

**Question Bank for model examination**

1. Calculate the mass of 2.5 moles of Nitrogen.
2. Calculate the number of atoms in 0.2 molecules of Nitrogen.
3. Calculate the number of moles in 7.85 g of Fe (at. Mass is 56)
4. Calculate the volume of 14g of nitrogen at STP
5. Calculate the number of moles in 3.01 x 10 22 molecules of CO2.
6. An electron is in one of the 4d orbitals. Give the possible values of n, l and m1 for this electron.
7. . The ejection of the photoelectron from the silver metal in the photoelectric effect experiment can be stopped by supplying the voltage of 0.35 V when the radiation 256.7 nm is used. Calculate the work fuction of silver metal.
8. **If 22 g of benzene is dissolved in 122 g of carbon tetrachloride, determine the mass percentage of carbon tetrachloride (CCl4) and benzene (C6H6).**
9. **Describe the theory associated with the radius of an atom as it**

**a. gain of electron b. Loss of electron**

1. **What is hybridisation of atomic orbitals? Describe the shape of sp, sp2 and sp3 orbital.**
2. **What will be the pressure exerted by a mixture of 3.2g of methane and 4.1 g of carbon dioxide contained in a 9 dm3 flask at 270C?**
3. **Calculate the temperature of 4.0 moles of a gas occupying 5 dm3 at 3.32 bar (R = 0.083 bar dm3 K-1 mol-1)**
4. **Calculate the ∆rG0 for the conversion of oxygen to ozone,**

 **3/2 O2 (g) -> O3 (g) at 298 K, if Kp for the conversion is 2.47X 10-29.**

1. **The bond enthalpy of H2 (g) is 436 k j mol-1and that of N2 (g) is 941.3 k j mol-1. Calculate the average bond enthalpy of an N-H bond in ammonia.**

**Given: ∆H– (NH3) = -46 k j mol-1**

1. **Find out the value of equilibrium constant for the following reaction at 298K.( Antilog of 2.38= 2.4X102)**
2. **Calculate the molecular mass of the following:**
3. **H2O (ii) CO2 (iii) CH4**
4. **Yellow light emitted from a sodium lamp has a wavelength (λ) of 580 nm. Calculate the frequency (ν) and wave number ( ) of the yellow light.**
5. **What is the number of photons of light with a wavelength of 4000 pm that provide 1 J of energy?**
6. A photon of wavelength 4 × 10–7 m strikes on metal surface, the work function of the metal being 2.13 eV. Calculate (i) the energy of the photon (eV), (ii) the kinetic energy of the emission, and (iii) the velocity of the photoelectron (1 eV= 1.6020 × 10–19 J).
7. **What is the significance of the terms - ‘isolated gaseous atom’ and ‘ground state’ while defining the ionization enthalpy and electron gain enthalpy?**
8. **If benzene in solution containing 30% by mass in carbon tetrachloride, calculate the mole fraction of benzene?**
9. **Electromagnetic induction of wavelength 242 nm is just suddicient tot ionise the sodium atom. Calculate the ionisation energy of sodium in k j mol-1.**
10. **Discuss the shape of the following molecules using the VSEPR model:**
**BeCl2, BCl3 , SiCl4 and AsF5**
11. **How would you explain the fact that the first ionization enthalpy of sodium is lower than that of magnesium but its second ionization enthalpy is higher than that of magnesium?**
12. Prove that at a given temp density of a gas is proportional to the gas pressure by using the equation of state pV = nRT.
13. **Enthalpy of combustion of C to CO2 is -393.5**kJ mol-1. **Determine the heat released on the formation of 37.2g of CO2 from dioxygen and carbon.**
14. **Calculate the heat (in kJ) required for 50 g**[aluminium](https://byjus.com/chemistry/chemical-properties-of-aluminium/%22%20%5Ct%20%22_blank)**to raise the temperature from 45**∘C to 65∘C**. For aluminium molar heat capacity is 24**J mol-1 K-1
15. a. **Find energy of each of the photons which**

**(I) correspond to light of frequency**3 ×1015Hz**.**

**(II) Have wavelength of 0.50 armstrong.**

**b. Calculate the wavelength of an electron moving with a velocity of**2.05×107ms−1

1. a. Differentiate between sigma and pi bond.

 b. Use molecular orbital theory to explain why Li2 molecule does not exist.

1. What is the total no of electrons present in 28 g of dinitrogen gas?
2. b. How much time would it take to distribute 1 Avogadro no. of wheat grains, if 1010 grains are distracted each second?
3. The difference between the mass of displaced air and the mass of the balloon is known as pay load. What is the pay load when a balloon of radius is 10 m, mass 100 kg is filled with helium at 1.66 bar at 27^{\circ}27∘ C.

(Density of air = 1.2 kg m-3 and R = 0.083 bar dm3at  K-1 mol-1)

1. What will be the minimum pressure required to compress 500 dm3 of air at 1 bar to 200 dm3 at 30°C?
2. At 0°C, the density of a certain oxide of a gas at 2 bar is same as that of dinitrogen at 5 bar. What is the molecular mass of the oxide?
3. What will be the pressure of the gaseous mixture when 0.5 L of H2 at 0.8 bar and 2.0 L of dioxygen at 0.7 bar are introduced in a 1L vessel at 27°C?
4. The enthalpy of combustion of methane, graphite and dihydrogen at 298 K are, –890.3 kJ mol–1 –393.5 kJ mol–1 , and –285.8 kJ mol–1 respectively. Enthalpy of formation of CH4(g) will be (i) –74.8 kJ mol–1 (ii) –52.27 kJ mol–1 (iii) +74.8 kJ mol–1 (iv) +52.26 kJ mol–1 .
5. The reaction of cyanamide, NH2CN(s), with dioxygen was carried out in a bomb calorimeter, and ∆U was found to be –742.7 kJ mol–1 at 298 K. Calculate enthalpy change for the reaction at 298 K.



1. Calculate the enthalpy change on freezing of 1.0 mol of water at 10.0°C to ice at – 10.0°C. ∆fusH = 6.03 kJ mol–1 at 0°C. Cp[H2O(l)] = 75.3 J mol–1 K –1 Cp[H2O(s)] = 36.8 J mol–1 K –1