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- 13) The value of the gas constant R is  
 a)  $0.082 \text{ dm}^3 \text{ atm}$  b)  $0.987 \text{ cal mol}^{-1} \text{ K}^{-1}$   
 c)  $8.3 \text{ J mol}^{-1} \text{ K}^{-1}$  d)  $8 \text{ erg mol}^{-1} \text{ K}^{-1}$
- 14) Maximum deviation from ideal gas is expected from  
 a)  $\text{CH}_4(\text{g})$  b)  $\text{NH}_3$  c)  $\text{H}_2(\text{g})$  d)  $\text{N}_2(\text{g})$
- 15) The parameters that describe the gaseous state are \_\_\_\_\_  
 a) volume b) pressure c) temperature d) all of these

**Part - II**

Answer any four of the following questions.

**4×2=8**

**Question No. 21 is compulsory.**

- 16) Calculate the molar mass of the following compounds  
 (i) Urea [ $\text{CO}(\text{NH}_2)_2$ ] (ii) Boric acid [ $\text{H}_3\text{BO}_3$ ]
- 17) Balance the equation by ion electron method  
 $\text{C}_2\text{O}_4^{2-} + \text{Cr}_2\text{O}_7^{2-} \rightarrow \text{Cr}^{3+} + \text{CO}_2$  (in acid medium)
- 18) How many orbitals are possible for  $n = 4$ ?
- 19) The size of  $\text{Cl}^- = 1.81\text{Å}$  and  $\text{Cl} = 0.99\text{Å}$  Explain.
- 20) Write any two uses of deuterium.
- 21) Give the expressions of critical constants by using Vander Vaals constant.

**Part - III**

Answer any four questions.

**4×3=12**

**Question Number 27 is compulsory.**

- 22) 3.24g of titanium reacts with oxygen to form 5.40g of the metal oxide. Find the empirical formula of the metal oxide (atomic mass of Ti = 48).
- 23) Explain the shapes of 'P' orbitals.
- 24) Define electronegativity.
- 25) What is water-gas shift reaction?
- 26) Difference between diffusion and effusion.
- 27) An unknown gas diffuses at a rate of 0.5 time that of nitrogen at the same temperature and pressure. Calculate the molar mass of the unknown gas.

**Part - IV**

Answer all the questions:

**3×5=15**

- 28) i) Define equivalent mass of acid. (2)  
 ii) Any three rule assigning the oxidation number. (3)  
 (OR)  
 i) State Aufbau principle. (2)  
 ii) Explain briefly the time independent schroodinger wave equation. (3)
- 29) i) Calculate the effective nuclear charge of chlorine. (2)  
 ii)  $\text{Ni}^{2+}$ ,  $\text{Fe}^{3+}$  which has the stable electronic configuration why? (3)  
 (OR)  
 i) Explain exchange reaction of deuterium. (2)  
 ii) Explain covalent hydride. How are they classified? (3)
- 30) i) State Gay - Lussac's law. (2)  
 ii) How will you calculate the partial pressure in terms of mole fraction? (3)  
 (OR)  
 i) Define limiting reagent. (2)  
 ii) Derive de-Broglie equation. (3)