પુ•ના 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 –C2H6, C12H22O11, H2SO4, H3PO4 [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 ofwork 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 $3.61\times10^{-8} cm$. 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, $NH_2CN_{(s)}$,with dioxygen was carried out in a bomb calorimeter, and ΔU was found to be -742.7 kJ mol^{-1} at 298 K. Calculate enthalpy change for the reaction at 298 K. [3]

22. For the reaction at 298 K,

    2A + B → C

    ΔH = 400 kJ mol^{-1} and ΔS = 0.2 $kJ\ K^{-1}mol^{-1}$

    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: $2N_2(g)+O_2(g)\leftrightarrow 2N_2O(g)$ 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]