**1. All the five bonds in PCl5 molecule are not equal. Justify.**

**2. Why is standard entropy of an elementary substance not zero whereas standard enthalpy of formation is taken as zero?**

**3. Write the expression for the equilibrium constant for each of the following reactions:** 

4**. Why is Li2CO3 decomposed at a lower temperature whereas Na2CO3 at higher temperature?**

**5. Draw the cis and trans structure of But-2-ene. Which isomer will have higher boiling point? Why?**

**6. a. What is green chemistry?**

 **b. What are the reactions involved for ozone layer depletion in the stratosphere?**

**7. a. Why is Wurtz reaction not preferred for the preparation of alkanes containing odd number of carbon atoms? Illustrate your answer by taking one example.**

 **b. How will you convert the following into benzene?**

 **i. Ethyne ii. Ethene iii. Hexane**

 **8. Using Aufbau principle, write the ground state electronic configuration of following atoms:**

 **(i)Boron (Z = 5) (ii) Neon (Z = 10),**

 **(iii) Aluminium (Z = 13) (iv) Chlorine (Z = 17)**

 **(v) Calcium (Z = 20) (vi) Rubidium (Z = 37)**

**9. If the velocity of the electron in Bohr’s first orbit is 2.19x 106 ms-1.**

 **Calculate the de Broglie wavelength associated with it.**

 10. a. Calculate the molarity of NaOH in the solution prepared by dissolving its 4g in enough water to form 250mL of the solution**.**

**11.** a.**Identify the substance oxidised, reduced, oxidising agent and reducing agent for each of the following reactions.**
 

 **b.** What is Kc for the following equilibrium when the equilibrium concentration of each substance is : [SO2] = 0.60 M, [O2] = 0.82 M and

[SO2] = 1.90 M
 2SO2(g) + O2(g) ⇌ 2SO3(g)

 **11. a. Draw the resonance structures of phenol. Show the electron shift using curved arrow notation.**

 **b. What are electrophiles and nucleophiles? Explain with examples:**

 c. **What is polymerization? Give an example.**

**12. a) Sate Markovnikov rule. Write IUPAC name of the product obtained by addition reaction of HBr to hex-1-ene.**

 **b) What happens when: [ Give chemical equations]**

 **i) Butane undergoes complete combustion.**

 **ii) Ethanol is heated with conc. H2SO4.**

 **iii) Ethyne is passed through red hot iron tube at 873K.**

 **13. a. What effect the branching of an alkane has on its melting point?**

 **b. What type of isomerism is shown by methoxymethane and ethanol?**

**14. a. How do you account for the formation of ethane during chlorination of methane?**

**b. How will you convert benzene into p-nitrobromobenzene**

**c. Convert ethylene to ethane.**

**15.**  Define electronegativity. How does it differ from electron gain enthalpy?

In terms of period and group where would you locate the element with Z =114?

16. Write the atomic number of the element present in the third period and seventeenth group of the periodic table.

17. a.Why do elements in the same group have similar physical and chemical properties?

b. What does atomic radius and ionic radius really mean to you?

18. The skeletal structure of CH3COOH as shown below is correct, but some of the bonds are shown incorrectly. Write the correct Lewis structure for acetic acid.

19. What do you understand by bond pairs and lone pairs of electrons? Illustrate by iving one exmaple of each type.

20. Define hydrogen bond. Is it weaker or stronger than the vander Waals forces? Explain with an example.

21. a. Explain why cation are smaller and anions larger in radii than their parent atoms?

1. 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?

22. a. Which out of NH3 and NF3 has higher dipole moment and why?

 b. Distinguish between a sigma and a pi bond.

23. a. Explain the formation of H2 molecule on the basis of valence bond theory.

24. 1 . calculate ∆U,q and W, when 2.0 mole of an ideal gas at 25 degree Celsius are Compressed isothermally and reversibly from one bar to 10 bar

Hint : ∆U = 0 , W = 2.303 nRT log P2/P1

 ∆U = q + W

25 . 3 moles of H gas are compressed isothermally and reversibly from 60 L to 20 L and 8.50kJ of work is done on it . Assuming ideal behavior, calculate the temperature of the gas.

Hint: W = 2.303nRTlogV2/V1

26. The heat of combustion of gaseous methane (CH4) at constant volume is measured in bomb calorimeter at298K and is found to be -885.4kJ per mole .find the value of enthalpy change?

Hint: CH4 (g) + O2(g) 🡪 CO2(g) + H2O(l)

27. The enthalpy change (∆H) for the reaction

N2(g) + H2 🡪 NH3(g) is -92.38 kJ at 298K.what is ∆U at 298K ?

Hint: ∆H = ∆U + ∆ngRT

28. Enthalpy of combustion of carbon to CO2 (g) is -393.5kJ per mole. Calculate the heat released upon the formation of 35.2g of CO2 from carbon and dioxygen gas.

Hint: C(s) + O2 (g) 🡪CO2 (g)

29. Prove that at a given temp density of a gas is proportional to the gas pressure by using the equation of state pV = nRT.

**30. 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.**

**31. 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

32. 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