

SAMPLE PAPER
CHEMISTRY
Class XI

General instructions :

- All questions are compulsory.
- Q. Nos. **1 to 5** are **very short** questions and carry **one mark** each.
- Q. Nos. **6 to 10** are **short questions** and carry **two marks** each.
- Q. Nos. **11 to 22** are **short questions** and carry **three marks** each.
- Q. Nos. **23** is **short questions** and carry **four marks**
- Q. Nos. **24 to 26** are **long answer** questions and carry **five marks** each.
- Use log table if necessary. Use of calculators is not allowed.

- Q.1** Calculate the mass of 12.044×10^{23} atoms of Sulphur (S = 32) (1)
- Q.2** What is limiting reactant? (1)
- Q.3** Give the name and symbol of an element which is isoelectronic with S^{2-} ion? (1)
- Q.4** To which group and period of the periodic table does the element with atomic number 57 belong? (1)
- Q.5** What is the hybridization of chlorine in ClO_3^- ion? (1)
- Q.6** Write chemical reaction to justify that hydrogen peroxide can act as oxidizing as well as reducing agent ? (2)
- Q.7** a) Write the electronic configuration of Fe (Z=26) and count the total number of electrons having $(n+l) = 4$. (2)
b) Write the electronic configuration of Cu^{2+} ion (z=29).
- Q.8** a) what is hydrogen economy ? (2)
b) what is syngas or water gas shift reaction ?
- Q.9** a) Name the group of the periodic table which accommodates maximum number of elements. (2)
b) Why has nitrogen higher first ionization enthalpy than oxygen?
- Q.10** Explain with reasons : (2)
a) Mg^{2+} ion is smaller than O^{2-} ion, although both are isoelectronic.
b) The electron gain enthalpies of noble gases are positive.

OR

Explain on the basis of MOT why N_2 has greater bond dissociation enthalpy than N_2^+ ?

- Q.11** a) Why is the dipole moment of NH_3 more than NF_3 ? (3)
b) What happens when lithium metal heated in free supply of air ?
- Q.12** a) The hydroxide of sodium and potassium is soluble in water where as for magnesium and calcium are sparingly soluble . Give reason. (3)
b) Why sodium forms peroxide but potassium forms super oxide ?
- Q.13** Discuss the two methods for the removal of permanent hardness of water? (3)

- Q.14** a) What is Biological oxygen demand (BOD)? (2+1)
b) What is photochemical smog?

Q.15 What is the molality of 1 molar solution of sodium nitrate if its density is 1.25 g/cc? (3)

OR

3g of H_2 react with 29 g of O_2 to yield H_2O .

- a) Which is the limiting reactant?
b) Calculate the maximum amount of H_2O that can be formed.
c) Calculate the amount of one of the reactants which remains unreacted.

Q.16 Write down the electronic configuration of Cr^{2+} and Mn^{4+} ions. How many unpaired electrons are present in each? (Cr $Z = 24$, Mn $Z=25$) (3)

Q.17 Differentiate between : (one point of difference) (3)

- a) Orbit and orbital b) Emission and absorption spectra c) Isotopes and isobars

Q.18 a) A student reported the radii of Fe, Fe^{2+} and Fe^{3+} as 117 pm, 64 pm and 76 pm respectively. Do you agree with the reported values? Justify the answer. (3)

b) What is meant by transition elements? Give their 3 general characteristics?

Q.19 A gas occupies a volume of 250 cm^3 at 745 torr and 25°C . What additional pressure is required to reduce the gas volume to 200 cm^3 at the same temperature? (3)

Q.20 Give reason LiI is more soluble in ethanol than KI (3)

Q.21 a) Why are the liquid drops spherical in shape? (3)

b) Why do gases deviate from ideal behavior?

c) How is the vapour pressure of a liquid related to intermolecular forces?

Q.22 a) What is coal gasification? Explain with equations. (3)

b) Write two reactions which show the oxidizing and reducing character of H_2O_2 ?

Q.23* Sarabjeet was going with his friend Maninder on a motorcycle. Their motor cycle was producing a lot of smoke. On the way, a policeman stopped them and asked to show pollution check certificate. They did not have that certificate and the policeman challaned their vehicle. After reading this passage answer the following questions: (4)

a) Why did policeman challan their vehicle?

b) What human values do you associate with the act of policeman?

Q.24 a) What is empirical formula? How is it related to molecular formula of a compound? (2+3)

b) A welding fuel gas contains carbon and hydrogen only. Burning a sample of it in oxygen gives 3.38 g carbon dioxide, 0.69g of water and no other products. A volume of 10 L (measured at STP) of this welding gas is found to weigh 11.6 g. Calculate :

- i) Empirical formula ii) Molecular formula of the compound.

OR

a) Haemoglobin contains 0.25% iron by mass. The molecular mass of haemoglobin is 89600. Calculate the number of iron atoms per molecule of haemoglobin.

b) How many moles and how many grams of sodium chloride are present in 500 cm^3 of 0.25 M NaCl solution?

- Q.25** a) State and explain Heisenberg's uncertainty principle. (2+3)
b) The uncertainty of a particle in momentum is $3.3 \times 10^{-2} \text{ kg ms}^{-1}$. Calculate the uncertainty in its position. ($h = 6.6 \times 10^{-34} \text{ J sec}$)

OR

- a) What is photoelectric effect? How does the kinetic energy of photoelectrons depend on the frequency of incident radiation?
b) In a photoelectric effect experiment irradiation of a metal with light of frequency $5.2 \times 10^{14} \text{ s}^{-1}$ yields electrons with maximum Kinetic energy of $1.3 \times 10^{-19} \text{ J}$. Calculate threshold frequency of the metal.

- Q.26** a) What is hybridization? (2+3)
b) On the basis of hybridization discuss the structure of the following :
i) PCl_5 ii) IF_7 iii) SF_6

OR

- a) What are polar and non polar molecules?
b) Give reasons for the following:
(i) BF_3 and NF_3 both are covalent, but BF_3 is non polar while NF_3 is polar
(ii) HF has a much higher boiling point than HCl .
(iii) He_2 and Be_2 molecules do not exist.

