



PUNJA International School

Shree Swaminarayan Gurukul, Zundal

HALF YEARLY EXAMINATION [2020 – 21]			
Student Name		Grade	XI
Date	4-11-2020	Subject	CHEMISTRY
Time	3 Hrs.	Total Marks	70

General instructions:

- ❖ All questions are compulsory
- ❖ Questions No. 1 -5 are very short answer questions and carry one mark each.
- ❖ Question No 6-12 are short answer question and carry 2 marks each.
- ❖ Question No 13-24 are also short answer question and carry 3 marks each.
- ❖ Question No 25-27 are long answer question and carry 5 marks each.
- ❖ Use of log tables if necessary. Calculators are not allowed.

1. What is the SI unit of density? [1]
2. Give the de – Broglie’s relation. [1]
3. Define Boyle’s law. [1]
4. How does dilution with water affect the pH of a buffer solution? [1]
5. State Henry’s law. [1]
6. Calculate molecular mass of C_2H_6 , $C_{12}H_{22}O_{11}$, H_2SO_4 , H_3PO_4 [2]
7. Electromagnetic radiation of wavelength 242 nm is just sufficient to ionise the sodium atom. Calculate the ionisation energy of sodium in kJ mol^{-1} . [2]
8. How does atomic radius vary in a period and in a group? How do you explain the variation? [2]
9. Write the resonance structures for SO_3 , NO_2 and NO_3^- . [2]
10. State Avogadro’s Law. Is the converse of Avogadro’s law true? [2]
11. In a process, 701 J of heat is absorbed by a system and 394 J of work is done by the system. What is the change in internal energy for the process? [2]
12. When the total number of moles of product and reactants are equal, K has no unit. Give reason. [2]
13. Calculate the mass percent of different elements present in sodium sulphate (Na_2SO_4). [3]

14. Yellow light emitted from a sodium lamp has a wavelength (λ) of 580 nm. Calculate the frequency (ν) and wave number ($\bar{\nu}$) of the yellow light. [3]

15. What does atomic radius and ionic radius really mean to you? [3]

16. Copper crystallises into a fcc lattice with edge length $3.61 \times 10^{-8} \text{ cm}$. Show that the calculated density is in agreement with its measured value of 8.92 g cm^3 . [3]

17. 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]

18. Give the relationship between ΔU and ΔH for gases. [3]

19. What do you understand by isoelectronic species? Name a species that will be isoelectronic with each of the following atoms or ions. [3]

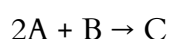
(i) F^- (ii) Ar (iii) Mg^{2+} (iv) Rb^+

20. Draw the Lewis structures for the following molecules and ions: [3]

H_2S , SiCl_4 , BeF_2 , CO_3^{2-} , HCOOH

21. The reaction of cyanamide, $\text{NH}_2\text{CN}_{(s)}$, with dioxygen was carried out in a bomb calorimeter, and ΔU was found to be $-742.7 \text{ kJ mol}^{-1}$ at 298 K. Calculate enthalpy change for the reaction at 298 K. [3]

22. For the reaction at 298 K,



$$\Delta H = 400 \text{ kJ mol}^{-1} \text{ and } \Delta S = 0.2 \text{ kJ K}^{-1}\text{mol}^{-1}$$

At what temperature will the reaction become spontaneous considering ΔH and ΔS to be constant over the temperature range? [3]

23. Discuss the shape of the following molecules using the VSEPR model: [3]

BeCl_2 , BCl_3 , SiCl_4 , AsF_5 , H_2S , PH_3

24. What are the various factors due to which the ionization enthalpy of the main group elements tends to decrease down a group? [3]

25. Reaction between N_2 and O_2 takes place as follows: $2\text{N}_2(\text{g}) + \text{O}_2(\text{g}) \leftrightarrow 2\text{N}_2\text{O}(\text{g})$ If a mixture of 0.482 mol of N_2 and 0.933 mol of O_2 is placed in a 10 L reaction vessel and

allowed to form N_2O at a temperature for which $K_c = 2.0 \times 10^{-37}$, determine the composition of equilibrium mixture. [5]

26. Calculate the concentration of nitric acid in moles per litre in a sample which has a density, 1.41 g mL^{-1} and the mass per cent of nitric acid in it being 69%. [5]

27. Define octet rule. Write its significance and limitations. [5]