

BLUE PRINT

CLASS:XI

SUB:CHEMISTRY

TIME:3:00HRS

MAX.M.70

Unit No.	Name of the Chapter	VSA(01 Mark)	SA1 (02Marks)	SA2 (03Marks)	VBA (04Mark)	LA`05 (Marks)	Total Questions	Total Marks
01.	Some Basic Concepts of Chemistry	---	01(02)	01(03)`	--	--	02	05
02.	Structure of Atom	01(01)	01(02)	01(03)	--	--	03	06
03.	Classification of Elements & Periodicity in Properties	01(01)	--	01(03)	--	--	02	04
04.	Chemical Bonding & Molecular Structure	--	01(02)	01(03)	--	--	02	05
05.	States of Matter	01(01)	--	01(03)	--	--	02	04
06.	Thermodynamics	01(01)	--	--	--	01(05)	02	06
07.	Equilibrium	--	--	02(06)	--	--	02	06
08.	Redon Reactions	--	--	01(03)	--	--	01	03
09.	Hydrogen	--	--	01(03)	--	--	01	03
10.	S-Block Elements	--	01(02)	01(03)	--	--	02	05
11.	Some P-Block Elements	--	--	--	--	01(05)	01	05
12.	Organic Chemistry Some Basic Principles and Techniques	01(01)	--	02(06)	--	--	03	07
13.	Hydro Carbons	--	01(02)	--	--	01(05)	02	07
14	Environmental Chemistry	--	--	--	01(04)	--	01	04
	Total	05(05)	05(10)	12(36)	01(04)	03(15)	26	70

General Instruction:

- 1.All questions are compulsory
- 2.Question numbers 1 to 5 are very short---answer questions, carrying 1 mark each.
- 3.Question numbers 6 to 10 are short---answer question, carrying 2 marks each.
4. Question numbers 11 to 22 are also short---answer questions, carrying 3 marks each.
- 5.Question number 23 is a value based question carrying 4 marks.
6. Question number 24 to 26 are long-answer questions of 5 marks each.
- 7.Use log tables if necessary. Use of calculator is not permitted.

Q1. Critical temperatures of CO₂ and CH₄ are 31.1°C & -- 81.9° C respectively .. Which of these has stronger inter molecular forces & why? (1)

Q2, Explain the reason for the fusion of an organic compound with metallic sodium for testing nitrogen, sulphur & Halogens ? (1)

Q3.What would be the IUPAC name & symbol for the element with atomic number 120? (1)

Q4.For the reaction, 2 Cl(g) → Cl₂(g) what are the signs of ΔH & ΔS? (1)

Q5 .State Hund's rule of maximum multiplicity? (1)

Q6.Explain the following observations:-

(a)The motilities of the following alkali metal ions in aqueous solution are---



(b) Be and Mg do not give colour to flame while other alkaline earth metals do so..

Q7 .Calculate the amount of carbon dioxide that could be produced when 1 mole of carbon is burnt in 16g of dioxygen . (2)

Q8.Discuss the shapes of the following molecules using VSEPR model :---



OR

Although the geometries of NH₃ and H₂O are distorted tetrahedral , bond angle in water is less than in ammonia . Explain with the help of suitable structures.

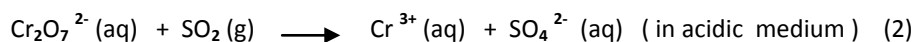
Q9.Out of benzene , m-dinitro benzene and toluene, which will undergo nitration most easily & why? (2)

Q10 .Write electronic configuration of :- (2)



Q11(a.) What is meant by disproportionation reaction? Give an example. (1)

(b) .Balance the following redox reaction by ion- electron method.



Q12. (i) Calculate the total numbers of electrons present in 1.4g of Nitrogen gas. (1+2)

(ii) Calculate the concentration of Nitric acid in moles per litre in a sample which has a density of 1.41 g / ml and its mass percentage being 69% .

Q13 .Hydrogen gas is obtained from natural gas by partial oxidation with steam according to the following endothermic reaction;



(a) Write an expression for Kp for the above reaction.

(b) How will the value of Kp be affected by:-

i)Increasing the pressure?

ii) Using a catalyst ?

OR

Q13(a).Calculate the solubility product of CaF_2 if its solubility is 2.18×10^{-4} moles per litre. (1)

b What is common ion effect? Describe its application in preparation of pure NaCl . (2)

Q14.i) Write bond line structural formula of 2,3-Dimethyl butanal

i)Give IUPAC names of:- (3)

(a) $HOOC - CH = CH - COOH$

(ib) $C_6H_5 - CH_2 - CH(OH) - CH_2 - CHO$

Q15 (i) What causes temporary and permanent hardness of water? (3)

(ii) How does H_2O_2 act as a bleaching agent?

(iii) What do you understand by the term **“Water gas Shift Reaction”**?

Q16 (a) Find the energy of photons which have wavelength of 0.50 \AA . (1)

(b) What is the wavelength of light emitted when the electron in a hydrogen

atom undergoes transition from an energy level with $n=4$ to an energy level with $n=2$? (2)

(Rydberg's constant = $109,677 \text{ cm}^{-1}$)

- Q17 .(i) State Boyle's law? (1)
- (ii) Calculate the total pressure in a mixture of 8 g of oxygen & 4 g of hydrogen (2)
confined in a vessel of 1 dm^3 at 27°C . ($R = 0.083 \text{ bar dm}^3 \text{ K}^{-1} \text{ mol}^{-1}$)
- Q18 .(a) Explain inductive effect . (1)
- (b) In Sulphur estimation, 0.157 g of an organic compound gave 0.4813 g of Barium Sulphate.
What is the percentage of sulphur in the compound? (2)
- Q19 (i) Arrange the following species:-
 N^{3-} , O^{2-} , F^- , Na^+ , Mg^{2+} & Al^{3+} in the order of increasing ionic radius.
- (ii) Assign the position of the element having the following outer electronic configuration (3)
 $ns^2 np^4$ for $n = 3$
- (iii) Which of the following pair of elements, F or Cl would have a more negative electron gain (3)
enthalpy & why?
- Q20 (a) What is the conjugate acid & conjugate base of H_2O ? (3)
- (b) Assuming complete dissociation, calculate pH of 0.005 M NaOH solution. ($\log 2 = 0.3010$)
- Q21 (a) Write the molecular orbital configuration of O_2 , O_2^+ , O_2^- & O_2^{2-} (3)
- (b) Arrange them in the increasing order of their stability.
- (c) Indicate magnetic property of each.
- Q22 (a) Why does Li show anomalous behaviour? (3)
- b) In what ways Li shows similarities with Magnesium in its chemical behaviour?
- Q23 Nilesh & his group are doing a great job of creating awareness in their locality about the need to check environmental pollution due to burning of fuels,
Global warming, acid rain, smog formation are the consequences., It is necessary (4)
for the young minds to become aware of the problem so that they become socially responsible citizens .
- (1) . CO_2 is more dangerous than Carbon monoxide gas. Why?
- (2) .Name any two green house gases?
- (3) .Mention two ways in which acid rain is harmful for us..
- (4). What values are shown by Nilesh & his group?

Q24 (a) State second law of Thermodynamics. (1)

b) **Give reasons:-**

Neither q nor w is a state function, but $q + w$ is a state function (1)

(c) **For the reaction:**, $2A(g) + B(g) \longrightarrow 2D(g)$

$$\Delta U^{\circ} = -10.5 \text{ kJ} \quad \text{and} \quad \Delta S^{\circ} = -44.10 \text{ J K}^{-1}$$

Calculate ΔG° for the reaction and predict whether the reaction would occur spontaneously or not ...

OR

(a) State Hess's Law of constant heat summation.

(b) Give reason -- The dissolution of ammonium chloride in water is endothermic still

it dissolves in water. (5)

(c) Ethylene (C_2H_4) on combustion gives CO_2 , H_2O & its enthalpy of combustion is

$-1410 \text{ kJ mol}^{-1}$. If enthalpy of formation of $CO_2(g)$ & $H_2O(l)$ are -393.3 kJ and

-286.2 kJ respectively, calculate enthalpy of formation ethylene .

Q25 (i) Write the structure of Diborane and explain the nature of bonding in it:-

(2) **Give reasons:-**

i) CO_2 is a gas while SiO_2 is a solid.

(ii) PbX_2 is more stable than PbX_4 .

(iii) B does not form B^{3+} ion

OR

Q25 (i) What happens when:-

Borax is heated strongly . Give the reactions involved. (2)

i) **Give reasons:-**

(i) Boric acid is not a protic acid. (3)

(ii) Graphite is a good conductor of electricity.

(iii) CCl_4 is resistant to hydrolysis but $SiCl_4$ is readily hydrolysed.

Q26. (a) Draw Newman projection formula for staggered & eclipsed conformation of ethane, (2)

Which of the two is more stable why?

(b) Write a reaction to illustrate Wurtz reaction. (1)

(c) Describe a chemical test to distinguish between ethane & ethene (1)

(d) Out of pentane & 2,2-Dimethyl propane, which has higher boiling point & why? (1)

OR

Q26.(a) With the help of orbital structure, explain the extraordinary stability of benzene even though it contains three double bonds. (2)

(b) Write a reaction to illustrate Friedel Crafts alkylation reaction. (1)

(c) Terminal alkanes are acidic in nature. Why? (1)

(d) Draw the geometrical isomers of But-2-ene and compare their polarity. (1)

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Marking Scheme

SUB:CHEMISTRY

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S.NO.	ANSWER	MARKS
Q1.	CO ₂ Higher T _c	½ ½
Q2.	Correct Statement	1
Q3..	Unbinilium , Ubn	1/2+1/2
Q4.	Δ H = Negative , Δ S = Negative	½ +1/2
Q5.	Correct Statement	1
Q6.	i)Small Size, More Hydrated ii)High Δ iH	½ +1/ 2 1
Q7.	C(S)+O ₂ (g) \rightleftharpoons CO ₂ (g) O ₂ ----limiting reagent 22g of CO ₂	½ ½ 1
Q8.	Correct Shape with explanation OR Each structure Lone pair - Lone pair repulsion	1+1 ½ x 2 =1 1
Q9,	Toluene --CH ₃ group , e- donating	1 1
Q10	Correct electronic configuration	1+1
Q11	i)Correct definition, example ii)Oxidation half reaction , Reduction half reaction Balanced reaction, Cr ₂ O ₇ ²⁻ (aq) + 3 SO ₂ (g) + 2H ⁺ (aq) \longrightarrow 2Cr ³⁺ (aq) + 3SO ₄ ²⁻ (aq) + H ₂ O (l)	½ +1/2 ½ + 1/2 1
Q12	i) 0.05mol x NA = 3.01x10 ²² molecules 3.01 x 10 ²² x 14 e- = 4.214x10 ²³ e- ii) Correct formula Putting the values and calculation 15.44 M	½ ½ ½ ½ 1
Q13	i)K _p = pCO x P ³ H ₂ / pCH ₄ x pH ₂ O (2)Equilibrium shift in backward direction (3)Equilibrium composition will not be disturbed,, equilibrium .will be attained quickly OR 1)Correct formula K _{sp} = (2.18 x 10 ⁻⁴) (2x2.18x10 ⁻⁴) ²	1 1 1 ½ ½

	$= 4.14 \times 10^{-11}$ ii) Correct definition Correct application	1 1

S.NO.	ANSWER	MARKS
Q14	1) Correct bond line formula (2) (a) But-2-ene-1,4-dioic acid (b) 4-phenyl-3-hydroxy butanal	1 1 1
Q15	i) Bicarbonate & Ca & Mg---temporary hardness Chlorides & Sulphates of Ca & Mg—Permanent Hardness ii) $\text{H}_2\text{O}_2 \longrightarrow \text{H}_2\text{O} + [\text{O}]$ (O)+ bleaches colouring matter iii) Correct reaction	$\frac{1}{2} + 1/2$ 1 1
Q16	1) $E = hc / \lambda$ $= \frac{6.626 \times 10^{-34} \times 3 \times 10^8}{0.50 \times 10^{-10}}$ $= 3.98 \times 10^{-15} \text{ J}$ 2) $1/\lambda = R (1/n_1^2 - 1/n_2^2)$ $= 109677 (1/2^2 - 1/4^2)$ $= 20564.4 \text{ cm}^{-1}$ $\lambda = 486 \text{ nm}$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ 1
Q.17	1) Correct statement 2) $P = nRT/V$ $n = 8/32 + 4/2 = 2.25 \text{ mol}$ $P = 2.25 \times 0.0831 \times 300 / 1 = 56.025 \text{ bar}$	1 1/2 $\frac{1}{2}$ 1
Q.18	1) Correct explanation 2) $\% S = 32/233 \times \text{mass of BaSO}_4 / \text{mass of organic compound} \times 100$ $= 32/233 \times 0.4813 / 0.157 \times 100$ & calculation $= 42.10\%$	1 $\frac{1}{2}$ $\frac{1}{2}$ 1
Q.19	1) $\text{N}^{3-}, \text{O}^{2-}, \text{F}^-, \text{Na}^+, \text{Mg}^{2+}, \text{Al}^{3+}$ 2) Period - 3, Group - 16 3) Cl, larger size	1 $\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$
Q.20	1) Conjugate acid - H_3O^+ , Conjugate base - OH^- 2) Concentration of $\text{H}^+ = 1 \times 10^{-14} / 5 \times 10^{-3} = 2 \times 10^{-12} \text{ M}$ $\text{pH} = -\log [\text{H}_3\text{O}^+]$ Calculation Correct answer = 11.70	$\frac{1}{2} + 1/2$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$

Q.21	1)Correct M.O configuration of each 2)Correct order of stability 3)Correct magnetic property of each	$\frac{1}{4} \times 4 = 1$ 1 $\frac{1}{4} \times 4 = 1$
Q.22	1)Four correct reasons 2)Any four similarities	$\frac{1}{4} \times 4 = 1$ $\frac{1}{2} \times 4 = 2$
Q.23	1)Green house gas , Global warming 2)Any two examples 3)Any two harmful effects 4) Concerned about environment , uses scientific knowledge ,understands social Responsibility etc	1 $\frac{1}{2} \times 2 = 1$ $\frac{1}{2} \times 2 = 1$ 1
Q.24	1)Correct statement 2)Correct reason 3) $\Delta n_g = 2 - 3 = -1$ $\Delta H^0 = \Delta U^0 + \Delta n_g RT$ Calculation & result = -- 12.98 kJ $\Delta G^0 = \Delta H^0 - T \Delta S^0$ Calculation & result = + 0.16 kJ , nonspontaneous OR a)Correct statement b)Entropy increases c)Desired equation - $2 C(s) + 2 H_2(g) \rightarrow C_2H_4(g)$ Correct use of three equations ΔH_f of $C_2H_4 = 51.0 \text{ kJ mol}^{-1}$	1 1 $1/2$ $1/2$ 1 1 1 1 1 $1/2$ $1/2$ 1
Q.25	1) Correct structure with explanation of 3c – 2e bond 2)Correct reason for each OR 1)Borax loses water molecules , forms a transparent liquid which solidifies into Borax Bead . Correct reaction 2) Correct reasoning for each	1 + 1 1 + 1 + 1 1 1 1 + 1 + 1
Q.26	1) Correct projection formulae Staggered conformation is more stable , correct reason 2) Correct reaction 3) Bromine water test or test with Baeyer's reagent 4) Pentane . greater surface area ,greater van der waals forces OR 1)Orbital structure of Benzene Delocalisation of pi electrons - explanation 2)Correct reaction 3) Correct reason 4)cis and trans isomers, cis is polar	1 1 1 1 1 1 1 1 1 1

