

**CBSE Board**  
**Class XI Chemistry**  
**Sample Paper - 8**

**Time: 3 Hours****Total Marks: 70****General Instructions**

1. All questions are compulsory.
2. Question nos. 1 to 8 are very short answer type questions and carry 1 mark each.
3. Question nos. 9 to 18 are short answer type questions and carry 2 marks each.
4. Question nos. 19 to 27 are also short answer type questions and carry 3 marks each.
5. Question nos. 28 to 30 are long answer type questions and carry 5 marks each.
6. Use log tables if necessary, use of calculators is not allowed.

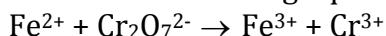
**Q1.** Write the expression for  $K_{sp}$  of  $\text{As}_2\text{S}_3$ .**Q2.** If we get a blood red colouration on adding  $\text{FeSO}_4$  and dil.  $\text{H}_2\text{SO}_4$  to the sodium extract, what do you infer about the elements present in the organic compound?**Q3.** Would the aq. solution of  $\text{NaCN}$  be acidic, basic or neutral?**Q4.** Calculate the percentage of N in  $\text{NH}_3$ . (Atomic mass N = 14, H = 1 u)**Q5.** Calculate the oxidation number of C in  $\text{HCHO}$  and S in  $\text{S}_2\text{O}_4^{2-}$ .**Q6.** Name two types of smog. Which of the two is oxidizing in nature?**Q7.** Predict the group and period of the element in the periodic table satisfying the electronic configuration  $(n-1)d^1 n s^2$  for  $n = 4$ .**Q8.** Give an equation showing the oxidizing action of  $\text{H}_2$ .**Q9.** Describe the soil pollution caused by excessive use of pesticides and fertilizers.**Q10.** On the basis of VSEPR theory, predict the shapes of the following species:

- a)  $\text{PH}_3$       b)  $\text{SF}_4$

**Q11.** Why is  $\text{LiF}$  almost insoluble in water whereas  $\text{LiCl}$  is soluble in both water and acetone?**Q12.** Account for the following:

- Will Dalton's law hold good for a mixture of  $\text{CO}$  and  $\text{O}_2$ ? Why?
- Which out of  $\text{NH}_3$  and  $\text{N}_2$  will have a higher value of van der Waal's constant 'a' and why?

**Q13.** Balance the following equation by the half reaction method (acidic medium):



**Q14.** How many grams of chlorine (atomic mass = 35.5 g/mole) are required to completely react with 0.40 g of hydrogen (atomic mass = 1 g/mole) to yield hydrochloric acid? Also calculate the amount of HCl formed.

**Q15.** How many moles and how many grams of sodium chloride are present in 250 mL of a 0.50 M NaCl solution?

**Q16.**

- Why do carbon hydrides of the type  $\text{C}_n\text{H}_{2n+2}$  not act as Lewis acids or Lewis bases?
- Give a balanced equation showing the reaction between  $\text{KMnO}_4$  and acidified hydrogen peroxide.

**Q17.**

- Give conjugate acid and base of  $\text{HSO}_4^-$ .
- Write the nature of the following solution:  
(i)  $[\text{OH}^-] = 10^{-6}$    (ii)  $[\text{OH}^-] = 10^{-10}$

**OR**

**Q17.**

- Give the conjugate acid and base of  $\text{H}_2\text{O}$ .
- If  $K_w = 25 \times 10^{-12}$ , what will be the pH of neutral water?

**Q18.** At 273 K the density of a gaseous oxide at 2 bar is the same as that of nitrogen (atomic mass = 14 u) at 5 bar. Calculate the molar mass of the oxide.

**Q19.**

- Calculate the wavelength of an electron moving with a velocity of  $2.05 \times 10^7 \text{ m/s}$ . (mass of electron =  $9.1 \times 10^{-31} \text{ kg}$ ,  $h = 6.63 \times 10^{-34} \text{ Js}$ )
- How many nodes are present in the 3p orbital?
- What is the value of all the four quantum numbers of the valence electron in potassium? (Atomic number = 19)

**OR**

**Q19.**

- Two particles A and B are in motion. If the wavelength of A is  $5 \times 10^{-8} \text{ m}$ , calculate the wavelength of B if its momentum is half of A.
- How many electrons are possible in all shells with  $n + l = 5$ ?
- Write the electronic configuration of  $\text{Cu}^+$ . (atomic number of Cu = 29)

**Q20.**

- Arrange the following elements in increasing order of metallic character: Si, Be, Mg, Na, P.
- Out of Be and B which has higher first ionization energy and why?
- Give two species isoelectronic with  $\text{F}^-$ .

**Q21.**

- What is diagonal relationship? Give two points of similarity between Li and magnesium.
- What happens when sodium metal reacts with liquid ammonia?

**Q22.** Rajat and Rajesh are conducting an experiment in laboratory. They require to make  $100 \text{ cm}^3$  0.15 M  $\text{Na}_2\text{CO}_3$  solution. Now, both are confused as in how many grams of  $\text{Na}_2\text{CO}_3$  should be dissolved. Their classmate comes and says to dissolve 1.59 grams.

- Is the classmate right or wrong? Elaborate.
- What values do you get from this?

**Q23.**

- What do you infer about the structure of  $\text{CO}_2$  if its dipole moment is zero?
- Write the molecular orbital configuration of  $\text{N}_2^-$  and calculate its bond order.
- Draw the resonating structures of  $\text{NO}_3^-$  ion.

**Q24.**

- What will be the pH of 0.1M ammonium acetate solution?  $\text{pK}_a = 4.76$  and  $\text{pK}_b = 4.75$
- Calculate the concentration of hydroxyl ion in 0.1M solution of ammonium hydroxide having  $\text{K}_b = 1.8 \times 10^{-5}$

**Q25.**

- Write the designations for the orbital with the following quantum numbers:  
(i)  $n = 3, l = 1$     (ii)  $n = 5, l = 3$
- Why does 3d subshell have higher energy than 4s for a multielectron system?
- How many electrons in a fully filled f- subshell have  $m_l = 0$ ?

**Q26.**

- How would you distinguish between but-1-yne and but-1-ene?
- An alkene 'A' on ozonolysis gives a mixture of propanal and pentan-3-one. Write the structure and IUPAC name of 'A'.

**Q27.**

- Write the IUPAC name of:  
(i)  $\text{CH}_3\text{CH}(\text{CN})\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$     (ii)  $\text{CHOCHO}$
- Arrange in increasing order of stability:  
 $\text{CH}_3^-$ ,  $(\text{CH}_3)_3\text{C}^-$ ,  $(\text{CH}_3)_2\text{CH}^-$ ,  $\text{CH}_3\text{CH}_2^-$

**Q28.**

- For the reaction at 298K:  $2\text{A} + \text{B} \rightarrow \text{C}$ ,  
 $\Delta H = 400 \text{ kJ/mol}$  and  $\Delta S = 200 \text{ JK}^{-1}\text{mol}^{-1}$ . At what temperature will the reaction become spontaneous?

- b)  $\Delta U^0$  of combustion of methane is  $-X \text{ kJ/mol}$ . The value of  $\Delta H^0$  is  
(i)  $= \Delta U^0$     (ii)  $< \Delta U^0$     (iii)  $> \Delta U^0$     (iv)  $= 0$ .  
c) Predict the sign of  $\Delta S$  for the following processes:  
(i)  $\text{PCl}_5(\text{s}) \rightarrow \text{PCl}_5(\text{g})$   
(ii) Boiling of egg

**OR****Q28.**

- a) For the reaction:  $2\text{A}(\text{g}) + \text{B}(\text{g}) \rightarrow 2\text{D}(\text{g})$ ,  
 $\Delta U^0 = -10.5 \text{ kJ}$  and  $\Delta S^0 = -44.1 \text{ J K}^{-1}$ .  
Calculate  $\Delta G^0$  and predict whether the reaction may occur spontaneously.  
b) For a process to occur under adiabatic conditions, the correct condition is  
(i)  $\Delta T = 0$     (ii)  $\Delta P = 0$     (iii)  $q = 0$     (iv)  $w = 0$ .  
c) A reaction  $\text{A} + \text{B} \rightarrow \text{C} + \text{D} + q$  is found to have a positive entropy change. The reaction will be  
i. possible at high temperature  
ii. possible only at low temperature  
iii. not possible at any temperature  
iv. possible at all temperatures.  
Explain.

**Q29.**

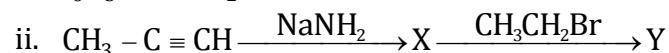
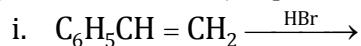
- a) Name the type of hybridization of carbon in carbon monooxide.  
(i) sp    (ii)  $\text{sp}^2$     (iii)  $\text{sp}^3$     (iv)  $\text{sp}^3\text{d}$   
b) How can you explain the higher stability of  $\text{BCl}_3$  as compared to  $\text{TlCl}_3$ ?  
c)  $[\text{SiF}_6]^{2-}$  is known but  $[\text{CF}_6]^{2-}$  is not known. Why?  
d) Write a short note on silicones and give two of their uses.

**OR****Q29.**

- a) The tendency to show catenation in group 14 decreases down the group. Explain.  
b) Lead (IV) chloride is highly unstable towards heat. Why?  
c) Which of the following statement about boric acid is false?  
(i) it exists as a polymer due to the presence of hydrogen bonds  
(ii) it is formed by the hydrolysis of boron halides  
(iii) it has a planar structure  
(iv) it acts as a tribasic acid.  
d) Anhyd.  $\text{AlCl}_3$  is covalent while hydrated is ionic. Why?

**Q30.**

- a) Convert 2-Bromopropane to 1- Bromopropane.  
b) Predict the major products of the following:



- c) A hydrocarbon 'A' adds one mole of hydrogen in the presence of platinum catalyst to form n-hexane. When 'A' is oxidized vigorously with  $\text{KMnO}_4$ , a single carboxylic acid containing three carbon atoms is isolated. Give the structure of 'A' and explain. Also give the equations involved.

**OR**

**Q30.**

- a) Convert ethane into butane.  
b) Give IUPAC name of product formed when benzene is made to react with ethanoyl chloride in the presence of anhy.  $\text{AlCl}_3$ .  
c) Draw the geometrical isomers of but-2-ene and predict which would have a higher boiling point and why?  
d) Arrange the following in decreasing order of reactivity towards electrophilic substitution reaction: Benzene, nitrobenzene, phenol.