

HALF YEARLY EXAMINATION, 2017-18

CHEMISTRY

Time : 3 hrs.

Class - XI

M.M. : 70

Name of the student _____ Section _____ Date-21.09.2017 (Thursday)

General instructions :

- All questions are compulsory. Internal choice is there in some questions.
- Question nos. 1 to 5 are very short answer questions carrying 1 mark each.
- Question nos. 6 to 10 are short answer questions carrying 2 marks each.
- Question nos. 11 to 22 are short answer questions carrying 3 marks each.
- Question no. 23 is a value based question carrying 4 marks.
- Question nos. 24 to 26 are long answer questions carrying 5 marks each.
- Use of calculator is strictly prohibited.
- Use log table if necessary.

SECTION - A

- Q.1 What is the difference between molality and molarity?
- Q.2 Calculate the mass of a molecule of CO₂ in gram.
- Q.3 State Aufbau principle.
- Q.4 What type of graph will you get when PV is plotted against P at constant temperature? (Draw the plot)
- Q.5 Write the names of isotopes of hydrogen. What is the mass ratio of these isotopes?

SECTION - B

- Q.6 How many grams of Na₂CO₃ should be dissolved to make 100cm³ of 0.15 M Na₂CO₃ solution? (At wt of Na = 23 u, C = 12 u, O = 16 u).
- Q.7 Which among the following pair of elements would have a more negative electron gain enthalpy?
F or Cl Explain.
- Q.8 Show by a chemical reaction with water that Na₂O is a basic oxide and Cl₂O₇ is an acidic oxide.

OR

Define ionization enthalpy. Explain why ionization enthalpy of noble gases are so high?

- Q.9 What is the difference between the terms 'hydrolysis' and 'hydration'?
- Q.10 What do you mean by BOD? What is the importance of measuring BOD?

SECTION – C

- Q.11** Commercially available concentrated HCl contains 38% HCl by mass.
- What is the molarity of the solution (density of the solution = 1.19 g ml⁻¹)?
 - What volume of the above concentrated HCl is required to make 1.0 L of 0.10 M HCl?

- Q.12**
- State the law of multiple proportion and Avogadro's law.
 - Report the answer of the following calculation in a appropriate number of significant figures.

$$\frac{2.5 \times 1.25 \times 3.5}{2.01}$$

- Q.13**
- Account for the following :
 - Chromium has configuration 3d⁵4s¹, not 3d⁴4s².
 - Bohr's orbits are called stationary orbits or states.
 - State Heisenberg's uncertainty principle.

- Q.14**
- Draw the shape of 'd' orbitals.
 - Calculate the number of angular nodes and radial nodes present in 4p orbital.
 - Calculate the mass of a photon with wavelength 3.6 Å.

- Q.15**
- Name the most metallic element and most non metallic element in second period.
 - Name the elements with largest atomic radius and smallest atomic radius in third period.
 - Name the element having general electronic configuration ns²np⁴ in fourth period.

- Q.16**
- Which is smallest in size, Cu⁺, Cu²⁺ and Cu? Why?
 - IE₁ values (in KJ mol⁻¹) of group 13 element are –

₅ B	₁₃ Al	₃₁ Ga	₄₉ In	₈₁ Tl
801	577	579	558	589

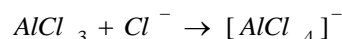
How would you explain the deviation from general trend?

- Q.17** Using molecular orbital theory compare the bond energy and magnetic character of O₂, O₂⁺ and O₂⁻.

- Q.18**
- Write the examples of compounds which show inter molecular H-bonding, intra molecular H-bonding. Draw their structures showing H-bonds.
 - Explain the shape of I₃⁻ ion.

- Q.19**
- Draw diagram showing the formation of a double bond and triple bond between the C-atoms in C₂H₄ and C₂H₂.

- ii) Describe the change in hybridization (if any) of the *Al* atom in the following reaction.



- Q.20** i) BH_4^- and NH_4^+ are iso structural. Explain.
ii) What type of hybridization is involved in SF_6 ?
iii) Why H-O-H has greater bond angle than H-S-H?

OR

- i) Predict the shape of the following molecule/ion.
a) PCl_5 b) NO_3^-
ii) Between NH_3 and NF_3 which has higher dipole moment and why?

- Q.21** A 2 L flask contains 1.6 g of methane and 0.5 g of hydrogen at $27^\circ C$. Calculate the partial pressure of each gas in the mixture and also calculate the total pressure.

- Q.22** i) State Charle's law.
ii) On a ship sailing in pacific ocean where temperature is $23.4^\circ C$, a balloon is filed with 2L air. What will be the volume of the balloon when the ship reaches Indian ocean, where the temperature is $26.1^\circ C$?

SECTION – D

- Q.23** Water is essential for life and we cannot imagine our life without it. Municipal and industrial discharge lead to water pollution. Organic wastes also create water pollution. Heavy metals from industries create lot of water pollution. Immersion of statues during festivals, create lot of water pollution. The residents of Chitranjan Park decided not to immerse Durga statues into Yamuna river like every year. This step was highly appreciated by Delhi Govt., and the NGO Save Yamuna Project.

- i) What should be done to reduce water pollution? Give two ways.
ii) What is the effect of water pollution?
iii) What is the threat for aquatic animals due to water pollution?
iv) What values are possessed by the residents of Chitranjan Park?

SECTION – E

- Q.24** i) Write any two postulates of Bohr's atomic model.
ii) Define black body.
iii) A gas absorbs a photon of 355 nm and emits at two wavelengths. If one of the emission is at 680 nm, at what wavelength the other emission occur?

OR

- i) Which state of the triple ionized beryllium (Be^{3+}) has the same orbit radius as that of the ground state of hydrogen atom?
- ii) Calculate the wave number for the longest wavelength transition in the Balmer series of atomic hydrogen?
- iii) Explain any one observation of photoelectric effect experiment.

Q.25 a) Arrange the following :

- i) CaH_2 , BeH_2 and TiH_2 in the order of increasing electrical conductance.
- ii) LiH , NaH and CsH in the order of increasing ionic character.

b) Draw the structure of hydrogen peroxide in gas phase.

c) How many hydrogen bonded water molecule(s) are associated in $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$? Draw the H-bonded structure.

OR

- a) What is heavy water? Write one use of it.
- b) Discuss any one method for the removal of each of the following types of hardness of water i.e. temporary and permanent.
- c) Write one use of hydrogen peroxide.

Q.26 a) 35 ml of oxygen were collected at 6°C and 758 mm pressure. Calculate its volume at NTP.

b) Using the ideal gas equation show that at a given temperature density of a gas is proportional to gas pressure P.

c) Why boiling point of H-F is exceptionally higher than H-Cl.

OR

a) Pressure of 1gm of an ideal gas A at 27°C is found to be 2 bar. When 2 gm of another ideal gas B is introduced in the same flask at same temperature, the pressure becomes 3 bar. Find a relationship between their molecular masses.

b) Give reasons for the following :

i) the size of weather balloon becomes larger and larger as it ascends into higher altitudes.

ii) tyres of automobiles are inflated to lesser pressure in summer than in winter.

c) What will be molar volume of nitrogen and argon at 273.15 K and 1 atm?

