3$  of  $\text{N}_2$  at  $150^{\circ}\text{C}$  and 0.987 bar pressure.

Q4 Using equation of state  $PV = nRT$  show that at a given temperature, the density of gas is proportional to the gas pressure  $p$ .

Q5 The density of a gas is found to be  $5.46\text{ g/dm}^3$  at  $27^{\circ}\text{C}$  and under 2 bar pressure. What will be its density at STP?

Q6 Calculate the temperature of 4.0 moles of a gas occupying  $5\text{ dm}^3$  at 3.32 bar  
( $R = 0.083\text{ bar dm}^3\text{ K}^{-1}\text{ mol}^{-1}$ )

Q7 Calculate the volume occupied by 8.8 g of  $\text{CO}_2$  at  $31.1^{\circ}\text{C}$  and 1 bar pressure  
( $R = 0.083\text{ bar L K}^{-1}\text{ mol}^{-1}$ )

Q8 A student forgot to add the reaction mixture to the round bottomed flask at  $27^{\circ}\text{C}$  but put it on the flame, After a lapse of time, he realised his mistake. By using a pyrometer, he found that the temperature of flask was  $477^{\circ}\text{C}$ . What fraction of air would

have been expelled out?

Q9 Calculate the total number of electrons present in 1.4 g of nitrogen gas.

Q10 How many time would it take to distribute one Avogadro number of wheat grains if  $10^{10}$  grains are distributed each second?

Q11 What would be SI units of a quantity  $pV^2T^2/n$ ?

Q12 What are van der Waal's constants also write its physical significance.

Q13 For a non-zero value of force of attraction between the gas molecule and zero volume occupied by the gas molecules, give a modified expression of van der Waal's equation

Q14 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 and mass 100 kg is filled with helium at 1.66 bar at  $27^\circ\text{C}$  (Density of air =  $1.2 \text{ kg m}^{-3}$  and  $R = 0.083 \text{ bar dm}^3 \text{ K}^{-1} \text{ mol}^{-1}$ )

Q15 Pressure of 1 g of an ideal gas A at  $27^\circ\text{C}$  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 relationship between their molecular masses.