SURA'S

New

Sigaram Thoduvom

TARGET

HIGHER SECONDARY FIRST YEAR

CHEMISTRY

VOLUME - I & II

1 Mark

Questions & Answers

Salient Features :

- Prepared as per the New Syllabus for the year 2018.
- Complete 1 mark questions for all chapters. In-text, Reasoning Questions(HOTS), Board Expected Question & Answers for Public Exam.
- First Mid Term Test(FMT-2018), Govt.Model Paper (Govt.MQP - 2018) and Quarterly Examination(QY.2018) all in included.
- Useful for Public Exam 2019.

SURA PUBLICATIONS

Chennai

2018-19 *Edition*

ISBN : 978-93-81650-52-3

Code No : SG 174

Head Office:

1620, 'J' Block, 16th Main Road, Anna Nagar, **Chennai - 600 040.**
Phones: 044-26162173, 26161099.

Mobile : 96001 75757 / 81242 01000 / 81243 01000

Whatsapp : 81242 01000

e-mail : orders@surabooks.com
website : www.surabooks.com

Our Guides for +1 Standard

- Sura's Tamil
- Sura's English
- Sura's Will to Win English
- Sura's English Workbook
- Sura's Mathematics (EM/TM)
- Sura's Physics (EM/TM)
- Sura's Chemistry (EM/TM)
- Sura's Biology (EM/TM)
- Sura's Computer Science (EM/TM)
- Sura's Commerce (EM/TM)
- Sura's Economics (EM/TM)
- Sura's Accountancy (EM/TM)
- Sura's Business Maths (EM/TM)

Also available Sigaram Thoduvom mini guide (EM/TM) for all Subjects.

TO ORDER WITH US

SCHOOLS and TEACHERS:

We are grateful for your support and patronage to 'SURA PUBLICATIONS'

Kindly prepare your order in your School letterhead and send it to us.

For Orders contact: 81242 01000 / 81243 01000

DIRECT DEPOSIT

A/c Name	: **Sura Publications**
Our A/c No.	: **36550290536**
Bank Name	: **STATE BANK OF INDIA**
Bank Branch	: Padi
IFSC	: SBIN0005083

A/c Name	: **Sura Publications**
Our A/c No.	: **21000210001240**
Bank Name	: **UCO BANK**
Bank Branch	: Anna Nagar West
IFSC	: UCBA0002100

A/c Name	:	**Sura Publications**
Our A/c No.	:	**6502699356**
Bank Name	:	**INDIAN BANK**
Bank Branch	:	Asiad Colony
IFSC	:	IDIB000A098

After Deposit, please send challan and order to our address.

email : orders@surabooks.com / Whatsapp : 81242 01000.

DEMAND DRAFT / CHEQUE

Please send Demand Draft / cheque in favour of '**SURA PUBLICATIONS**' payable at **Chennai**.

The Demand Draft / cheque should be sent with your order in School letterhead.

STUDENTS :

Order via Money Order (M/O) to

SURA PUBLICATIONS

1620, 'J' Block, 16th Main Road, Anna Nagar,

Chennai - 600 040.

Phones : 044-26161088, 26161099.

Mobile : 96001 75757/ 81242 01000/81243 01000.

email : orders@surabooks.com Website : www.surabooks.com

CONTENTS

VOLUME I

VOLUME II

CHEMISTRY

1 Mark Questions & Answers

VOLUME I

CHAPTER 1

BASIC CONCEPTS OF CHEMISTRY AND CHEMICAL CALCULATIONS

EVALUATION

CHOOSE THE BEST ANSWER :

1. 40ml of methane is completely burnt using 80ml of Oxygen at room temperature. The Volume of gas is left after cooling at room temperature is

(a) 40 ml CO_2 gas

(b) 40 ml CO_2 gas and 80 ml H_2O gas

(c) 60 ml CO_2 gas and 60 ml H_2O gas

(d) 120 ml CO_2 gas **[Ans. (a)** 40 ml CO_2 gas**]**

2. An element X has the following isotopic composition $^{200}X = 90\%$, $^{199}X = 8\%$ and $^{202}X = 2\%$. The weighted average atomic mass of the element X is closest to

(a) 201 u (b) 202 u (c) 199 u (d) 200 u

[Ans. (d) 200 u**]**

3. Assertion : Two mole of glucose contains 12.044×10^{23} molecules of glucose

Reason : Total number of entities present in one mole of any substance is equal to 6.02×10^{22}

(a) both assertion and reason are true and the reason is the correct explanation of assertion

(b) both assertion and reason are true but reason is not the correct explanation of assertion

(c) assertion is true but reason is false

(d) both assertion and reason are false

[Ans. (c) assertion is true but reason is false**]**

28. One mole of a triatomic gas contains ..... atoms.

(a) 18.06×10^{23} (b) 1.806×10^{23}

(c) 18.06×10^{-23} (d) 0.1806×10^{-23}

[Ans. (a) 18.06×10^{23}**]**

29. Consider the following statements :

(i) Oxidation number of He = zero

(ii) Increase in oxidation number results in reduction.

(iii) The substance undergoing increase in oxidation number is reducing agent.

Which among the above statement(s) is/are correct?

(a) only (i) (b) (ii) and (iii)

(c) (i) and (iii) (d) only (ii) **[Ans. (c)** (i) and (iii)**]**

Board Expected Question & Answers

1. Consider the following statements

i) Matter possesses mass.

ii) 22 carat gold is a mixture.

iii) Dry ice is a compound.

Which of the following statement(s) given above is/ are correct?

(a) 1 & 3 (b) only 1

(c) 1 & 2 (d) 1, 2 & 3 **[Ans. (d)** 1, 2 & 3**]**

2. Match the list I with List II and select the correct answer using. the code given below the lists.

	List I		List II
A	Diamond	**1**	Heterogeneous mixture
B	Aerated drinks	**2**	Element
C	Distilled water	**3**	Homogeneous mixture
D	Sand	**4**	Compound

	A	B	C	D
(a)	2	3	4	1
(b)	4	3	1	2
(c)	3	1	4	2
(d)	2	1	4	3

[Ans. (a) 2 3 4 1**]**

30. Consider the following statements :

(i) Oxidation number of He = zero

(ii) Increase in oxidation number results in reduction.

(iii) The substance undergoing increase in oxidation number is reducing agent.

Which among the above statement(s) is/are correct?

(a) only (i) (b) (ii) and (iii)

(c) (i) and (iii) (d) only (ii)

[Ans. (c) (i) and (iii)**]**

REASONING QUESTION & ANSWERS (HOTS)

1. Calculate the percentage of N in ammonia molecule.

(a) 121.42% (b) 28.35%

(c) 82.35% (d) 28.53%

Sol : Molar mass of NH_3 = $14 + 1 \times 3 = 17$ g mol^{-1}

$$\text{Percentage of N} = \frac{\text{mass of N in } NH_3}{\text{molar mass of } NH_3} \times 100$$

$$= \frac{14}{17} \times 100 = 82.35\%.$$ **[Ans. (c)** 82.35%**]**

2. If a beaker holds 576g of water, what will be the gram molecules of water in that beaker?

(a) 23 gram molecule (b) 23%

(c) 32% (d) 32 gram molecule

Sol : Molecular mass of H_2O = $2 \times 1 + 16$

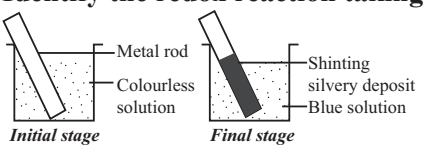
= 18 g mol^{-1}

18 g of water = 1 gram molecule

$$\therefore 576 \text{ g of water} = \frac{1 \times 576}{18} = 32 \text{ gram molecules.}$$

[Ans. (d) 32 gram molecule**]**

3. Identify the redox reaction taking place in a beaker.



7. In the reaction, $4NH_{3(g)} + 50x_{(g)} \rightarrow 4NO_{(g)} + 6H_2O_{(l)}$ when 1 mol of ammonia and 1 mol of O2 are made to react to completion. Then

(a) 1.0 mol of H_2O will be produced

(b) 1.0 mol of No will be produced

(c) all the NH_3 will be consumed

(d) all the oxygen will be consumed

Reason : According to stoichiometry, They should react as follows:

$4NH_{3(g)} + 50x_{(g)} \rightarrow 4NO_{(g)} + 6H_2O_{(l)}$

4 mol 5 mol 4 mol 6 mol

0.8 mol 1 mol 0.8 mol 1.2 mol

In this reaction, 1 mole of O_2 and 0.8 mole of NH_3 are consumed thereby indicating complete consumption of O_2.

[Ans. (d) all the oxygen will be consumed**]**

CHAPTER 2

QUANTUM MECHANICAL MODEL OF ATOM

EVALUATION

CHOOSE THE BEST ANSWER :

1. Electronic configuration of species M^{2+} is $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^6$ and its atomic weight is 56. The number of neutrons in the nucleus of species M is

(a) 26 (b) 22 (c) 30 (d) 24 **[Ans. (c)** 30**]**

2. The energy of light of wavelength 45 nm is

(a) 6.67×10^{15}J (b) 6.67×10^{11}J

(c) 4.42×10^{-18}J (d) 4.42×10^{-15}J

[Ans. (c)4.42×10^{-18}J**]**

In-text Question & Answers

1. In which of the following pairs, the ions are iso-electronic?

(i) Na^+, Mg^{2+} **(ii)** Al^{3+}, O^-

(iii) Na^+, O^{2-} **(iv)** N^{3-}, Cl^-

(a) Only (i) (b) Both (i) & (iii)

(c) Both (iii) & (iv) (d) Only (ii)

[Ans. (b) Both (i) & (iii)**]**

2. The wavelength associated with an electron moving with velocity 10^{10} ms^{-1} is

(a) $6.62 \times 10^{-10}\ m$ (b) $7.28 \times 10^{-14}\ m$

(c) $3.69 \times 10^{-12}\ m$ (d) $4.92 \times 10^{-11}\ m$

Sol : $\lambda = \frac{h}{mv} = \frac{6.626 \times 10^{-34}}{9.1 \times 10^{-31} \times 10^{10}} = 7.28 \times 10^{-14}\ m$

[Ans. (b) $7.28 \times 10^{-14}\ m$**]**

3. Match the list I with List II and select the correct answer using. the code given below the lists.

List I		List II	
A	The energies of electrons are quantized	**1**	Thomson's atomic model
B	Atom is a positively charged sphere in which the electrons are embedded	**2**	Bohr atom model
C	Planetary model	**3**	De Broglie
D	Dual nature of the microscopic particles	**4**	Rutherford

	A	B	C	D
(a)	1	3	2	4
(b)	4	3	1	2
(c)	3	1	4	2
(d)	2	1	4	3

[Ans. (d) 2 1 4 3**]**

32. Eg is the name given to ..... set of orbitals.

(a) dxy, dyz,dzx (b) dx^2-y^2, dz^2

(c) dxy,dyz,dz^2 (d) dx^2-y^2, dxy

[Ans. (b) dx^2-y^2, dz^2**]**

33. Each p-orbital has ..... lobes.

(a) 2 (b) 4 (c) 6 (d) 8 **[Ans. (a)]**

34. In absence of magnetic field, five d-orbitals are equivalent in energy and are called..... degenerate.

(a) doubly (b) triply

(c) four fold (d) five fold **[Ans. (d)** doubly**]**

Board Expected Question & Answers

1. Consider the following statements

1. $\lambda = h/mv$ is valid only when the particle travels at speed much less than the speed of light.

2. Einstein's mass-energy relationship is $E = mc^2$

3. The angular momentum (mvr) of the electron must be equal to an integral multiple of $h/4\pi$.

Which of the following statement(s) given above is/ are correct?

(a) 1 & 3 (b) only 1 (c) 1 & 2 (d) 1, 2 & 3

[Ans. (c) 1 & 2**]**

2. The electrons identified by quantum numbers n and l (i) n = 4, l = 1 (ii) n = 4, l = 0 (iii) n = 3, l = 2 (iv) n = 3, l = 1 can be placed in the order of increasing energy as **(QY. 2018)**

(a) (iv) < (ii) < (iii) < (i)

(b) (ii) < (iv) < (i) < (iii)

(c) (i) < (iii) < (ii) < (iv)

(d) (iii) < (i) < (iv) < (ii) **[Ans. (a)** (iv) < (ii) < (iii) < (i)**]**

3. Using s, p, d, f notations, describe the orbital with the following quantum numbers n = 2, l = 1.

(a) 2s (b) 1s (c) 2p (d) 1p **[Ans. (c)** 2p**]**

33. The splitting of spectral lines by external magnetic field represent..... effect.

(a) Zeeman (b) Stark

(c) Raman (d) None **[Ans. (a)** Zeeman**]**

34. The possible values for spin quantum number is_____

(a) 0 (b) +1/2

(c) –1/2 (d) both b & c

[Ans. (d) both b & c**]**

35. The electronic configuration of copper is _____

(a) $[Ar]4s^2\ 3d^9$ (b) $[Ar]4s^1\ 3d^{10}$

(c) $[Ar]4s^0\ 3d^{10}$ (d) All

[Ans. (b) $[Ar]4s^1\ 3d^{10}$**]**

36. In multi-electron atom, 4*s*-orbital is lower in energy than

(a) 3*d*-orbital (b) 3*p*-orbital

(c) 2*s*-orbital (d) 2*p*-orbital **[Ans. (a)** 3*d*-orbital**]**

Reasoning Question & Answers (Hots)

1. Name the element whose isotope has mass number 14 and 8 neutrons.

(a) Carbon (b) Nitrogen

(c) Oxygen (d) Fluorine

Sol : Atomic number = Mass no – No. of neutrons

= 14 – 8 = 6

So, the element is **carbon**. **[Ans. (a)** Carbon**]**

2. The de-Broglie wavelength of a particle with mass 1g and velocity 100m/s is

(a) 6.63×10^{-35} m (b) 6.63×10^{-34} m

(c) 6.63×10^{-33} m (d) 6.65×10^{-35} m

Sol : $\lambda = \frac{h}{mv} = \frac{6.63\times10^{-34}}{1\times10^{-3}\times100} = 6.63\times10^{-33}\,m$

[Ans. (c) 6.63×10^{-33} m**]**

7. Which is the correct order of increasing energy of the listed orbitals in the atom of titanium? (At. no. Z = 22)

(a) 4s 3s 3p 3d (b) 3s 3p 3d 4s

(c) 3s 3p 4s 3d (d) 3s 4s 3p 3d

Reason: Ti(22) : 1s2 2s2 2p6 3s2 3p6 3d2 4s 2

∴ Order of increasing energy is 3s, 3p, 4s, 3d.

[Ans. (c) 3s 3p 4s 3d**]**

8. If the principal quantum number n = 6, the correct sequence of filling of electrons will be

(a) ns → np → (n – 1)d → (n – 2)f

(b) ns → (n – 2)f → (n – 1)d → np

(c) ns → (n – 1)d → (n – 2)f → np

(d) ns → (n – 2)f → np → (n – 1)d

[Ans. (b) ns → (n – 2)f → (n – 1)d → np**]**

9. Consider the following electronic configuration of an element. **(FMT – 2018)**

$1s^2$	$2s^2$	$2p^2$
↿⇂	↿⇂	↿ ⇂

It deviates from

(a) Aufbau Principle (b) Hund's Principle

(c) Paulis Exclusion Principle

(d) Both Aufbau and Hund's rule.

[Ans. (d) Both Aufbau and Hund's rule.**]**

☆☆☆

CHAPTER 3

PERIODIC CLASSIFICATION OF ELEMENTS

EVALUATION

CHOOSE THE BEST ANSWER :

1. What would be the IUPAC name for an element with atomic number 222?

(a) bibibiium (b) bididium

(c) didibium (d) bibibium **[Ans. (d)** bibibium**]**

IN-TEXT QUESTION & ANSWERS

1. Which of the following is Dobereiner's triad?

(a) Ne,Ca,Na (b) H_2,N_2,O_2

(c) Li, Na, K (d) Na, Br,K **[Ans. (c)** Li, Na, K**]**

2. An element M combines with Cl. What would be the formula of the compound obtained if M has a valence of 2?

(a) MCl (b) MCl_2 (c) M_2Cl (d) M_2Cl_2

[Ans. (b) MCl_2**]**

3. _____ proposed modern periodic law

(a) Henry Moseley (b) Mendeleev

(c) Newland (d) Doberenier

[Ans. (a) Henry Moseley**]**

4. The atomic mass of Au is _____

(a) 195 (b) 197 (c) 198 (d) 196

[Ans. (b) 197**]**

5. The horizontal rows in the periodic table are called as _____

(a) group (b) family

(c) period (d) column **[Ans. (c)** period**]**

6. The number of groups in the periodic table

(a) 7 (b) 18 (c) 5 (d) 6 **[Ans. (b)** 18**]**

7. The element with atomic number 57 belongs to _____

(a) s-block (b) p-block

(c) d-block (d) f-block **[Ans. (c)** d-block**]**

8. The electronic configuration of nitrogen is _____

(a) $1s^2\ 2s^2\ 2p^3$ (b) $1s^2\ 2s^2\ 2p_x^1\ 2p_y^1\ 2p_z^1$

(c) $1s^2\ 2s^1\ 2p^4$ (d) both (a) and (b)

[Ans. (d) both (a) and (b)**]**

9. The element with Z = 24 is placed in the _____ period

(a) 5 (b) 2 (c) 3 (d) 4 **[Ans. (d)** 4**]**

10. _____ is the lightest metal known.

(a) Na (b) Li (c) Mg (d) Al **[Ans. (b)** Li**]**

45. The general electronic configuration of d-block element is

(a) $ns^2 np^6$ (b) $(n-1)\, d^{1-10}\, ns^{0-2}$

(c) $(n-1)\, d^{1}\, ns^{0-2}$ (d) $(n-1)\, d^{0-10}\, ns^{2}$

[Ans. (b) $(n-1)\, d^{1-10}\, ns^{0-2}$**]**

46. d-block elements form _____ compounds

(a) ionic (b) covalent

(c) metallic (d) both (a) and (b)

[Ans. (d) both (a) and (b)**]**

47. The vertical columns in the periodic table are called as

(a) family (b) group

(c) period (d) both (a) and (c)

[Ans. (b) group**]**

48. There are _____ periods in the periodic table

(a) 18 (b) 7 (c) 6 (d) 5 **[Ans. (b)** 7**]**

49. Lithium shows diagonal relationship with _____

(a) Mg (b) Al (c) Na (d) Si

[Ans. (a) Mg**]**

Board Expected Question & Answers

1. Which of the following statement (s) about the Modern Periodic Table is are incorrect

i. The elements in the Modern Periodic Table are arranged on the basis of their decreasing atomic number

ii. The elements in the Modern Periodic Table are arranged on the basis of their increasing atomic masses

iii. Isotopes are placed in adjoining group (s) in the Periodic Table

iv. The elements in the Modern Periodic Table are arranged on the basis of their increasing atomic number

(a) (i) only (b) (i), (ii) and (iii)

(c) (i), (ii) and (iv) (d) (iv) only

[Ans. (b) (i), (ii) and (iii)**]**

29. Which set of elements shows positive electron gain enthalpy?

(a) He, N, O (b) Ne, N, Cl

(c) O, Cl, F (d) N, He, Ne **[Ans. (d)** N, He, Ne**]**

30. Which of the following has the highest positive electron gain enthalpy?

(a) F (b) O^- (c) Na^+ (d) Mg^{2+} **[Ans. (b)** O^-**]**

31. Match the list I with List II and select the correct answer using. the code given below the lists.

List I		List II	
A	Element with first highest ionization enthalpy	**1**	Fluorine
B	Element with second highest ionization enthalpy	**2**	Chlorine
C	Element with highest electron gain enthalpy	**3**	Sodium
D	Element with highest electronegativity	**4**	Neon

	A	B	C	D
(a)	1	3	2	4
(b)	4	3	2	1
(c)	3	1	4	2
(d)	2	1	4	3

[Ans. (b) 4 3 2 1]

Reasoning Question & Answers (Hots)

1. The following species are isoelectronic with noble gas neon. Arrange them in the order of increasing size: Na^+, F^-, O^{2-}, Mg^{2+}, Al^{3+}

(a) $Al^{3+} < Mg^{2+} < Na^+ < F^- < O^{2-}$

(b) $Al^{3+} > Mg^{2+} > Na^+ > F^- > O^{2-}$

(c) $Al^{3+} < Mg^{2+} < Na^+ > F^- > O^{2-}$

(d) $Al^{3+} = Mg^{2+} > Na^+ < F^- < O^{2-}$

CHAPTER 4

HYDROGEN

EVALUATION

CHOOSE THE BEST ANSWER :

1. Which of the following statements about hydrogen is incorrect ?

(a) Hydrogen ion, H_3O^+ exists freely in solution.
(b) Dihydrogen acts as a reducing agent.
(c) Hydrogen has three isotopes of which tritium is the most common.
(d) Hydrogen never acts as cation in ionic salts.

[Ans. (c) Hydrogen has three isotopes of which tritium is the most common.**]**

2. Water gas is **(QY. 2018)**

(a) $H_2O_{(g)}$ (b) $CO + H_2O$
(c) $CO + H_2$ (d) $CO + N_2$ **[Ans. (c)** $CO + H_2$**]**

3. Which one of the following statements is incorrect with regard to ortho and para dihydrogen ?

(a) They are nuclear spin isomers
(b) Ortho isomer has zero nuclear spin whereas the para isomer has one nuclear spin
(c) The para isomer is favoured at low temperatures
(d) The thermal conductivity of the para isomer is 50% greater than that of the ortho isomer.

[Ans. (b) Ortho isomer has zero nuclear spin whereas the para isomer has one nuclear spin**]**

4. Ionic hydrides are formed by **(Govt.MQP-2018)**

(a) halogens (b) chalogens
(c) inert gases (d) group one elements

[Ans. (d) group one elements**]**

5. Tritium nucleus contains

(a) 1p + 0 n (b) 2 p + 1n
(c) 1p + 2n (d) none of these

[Ans. (c)1p + 2n**]**

29. Presence of which cation makes the water hard in nature?

(a) Ca & Mg (b) Na & Mg

(c) Ca & Na (d) Mg & F **[Ans. (a)** Ca & Mg**]**

30. Hydrogen peroxide was discovered by _____

(a) Chadwick (b) J.J Thomson

(c) Urey (d) J.L. Thenard

[Ans. (d) J.L. Thenard**]**

Board Expected Question & Answers

1. The radioactive isotope of hydrogen is _____

(a) protium (b) deuterium

(c) tritium (d) nascent hydrogen

[Ans. (c) tritium**]**

2. The radioactive isotope used in illumination of wrist watches instead of Radium is _____

(a) $_1T^3$ (b) $_1D^2$ (c) $_{10}Ne^{21}$ (d) $_2He^3$ **[Ans. (a)** $_1T^3$**]**

3. Ammonia is manufactured by _____ process.

(a) Contact (b) Bergius

(c) Haber's (d) none of the above

[Ans. (c) Haber's**]**

4. Match the list I with list II and select the correct answer using the code given below

	List I		List II
A	Protium	**1**	Radio active
B	Tritum	**2**	Aligned nuclear spins
C	Ortho hydrogen	**3**	Opposed nuclear spins
D	Para hydrogen	**4**	No neutron

	A	**B**	**C**	**D**
(a)	1	3	2	4
(b)	4	1	2	3
(c)	3	1	4	2
(d)	2	1	4	3

[Ans. (b) 4 1 2 3**]**

29. Intramolecular H-bonding is present in _____

(a) o-nitrophenol (b) salicylic acid

(c) salicylaldlehyde (d) all of these **[Ans. (d)** all of these**]**

REASONING QUESTION & ANSWERS (HOTS)

1. Assertion : H_2O_2 has higher boiling point than water.

Reason : It has stronger dipole-dipole interactions than that shown by water.

(a) Both assertion and reason are true and reason is the correct explanation of assertion.

(b) Both assertion and reason are true but reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Both assertion and reason are false.

Reason: Hydrogen bonding is a special case of dipoledipole interaction and hydrogen peroxide is more hydrogen bonded than water.

[Ans. (a) Both assertion and reason are true and reason is the correct explanation of assertion.**]**

2. Assertion : Demineralised water does not contain any ions.

Reason : Permutit process for water softening gives demineralised water.

(a) Both assertion and reason are true and reason is the correct explanation of assertion.

(b) Both assertion and reason are true but reason is not the correct explanation of assertion.

(c) Assertion is true but reason is false.

(d) Both assertion and reason are false.

Reason: Water softened by Permutit process is not demineralised water since it still contains sodium salts.

[Ans. (c) Assertion is true but reason is false.**]**

3. Two moles of MnO_4^- reduce *x* mole(s) of H_2O_2 in basic medium. The value of *x* is

(a) 2 (b) 3 (c) 4 (d) 0

Hint: $2MnO_4^- + 3H_2O_2 \rightarrow 2MnO_2 + 3O_2 + 2H_2O + 2OH^-$ **[Ans. (b)** 3**]**

CHAPTER 5

ALKALI AND ALKALINE EARTH METALS

EVALUATION

CHOOSE THE BEST ANSWER :

1. For alkali metals, which one of the following trends is incorrect ?

(a) Hydration energy : Li > Na > K > Rb

(b) Ionisation energy : Li > Na > K > Rb

(c) Density : Li < Na < K < Rb

(d) Atomic size : Li < Na < K < Rb

[Ans. (c) Density : Li < Na < K < Rb**]**

2. Which of the following statements is incorrect ?

(a) Li^+ has minimum degree of hydration among alkali metal cations.

(b) The oxidation state of K in KO_2 is +1

(c) Sodium is used to make Na / Pb alloy

(d) $MgSO_4$ is readily soluble in water

[Ans. (a) Li^+ has minimum degree of hydration among alkali metal cations.**]**

3. Which of the following compounds will not evolve H_2 gas on reaction with alkali metals ?

(a) ethanoic acid (b) ethanol

(c) phenol (d) none of these

[Ans. (d) none of these**]**

4. Which of the following has the highest tendency to give the reaction

$$M^+_{(g)} \xrightarrow[\text{Medium}]{\text{Aqueous}} M^+_{(aq)}$$

(a) Na (b) Li (c) Rb (d) K

[Ans. (b) Li**]**

33. Which of the following is used in photoelectric cells?

(a) Na (b) K (c) Li (d) Cs **[Ans. (d)** Cs**]**

34. Which among the following is the strongest reducing agent?

(a) Na (b) K (c) Ac (d) Mg **[Ans. (b)** K**]**

35. _____ occurs in large amounts in sea water.

(a) NaCl

(b) KCl

(c) both a and b

(d) neither a nor b **[Ans. (c)**both a and b**]**

36. Which of the following oxides is the most basic in nature?

(a) Na_2O (b) BeO (c) Li_2O (d) H_2O

[Ans. (a) Na_2O**]**

37. Identify the most stable hydride among the following.

(a) NaH (b) LiH (c) KH (d) CsH

[Ans. (b) LiH**]**

38. Which hydroxide decomposes on heating?

(a) NaOH (b) RbOH (c) KOH (d) LiOH

[Ans. (d) LiOH**]**

39. The radioactive element of group 2 element is _____

(a) Strontium (b) Radium

(c) Beryllium (d) Francium **[Ans. (b)** Radium**]**

40. Alkaline earth metals exhibit ---------- oxidation state in their compounds.

(a) +1 (b) +2 (c) +4 (d) +6 **[Ans. (b)** +2**]**

Board Expected Question & Answers

1. The most electro positive element of the periodic table is

(a) Gold (b) Platinum

(c) Cesium (d) Calcium **[Ans. (c)** Cesium**]**

2. Alkali elements exhibit an oxidation state of _____

(a) +1 (b) +2 (c) +3 (d) +4 **[Ans. (a)** +1**]**

Reasoning Question & Answers (Hots)

1. Calculate heat of solution of sodium chloride from following data.

Hydration energy of Na^+ = – 389.4 kJ/mol
Hydration energy of Cl^- = – 382.3 kJ/mol
Lattice energy of NaCl = – 776 kJ/mol

(a) – 4.3 kJ/mol (b) – 4.5 kJ/mol
(c) 4.3 kJ/mol (d) – 4.6 kJ/mol

Reason: Hydration energy of NaCl = −389.4 − 382.3 − 771.7kJ
ΔH solution = Hydration energy − Lattice energy
= − 771.7 − (−776) = 4.3kJ/mol. **[Ans. (c)** 4.3 kJ/mol**]**

2. Which one of the following is true?

(a) Lithium on direct combination with nitrogen from Li3N.
(b) Magnesium on direct combination with nitrogen from Mg3N.
(c) Both (a) and (b)
(d) Lithium and magnesium form bicarbonates.

[Ans. (c) Both (a) and (b)**]**

3. Select the correct order of solubility in water.

(a) $CaCO_3 > KHCO_3 > NaHCO_3$
(b) $KHCO_3 > NaHCO_3 > CaCO_3$
(c) $NaHCO_3 > KHCO_3 > CaCO_3$
(d) $CaCO_3 > NaHCO_3 > KHCO_3$

Reason: $CaCO_3$ is insoluble in water. Solubility of bicarbonates of group 1 increases down the group.

[Ans. (b) $KHCO_3 > NaHCO_3 > CaCO_3$**]**

4. The set representing the correct order of ionic radii is

(a) $Na^+ > Li^+ > Mg^{2+} > Be^{2+}$
(b) $Li^+ > Na^+ > Mg^{2+} > Be^{2+}$
(c) $Mg^{2+} > Be^{2+} > Li^+ > Na^+$
(d) $Li^+ > Be^{2+} > Na^+ > Mg^{2+}$

CHAPTER 6

GASEOUS STATE

EVALUATION

CHOOSE THE BEST ANSWER :

1. Gases deviate from ideal behaviour at high pressure. Which of the following statement(s) is correct for non-ideality?

(a) at high pressure the collision between the gas molecule become enormous

(b) at high pressure the gas molecules move only in one direction

(c) at high pressure, the volume of gas become insignificant

(d) at high pressure the intermolecular interactions become significant

[Ans. (d) at high pressure the intermolecular interactions become significant**]**

2. Rate of diffusion of a gas is

(a) directly proportional to its density

(b) directly proportional to its molecular weight

(c) directly proportional to its square root of its molecular weight

(d) inversely proportional to the square root of its molecular weight

[Ans. (d) inversely proportional to the square root of its molecular weight**]**

3. Which of the following is the correct expression for the equation of vander Waals gas?

(a) $\left(P + \frac{a}{n^2V^2}\right)(V - nb) = nRT$

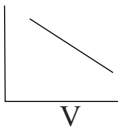
(b) $\left(P + \frac{na}{n^2V^2}\right)(V - nb) = nRT$

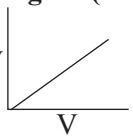
23. What is the density of N_2 gas at 227°C and 5.00 atm pressure? (R = 0.082 L atm K^{-1} mol^{-1})

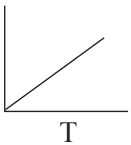
(a) 1.40 g/L (b) 2.81 g/L

(c) 3.41 g/L (d) 0.29 g/L **[Ans. (c)** 3.41 g/L**]**

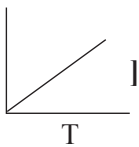
24. Which of the following diagrams correctly describes the behaviour of a fixed mass of an ideal gas ? (T is measured in K)

(a) 

(b) 

(c) 

(d) All of these

[Ans. (c) 

]

25. 25g of each of the following gases are taken at 27°C and 600 mm Hg pressure. Which of these will have the least volume ?

(a) HBr (b) HCl (c) HF (d) HI **[Ans. (d)** HI**]**

In-text Question & Answers

1. Temperature at which gas behave ideally over a wide range of pressure is called as

(a) Inversion temperature (b) Boyle's temperature

(c) Critical temperature (d) None of these

[Ans. (b) Boyle's temperature**]**

2. Equal weights of methane and oxygen are mixed in an empty container at 298 K. the fraction of total pressure exerted by oxygen is

(a) 1/3 (b) 1/2

(c) 2/3 (d) 1/3 × 273 × 298 **[Ans. (a)** 1/3**]**

(c) Statement I is true but statement II is false.

(d) Both the statements are false.

[Ans. (d) Both the statements are false.**]**

24. Match the list I with list II and select the correct answer using the code given below.

List-I		List-II	
A	Permanent Gas	**1**	2a/Rb
B	Temporary Gas	**2**	N_2
C	T_i	**3**	low T_c
D	Joule Thomson Effect	**4**	NH_3

	A	B	C	D
(a)	2	3	4	1
(b)	4	1	2	3
(c)	1	2	3	4
(d)	3	4	1	2

[Ans. (d) 3 4 1 2**]**

25. The corrected term for pressure in the vanderwaal's equation of state is _____.

(a) (V – b) (b) $P + \frac{a}{V^2}$

(c) (b – V) (d) $\frac{a}{V^2} \times P$ **[Ans. (b)** $P + \frac{a}{V^2}$**]**

Board Expected Question & Answers

1. Value of gas constant R is

(a) $0.082 dm^3 atm.$

(b) 0.987 cal mol^{-1} K^{-1}

(c) 8.3 J $mol^{-1}K^{-1}$

(d) 8 er $mol^{-1}K^{-1}$ **[Ans. (c)** 8.3 J $mol^{-1}K^{-1}$**]**

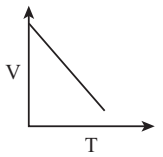
2. Pressure is _____.

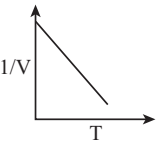
(a) Force/ area (b) force x Area

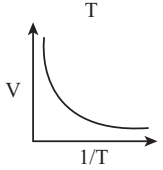
(c) Area/ force (d) Force / area × volume

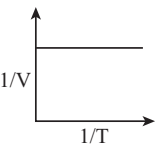
[Ans. (a) Force/ area**]**

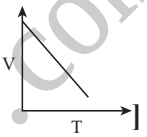
7. Which curve shows Charle's law?

(a) 

(b) 

(c) 

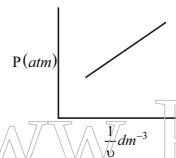
(d) 

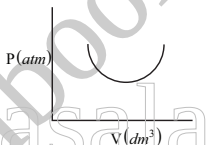
[Ans. (a) 

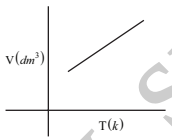
]

8. Which of the following correctly represents Boyle's Law?

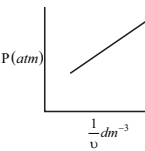
(Govt.MQP-2018)

(a) 

(b) 

(c) 

(d) All of these

[Ans. (a) 

]

9. The law that relates the pressure and volume of gases is

(a) Boyle's (b) Charles

(c) Dalton (d) none of the above

[Ans. (a) Boyle's**]**

10. The partial pressure of dry gas is

(a) greater than that of wet gas

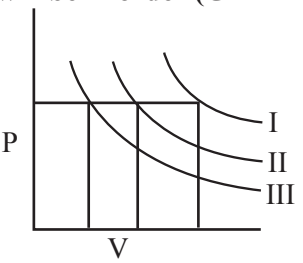
(b) lesser than that of wet gas

(c) equal to that of wet gas

(d) none of these **[Ans. (b)** lesser than that of wet gas**]**

REASONING QUESTION & ANSWERS (HOTS)

1. I, II, and III are three isotherms respectively at T_1, T_2, and T_3. Temperature will be in order (GRAPH)



(a) $T_1 = T_2 = T_3$ (b) $T_1 < T_2 < T_3$

(c) $T_1 > T_2 > T_3$ (d) $T_1 > T_2 = T_3$

Reason : Draw a line at constant P parallel to volume axis. Take volume corresponding to each temperature. From volume axis, $V_1 > V_2 > V_3$ Hence, $T_1 > T_2 > T_3$

[Ans. (c) $T_1 > T_2 > T_3$ **]**

2. One mole of nitrogen gas at 0.8 atm takes 38 seconds to diffuse through a pinhole, whearas one mole of an unknown compound of xenon with fluorine at 1.6 atm takes 57seconds to diffuse through the same hole. Calculate the molecular mass of the compound.

(a) 252 (b) 525

(c) 262 (d) 380

Reason : $\frac{r_1}{r_2} = \sqrt{\frac{M_2}{M_1}} \times \frac{P_1}{P_2}$ or $\frac{n_1}{t_1} \times \frac{t_2}{n_2} = \sqrt{\frac{M_2}{M_1}} \times \frac{P_1}{P_2}$

$$\frac{1}{38} \times \frac{57}{1} = \sqrt{\frac{M_{gas}}{28}} \times \frac{0.8}{16}$$

$$\therefore M_{gas} = \left[\frac{57}{38} \times \frac{1.6}{0.8}\right]^2 \times 28 \Rightarrow M_{gas} = 252.$$ **[Ans. (a)** 252**]**

CHAPTER 7

THERMODYNAMICS

EVALUATION

CHOOSE THE BEST ANSWER :

1. The amount of heat exchanged with the surrounding at constant temperature and pressure is given by the quantity

(a) ΔE (b) ΔH (c) ΔS (d) ΔG **[Ans. (b)** ΔH**]**

2. All the naturally occurring processes proceed spontaneously in a direction which leads to

(a) decrease in entropy

(b) increase in enthalpy

(c) increase in free energy

(d) decrease in free energy **[Ans. (d)** decrease in free energy**]**

3. In an adiabatic process, which of the following is true ?

(a) $q = w$ (b) $q = 0$ (c) $\Delta E = q$ (d) $P\Delta V = 0$

[Ans. (b) $q = 0$**]**

4. In a reversible process, the change in entropy of the universe is

(a) > 0 (b) > 0 (c) < 0 (d) $= 0$ **[Ans. (d)** $= 0$**]**

5. In an adiabatic expansion of an ideal gas

(a) $w = -\Delta U$ (b) $w = \Delta U + \Delta H$

(c) $\Delta U = 0$ (d) $w = 0$ **[Ans. (a)** $w = -\Delta U$**]**

6. The intensive property among the quantities below is

(a) mass (b) volume

(c) enthalpy (d) $\frac{\text{mass}}{\text{volume}}$ **[Ans. (d)** $\frac{\text{mass}}{\text{volume}}$**]**

7. An ideal gas expands from the volume of 1×10^{-3} m^3 to 1×10^{-2} m^3 at 300 K against a constant pressure at 1×10^5 Nm^{-2}. The work done is **(Govt.MQP-2018)**

(a) – 900 J (b) 900 kJ (c) 270 kJ (d) – 900 kJ

[Ans. (a) – 900 J**]**

25. The values of ΔH and ΔS for a reaction are respectively 30kJ mol^{-1} and 100 JK^{-1} mol^{-1}. Then the temperature above which the reaction will become spontaneous is

(a) 300 K (b) 30 K

(c) 100 K (d) 200 C **[Ans. (a)** 300 K]

In-text Question & Answers

1. For an adiabatic process,

(a) q = 0 (b) dP = 0 (c) dT = 0 (d) dP = 0

[Ans. (d) dP = 0]

2. The gravitational work done by an object is _____

(a) Qv (b) fx (c) PV (d) mgh

[Ans. (d) mgh]

3. In a compression process, P_{ext} is _____

(a) $(P_{int} + dP)$ (b) $(P_{int} - dP)$

(c) $(dP - P_{int})$ (d) $(-P_{int} + dP)$

[Ans. (a) $(P_{int} + dP)$]

4. If an automobile engine burns petrol at a temperature of 816°C and if surrounding temperature is 21°C, what is its maximum percentage?

(a) 37% (b) 73% (c) 83% (d) 33%

[Ans. (b) 73%]

5. The SI unit of entropy is _____

(a) JK (b) JK^{-1}

(c) KJ K^{-1} (d) KJ / mole **[Ans. (b)** JK^{-1}]

6. Which of the following is a state function?

(a) q (b) w

(c) q + w (d) All of these

HINT : ($\Delta H = \Delta U + \Delta ng\ RT$)

[Ans. (c) q + w]

30. Pick out the suitable condition in which a spontaneous endothermic reaction occurs.

(a) $\Delta G > 0$ (b) $\Delta G < 0$

(c) $\Delta G = 0$ (d) ΔG may be *+ve* or *–ve*

[Ans. (b) $\Delta G < 0$**]**

31. ΔG° of reversible reaction at its equilibrium is

(a) Positive (b) Negative

(c) Always zero (d) Both (a) & (b)

[Ans. (c) Always zero**]**

32. The molar heat of sublimation is equal to **(QY. 2018)**

a) the sum of molar heat of fusion and vapourization

b) molar heat of vaporization

c) molar heat of fusion

d) molar heat of neutralization

[Ans. (a) the sum of molar heat of fusion and vapourization **]**

33. Assertion : Enthalpy of neutralisation of 1 equivalent each of HCl and H_2SO_4 with NaOH is same

Reason : Enthalpy of neutralisation is always the heat evolved when 1 mole acid is neutralised by a base.

(a) Both assertion and reason are true and reason is the correct explanation of the assertion.

(b) Both assertion and reason are true but reason is not the correct explanation for assertion

(c) Assertion is true but reason are false.

(d) Both assertion and reason are false.

[Ans. (c) Assertion is true but reason are false.**]**

Reasoning Question & Answers (Hots)

1. For the reaction $PCl_{5(g)} \longrightarrow PCl_{3(g)} + Cl_{2(g)}$

(a) $\Delta H > \Delta U$ (b) $\Delta H < \Delta U$

(c) $\Delta H = \Delta U$ (d) Un predictable

[Ans. (a) $\Delta H > \Delta U$**]**

VOLUME II CHAPTER 8

PHYSICAL AND CHEMICAL EQUILIBRIUM

EVALUATION

CHOOSE THE BEST ANSWER :

1. If K_b and K_f for a reversible reactions are 0.8×10^{-5} and 1.6×10^{-4} respectively, the value of the equilibrium constant is,

a) 20 b) 0.2×10^{-1}

c) 0.05 d) none of these **[Ans. (a) 20]**

2. At a given temperature and pressure, the equilibrium constant values for the equilibria

$$3A_2 + B_{+2C} \rightleftharpoons 2A_3BC \text{ and}$$

$$A_3BC \rightleftharpoons \frac{3}{2}[A_2] + \frac{1}{2}B_2 + C$$

The relation between K_1 and K_2 is

a) $K_1 = \frac{1}{\sqrt{K_2}}$

b) $K_2 = K_1^{-1/2}$

c) $K_1^2 = 2K_2$

d) $\frac{K_1}{2} = K_2$ **[Ans. (b) $K_2 = K_1^{-1/2}$]**

3. The equilibrium constant for a reaction at room temperature is K_1 and that at 700 K is K_2. If $K_1 > K_2$, then

a) The forward reaction is exothermic

b) The forward reaction is endothermic

c) The reaction does not attain equilibrium

d) The reverse reaction is exothermic

[Ans. (a) The forward reaction is exothermic**]**

16. Le-Chatelier's principle is not applicable to

(a) $Fe_{(s)} + S_{(s)} \rightleftharpoons FeS_{(s)}$

(b) $H_{2(g)} + I_{2(g)} \rightleftharpoons 2HI_{(g)}$

(c) $N_{2(g)} + O_{2(g)} \rightleftharpoons 2NO_{(g)}$

(d) $N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$

Hint : Le-Chatelier's principle is applicable only for gas-phase equilibrium. **[Ans. (a)** $Fe_{(s)} + S_{(s)} \rightleftharpoons FeS_{(s)}$**]**

BOARD EXPECTED QUESTION & ANSWERS

1. Following three gaseous equilibrium reactions are occurring at 27°C.

(A) $2CO + O_2 \rightleftharpoons 2CO_2$

(B) $PCl_5 \rightleftharpoons PCl_3 + Cl_2$

(C) $2HI \rightleftharpoons H_2 + I_2$

The correct order of K_p/K_c for the following reaction is

(a) A < B < C (b) C < B < A

(c) A < C < B (d) B < A < C **[Ans. (c)** A < C < B**]**

Sol : (A) $\Delta n = 2 - 3 = -1$; $K_p = K_c(RT)^{-1}$; $K_p/K_c = \frac{1}{RT}$

(B) $\Delta n = 2 - 1 = 1$; $K_p = K_c(RT)$; $K_p/K_c = RT$

(C) $\Delta n = 2 - 2 = 0$; $K_p = K_c$; $K_p/K_c = 0$

2. The numerical value of equilibrium constant depends on

(a) temperature

(b) pressure

(c) concentration of reactants

(d) all of these **[Ans. (a)** temperature**]**

3. If the equilibrium constant for

$N_{2(g)} + O_{2(g)} \rightleftharpoons 2NO_{(g)}$ is K, the equilibrium constant for $\frac{1}{2}N_{2(g)} + \frac{1}{2}O_{2(g)} \rightleftharpoons NO_{(g)}$ will be

(a) K (b) K^2 (c) $K^{1/2}$ (d) $\frac{1}{2}K$ **[Ans. (c)** $K^{1/2}$**]**

The equilibrium constant for the formation of $S_3^{2-}(aq)$ from $S_2^{2-}(aq)$ and sulphur is

(a) 10 (b) 13 (c) 130 (d) 1300

[Ans. (b) 13]

17. For the reaction

$$CH_{4(g)} + 2O_{2(g)} \rightleftharpoons CO_{2(g)} + 2H_2O_{(l)}$$

$\Delta H = -170.8$ kJ mol^{-1} which of the following statement is not true?

(a) At equilibrium, the concentration of $CO_{2(g)}$ and $H_2O_{(l)}$ are not equal

(b) The equilibrium constant for the reaction is given by

$$K_p = \frac{[CO_2]}{[CH_4][O_2]}$$

(c) Addition of $CH_{4(g)}$ or $O_{2(g)}$ at equilibrium will cause a shift to the right.

(d) The reaction is exothermic.

[Ans. (b) The equilibrium constant for the reaction is given by

$$K_p = \frac{[CO_2]}{[CH_4][O_2]}]$$

18. The active mass of 7.0g of nitrogen in a 2.0L container would be

(a) 0.25 (b) 0.125 (c) 0.5 (d) 14.0

[Ans. (b) 0.125]

Reasoning Question & Answers (Hots)

1. For the reaction A + 3B $\rightleftharpoons$ 2C + D, initial mole of A is twice that of B. If at equilibrium moles of B and C are equal, then percent of B reacted is

(a) 10% (b) 20% (c) 40% (d) 60%

[Ans. (d) 60%]

10. The equilibrium $A_{(g)} + 4B_{(g)} \rightleftharpoons AB_{4(g)}$ is attained by mixing equal moles of A and B in a one litre vessel. Then at equilibrium

(a) [A] = [B] (b) [A] > [B]

(c) [A] < [B] (d) $[AB_4]$ > [A]

[Ans. (b) [A] > [B]**]**

11. If Ar is added to the equilibrium $N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_3$ at constant volume, then equilibrium will

(a) Shift in forward direction

(b) Not shift in any direction

(c) Shift in reverse direction

(d) All are incorrect **[Ans. (b)** Not shift in any direction**]**

☆☆☆

CHAPTER 9

SOLUTIONS

EVALUATION

CHOOSE THE BEST ANSWER :

1. The molality of a solution containing 1.8g of glucose dissolved in 250g of water is

a) 0.2 M b) 0.01 M

c) 0.02 M d) 0.04 M **[Ans. (d)** 0.04 M**]**

2. Which of the following concentration terms is / are independent of temperature?

a) molality

b) Molarity

c) Mole fraction

d) (a) and (c) **[Ans. (d)** (a) and (c)**]**

32. Equimolar solution of non-electrolyte in the same solvent have

a) same boiling point and same freezing point
b) different boiling point and different freezing point
c) same boiling point but different freezing point
d) same freezing point but different boiling point

[Ans. (a) same boiling point and same freezing point**]**

33. In the phenomenon of osmosis through the semipermeable membrane

a) solvent molecules pass from solution to solvent
b) solvent molecules pass from solvent to solution
c) solute molecules pass from solution to solvent
d) solute molecules pass from solvent to solution

[Ans. (b) solvent molecules pass from solvent to solution**]**

34. The osmotic pressure of 0.1 M sodium chloride solution at 27°C

a) 4.0 atm b) 2.46 atm
c) 4.92 atm d) 1.23 atm

[Ans. (c) 4.92 atm**]**

Reasoning Question & Answers (Hots)

1. Which of the following physical properties is used to determine, the molecular mass of a polymer solution?

a) Relative lowering of vapour pressure
b) Elevation in boiling point
c) Depression in freezing point
d) Osmotic pressure **[Ans. (d)** Osmotic pressure**]**

2. If van't Hoff factor, i = 1, then

a) It is dissociation
b) It is association
c) Both (1) & (2)
d) Neither dissociation nor association

[Ans. (d) Neither dissociation nor association**]**

CHAPTER 10

CHEMICAL BONDING

EVALUATION

CHOOSE THE BEST ANSWER :

1. In which of the following compounds does the central atom obey the octet rule?

a) XeF_4 b) $AlCl_3$

c) SF_6 d) SCl_2 **[Ans. (d)** SCl_2**]**

2. In the molecule O_A ═ C ═ O_B, the formal charge on O_A, C and O_B are respectively.

a) –1, 0, + 1 b) +1, 0, –1

c) –2, 0, +2 d) 0, 0, 0 **[Ans. (d)** 0, 0, 0**]**

3. Which of the following is electron deficient?

a) PH_3 b) $(CH_3)_2$

c) BH_3 d) NH_3 **[Ans. (c)** NH_3**]**

4. Which of the following molecule contains no bond?

a) SO_2 b) NO_2

c) CO_2 d) H_2O **[Ans. (d)** H_2O**]**

5. The ratio of number of sigma (σ) and pi (π) bonds in 2-butynal is

a) 8/3 b) 5/3 c) 8/2 d) 9/2

[Ans. (a)]

6. Which one of the following is the likely bond angles of sulphur tetrafluoride molecule?

a) 120°,80° b) 109°.28

c) 90° d) 89°,117° **[Ans. (d)** 89°,117°**]**

BOARD EXPECTED QUESTION & ANSWERS

1. The formula of the compound is A_2B_3. The number of electrons in the outermost orbits of A and B respectively are,

(a) 3 and 6 (b) 3 and 2

(c) 2 and 3 (d) 5 and 2 **[Ans. (a)** 3 and 6]

2. Which of the following is not true about covalent compounds?

(a) They undergo molecular reactions

(b) They possess low melting and boiling points

(c) They undergo ionic reactions

(d) They exhibit isomerism

[Ans. (c) They undergo ionic reactions]

3. Identify the valence electron for CO_3^{2-}

(a) 42 (b) 24 (c) 8 (d) 20

Sol : Valence electrons of C = 4;

Valence electrons of 3–0 = 3×6 = 18 unit negative charge = 2

∴ Total number of valence electrons = 4 + 8 + 2 = 24.

[Ans. (b) 24]

4. The sharing of valence electrons between the atoms will lead to the formation of _____

(a) Ionic bond

(b) Covalent bond

(c) Co-ordinate bond

(d) Hydrogen bond **[Ans. (b)** Covalent bond]

5. Which compound has planar structure?

(a) XeF_4 (b) $XeOF_2$

(c) XeO_2F_2 (d) XeO_4 **[Ans. (a)** XeF_4]

6. The geometry of electron pairs around S in SF_6 is

(a) Octahedral (b) Trigonal bipyramidal

(c) Square pyramidal (d) Linear **[Ans. (a)** Octahedral]

7. The correct order of increasing bond angles in the following triatomic species is:

(a) $NO_2^+ < NO_2 < NO_2^-$

(b) $NO_2^- < NO_2 < NO_2^+$

(c) $NO_2^- < NO_2^+ < NO_2$

(d) $NO_2^+ < NO_2^- < NO_2$ **[Ans. (b)** $NO_2^- < NO_2 < NO_2^+$**]**

8. In which of the following bond angle is maximum?

(a) NH_3 (b) PCl_3

(c) NH_4^+ (d) SCl_2 **[Ans. (c)** NH_4^+**]**

9. H_2O is polar, whereas BeF_2 is not It is because

Ans. (a) The electronegativity of F is greater than that of O.

(b) H_2O involves hydrogen bonding whereas BeF_2 is a discrete molecule

(c) H_2O is linear and BeF_2 is angular.

(d) H_2O is angular and BeF_2 is linear

[Ans. (c) H_2O is linear and BeF_2 is angular.**]**

10. Which molecule among the following has both polar and non-polar covalent bond?

(a) NH_4^+ (b) H_2O_2

(c) HCl (d) CH_4 **[Ans. (b)** H_2O_2**]**

Reasoning Question & Answers (Hots)

1. Which of the following statements are correct with respect to bond order?

(i) Bond order of N_2 is 3.5

(ii) Bond order of O_2 is 2

(iii) Bond order of NO^+ is 3.0

(iv) Bond order of NO is 2.5

(a) Only (i) (b) (i), (ii), (iv)

(c) (ii), (iii), (iv) (d) (i), (ii), (iii), (iv).

[Ans. (c) (ii), (iii), (iv)**]**

CHAPTER 11

FUNDAMENTALS OF ORGANIC CHEMISTRY

EVALUATION

CHOOSE THE BEST ANSWER :

1. Select the molecule which has only one π bond.

a) $CH_3 - CH = CH - CH_3$

b) $CH_3 - CH = CH - CHO$

c) $CH_3 - CH = CH - COOH$

d) All of these **[Ans. (a)** $CH_3 - CH = CH - CH_3$**]**

2. In the hydrocarbon

$\overset{7}{C}H_3 - \overset{6}{C}H_2 - \overset{5}{C}H = \overset{4}{C}H - \overset{3}{C}H_2 - \overset{2}{C} \equiv \overset{1}{C}H$

the state of hybridisation of carbon 1,2,3,4 and 7 are in the following sequence.

a) sp, sp, sp^3, sp^2, sp^3 b) sp^2, sp, sp^3, sp^2, sp^3

c) sp, sp, sp^2, sp, sp^3 d) none of these

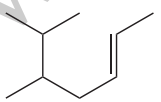
[Ans. (a) sp, sp, sp^3, sp^2, sp^3**]**

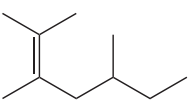
3. The general formula for alkadiene is

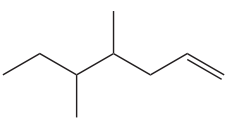
a) C_nH_{2n} b) C_nH_{2n-1}

c) C_nH_{2n-2} d) C_nH_{n-2} **[Ans. (c)** C_nH_{2n-2}**]**

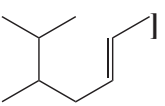
4. Structure of the compound whose IUPAC name is 5,6-dimethylhept - 2 - ene is

a) 

b) 

c) 

d) None of these

[Ans. (a)  **]**

IN-TEXT QUESTION & ANSWERS

1. Which of the following compound has linear shape?

(a) C_2H_4 (b) C_2H_2 (c) CH_4 (d) C_3H_6

[Ans. (b) C_2H_2**]**

2. In which of the following compound has only one type of hybridised carbon atom?

(a) 

(b) 

(c) 

(d) All of these

[Ans. (b)  **]**

3. Tetravalency of carbon is possible in the case of

(a) sp^3-hybridisation (b) sp^2-hybridisation

(c) sp-hybridisation (d) All of these

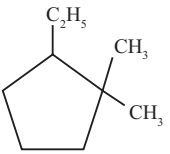
[Ans. (d) All of these**]**

4. Which of the following compound has maximum number of primary H–atoms?

(a) CH_4 (b) $CH_3–CH_2–CH_3$

(c) $H_5C_2–\underset{\displaystyle CH_3}{\underset{|}{CH}}–CH_3$ (d) $C(CH_3)_4$ **[Ans. (d)** $C(CH_3)_4$**]**

5. Identify the IUPAC name of the compound.



(a) 2 – Ethyl - 1,1 – dimethylcyclopentane

(b) 1 – Ethyl - 2,2 – dimethylcyclopentane

(c) 1,1 – Dimethyl – 2- ethylcyclopentane

(d) 2,2 – Dimethyl – 1- ethylcyclopentane

[Ans. (b) 1 – Ethyl - 2,2 – dimethylcyclopentane**]**

BOARD EXPECTED QUESTION & ANSWERS

1. $CH_3-CH_2-\underset{\displaystyle OH}{\underset{|}{CH}}-CH_2-CH_2-CH_3$ **and**

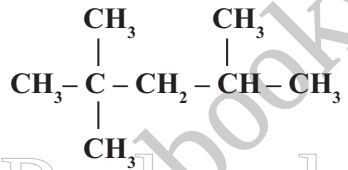
$CH_3-CH_2-CH_2-\underset{\displaystyle OH}{\underset{|}{CH}}-CH_3$ **are**

(a) Functional isomers (b) Position isomers

(c) Chain isomers (d) These are not isomers

[Ans. (d) These are not isomers**]**

2. The number of tertiary carbon atoms in the following structure is



(a) Four (b) Three (c) Two (d) One

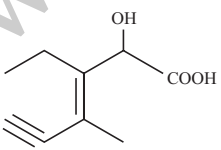
[Ans. (d) One**]**

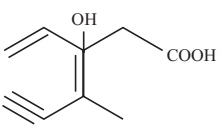
3. Number of structural isomers possible in C_3H_6O are

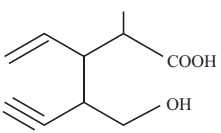
(a) 9 (b) 6 (c) 5 (d) 3

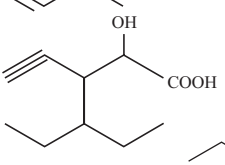
[Ans. (a) 9**]**

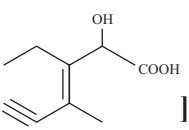
4. Structure of the compound whose IUPAC name is 3-ethyl 2-hydroxy-4-methyl hex-3-en-5-ynoic acid is

(a) 

(b) 

(c) 

(d) 

[Ans. (a)  **]**

5. The general molecular formula which represents the homologous series of alkanols is

(a) $C_nH_{2n}O_2$ (b) $C_nH_{2n}O$

(c) $C_nH_{2n+1}O$ (d) $C_nH_{2n+2}O$ **[Ans. (d)** $C_nH_{2n+2}O$**]**

6. Which one of the following pairs represents stereoisomerism?

(a) Chain isomerism and rotational isomerism.

(b) Structural isomerism and geometrical isomerism.

(c) Linkage isomerism and geometrical isomerism.

(d) Optical isomerism and geometrical isomerism.

[Ans. (d) Optical isomerism and geometrical isomerism.**]**

7. The correct order of increasing bond length of C–H, C–O, C–C, and C=C is

(a) C–H < C–O < C–C < C=C

(b) C–H < C=C < C–O < C–C

(c) C–C < C=C < C–O < C–H

(d) C–O < C–H < C–C < C=C

[Ans. (b) C–H < C=C < C–O < C–C**]**

Reasoning Question & Answers (Hots)

1. Assertion (A) : C_2 Br C*l* FI can farm 6 different geometrical isomers.

Reason (R) : Each one structure is geometrical isomer of other five structures.

(a) Both A and R are true and R is correct explanation of A.

(b) Both A and R are true but R is not correct explanation of A.

(c) A is true but R is false.

(d) Both A and R are false. **[Ans. (c)** A is true but R is false.**]**

2. Compounds having boiling points widely apart 40k and above can be purified by ____.

(a) Crystallisation (b) Sublimation

(c) Fractional distillation (d) Simple distillation

[Ans. (d) Simple distillation**]**

3. Purification of two miscible liquids possessing very close boiling points can be separated using –

(a) Fractional distillation (b) Sublimation

(c) Simple distillation (d) Steam distillation

[Ans. (a) Fractional distillation**]**

4. When stationary phase is solid, then the compounds can be separated on the basis of

(a) Adsorption (b) Partition

(c) Both (a) & (b) (d) Neither (a) nor (b)

[Ans. (a) Adsorption**]**

5. The principle involved in paper chromatography is

(a) partition (b) sublimation

(c) adsorption (d) filtration **[Ans. (a)** partition**]**

6. Nitrobenzene and benzene can be separated by the method of

(a) steam distillation (b) crystallization

(c) fractional crystallization

(d) chromatography **[Ans. (a)** steam distillation**]**

CHAPTER 12

BASIC CONCEPTS OF ORGANIC REACTIONS

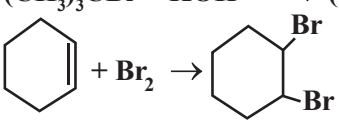
EVALUATION

CHOOSE THE BEST ANSWER :

1. For the following reactions

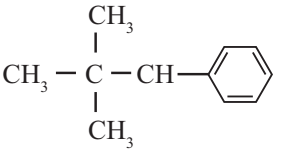
(A) $CH_3CH_2CH_2Br + KOH \longrightarrow CH_2 = CH_2 + KBr + H_2O$

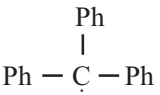
(B) $(CH_3)_3CBr + KOH \longrightarrow (CH_3)_3 COH + KBr$

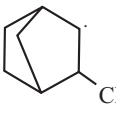
(C) 

REASONING QUESTION & ANSWERS (HOTS)

1. Consider the following compounds,

(i) 

(ii) 

(iii) 

Hyperconjugation occurs in

(a) (i) and (iii) (b) (i) only

(c) (ii) only (d) (iii) only **[Ans. (d)** (iii) only**]**

2. Among the following aromatic compounds is one of the most reaction towards electrophilic nitration is

(a) Toluene (b) Benzene

(c) Benzoic acid (d) Nitrobenzene

[Ans. (a) Toluene**]**

3. Assertion (A) : $CH_3 - \overset{+}{C}H - CH_3$ has 6 hyperconjugative hydrogens.

While $CH_3 - \overset{+}{C}H - CH_2 - CH_3$ has 5 hyperconjugative hydrogens.

Reason (R) : $CH_3 - \overset{+}{C}H - CH_3$ is more stable than $CH_3 - \overset{+}{C}H - CH_2 - CH_3$

(a) Both A and R are true and R is the correct explanation of A.

(b) Both A and R are true but R is not the correct explanation of A.

(c) A is true but R is false.

(d) Both A and R are false.

[Ans. (b) Both A and R are true but R is not the correct explanation of A.**]**

CHAPTER 13

HYDROCARBONS

EVALUATION

CHOOSE THE BEST ANSWER :

1. The correct statement regarding the comparison of staggered and eclipsed conformations of ethane, is ***(NEET)***

a) the eclipsed conformation of ethane is more stable than staggered conformation even though the eclipsed conformation has torsional strain.

b) the staggered conformation of ethane is more stable than eclipsed conformation, because staggered conformation has no torsional strain.

c) the staggered conformation of ethane is less stable than eclipsed conformation, because staggered conformation has torsional strain.

d) the staggered conformation of ethane is less stable than eclipsed conformation, because staggered conformation has no torsional strain.

[Ans. (b) the staggered conformation of ethane is more stable than eclipsed conformation, because staggered conformation has no torsional strain.**]**

2. $C_2H_5Br + 2Na \xrightarrow{\text{dry ether}} C_4H_{10} + 2NaBr$

The above reaction is an example of which of the following

a) Reimer Tiemann reaction

b) Wurtz reaction

c) Aldol condensation

d) Homann reaction **[Ans. (b)** Wurtz reaction**]**

14. Total number of conformations possible in cyclohexane is

a) Zero b) Infinite

c) Four d) Two **[Ans. (b)** Infinite**]**

BOARD EXPECTED QUESTION & ANSWERS

1. Which of the following has maximum angle strain?

a)  b) 

c)  d)  **[Ans. (a)**  **]**

2. Conformation arise due to rotation around

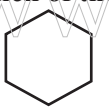
a) Carbon-carbon double bond

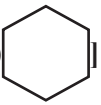
b) Carbon-carbon triple bond

c) Carbon-carbon single bond

d) All of these **[Ans. (c)** Carbon-carbon single bond**]**

3. Which of the following is the most stable cycloalkane?

a)  b) 

c)  d)  **[Ans. (a)**  **]**

4. Bond angle in chair form of cyclohexane is

a) $109^o28'$ b) 120^o

c) 60^o d) 108^o **[Ans. (a)**$109^o28'$**]**

5. The most stable conformation of Butane is

a) Gauche-form

b) Partially eclipsed form

c) Anti-form

d) Eclipsed form **[Ans. (c)** Anti-form**]**

19. The order of decreasing reactivity towards an electophilic reagent, for the following would be

a) Benzene **b) Toluene**

c) Chlorobenzene **d) Phenol**

a) d > b > a > c b) a > b > c > d

c) b > b > a > c d) d > c > b > a

[Ans. (c) b > b > a > c**]**

Reasoning Question & Answers (Hots)

1. Which is maximum stable?

a) But-1-ene b) cis-but-2-ene

c) trans-but-2-ene d) All have equal

[Ans. (c) trans-but-2-ene**]**

2. Geometrical isomers differ in

a) Position of functional group

b) Position of atoms

c) patial arrangement of atoms

d) Length of carbon chain

[Ans. (c) patial arrangement of atoms**]**

3. The correct order of reactivity towards the electophilic substitution of the compounds aniline (I), benzene (II) and nitrobenzene (III) is

a) III > II > I b) II > III I

c) I < II > III d) I > I > III **[Ans. (d)** I > I > III**]**

4. The cylindrical shape of alkyne is due to

a) Two sigma C-C and one π C-C bonds

b) One sigma C-C and two π C-C bonds

c) Three sigma C-C bonds

d) Three π C-C bonds

[Ans. (b) One sigma C-C and two π C-C bonds **]**

5. In the commercial gasonlines, the type of hydrocarbons which are more desirable is

a) Linear unsaturated hydrocarbon
b) Toluene
c) Branched hydrocarbon
d) Straight-chain hydrocarbon

[Ans. (c) Branched hydrocarbon**]**

6. The most stable conformation of n-butane is

a) Gauche b) Staggered
c) Skew boat d) Eclipsed **[Ans. (b)** Staggered**]**

7. Which one of these is not compatible with arenes?

a) Electrophilic
b) Delocalisation of π-electrons
c) Greater stability
d) Resonance

[Ans. (a) Electrophilic**]**

8. 2-butene shows geometrical isomerism due to

a) Restricted rotation about double bond
b) Free rotation about double bond
c) Free rotation about single bond
d) Chiral carbon

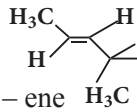
[Ans. (a) Restricted rotation about double bond**]**

CHAPTER 14

HALOALKANES AND HALOARENES

EVALUATION

CHOOSE THE BEST ANSWER :

1. The IUPAC name of  **is**

a) 2-Bromo pent – 3 – ene
b) 4-Bromo-pent-2-ene
c) 2-Bromo pent – 4 – ene
d) 4-Bromo pent – 1 – ene **[Ans. (b)** 4-Bromo-pent-2-ene**]**

2. Of the following compounds, which has the highest boiling point?

a) n-Butyl chloride b) Isobutyl chloride
c) t-Butyl chloride d) n-propyl chloride

[Ans. (a) n-Butyl chloride**]**

3. Arrange the following compounds in increasing order of their density

A) CCl_4 **B)** $CHCl_3$
C) CH_2Cl_2 **D)** CH_3Cl

a) D < C < B < A b) C > B > A > D
c) A < B < C < D d) C > A > B > D

[Ans. (a) D < C < B < A**]**

4. With respect to the position of – Cl in the compound CH_3 – CH = CH – CH_2 – Cl, it is classified as

a) Vinyl b) Allyl
c) Secondary d) Aralkyl **[Ans. (b)** Allyl**]**

5. What should be the correct IUPAC name of diethyl chloromethane?

a) 3 – Chloro pentane
b) 1-Chloropentane
c) 1-Chloro-1, 1, diethyl methane
d) 1 –Chloro-1-ethyl propane **[Ans. (a)**3 – Chloro pentane**]**

Board Expected Question & Answers

1. The _____ readily undergoes addition reaction with HBr.

(a) $(CH_3)_2 C = CH_2$ (b) $Cl - CH = CH - Cl$

(c) $CH_2 = CH - Cl$ (d) $CH_3 - CH = CH_2$

[Ans. (a) $(CH_3)_2 C = CH_2$**]**

2. $CH_3 - CH = CH_2 \xrightarrow[\text{Peroxide}]{\text{HBr}} ?$

The above reaction undergoes

(a) Electrophilic substitution

(b) Nucleophilic substitution

(c) Markovnikov's addition

(d) Anti-Markovnikov's addition

[Ans. (d) Anti-Markovnikov's addition**]**

3. Which of the following halogen exchange reaction will occur in acetone?

(a) R – I + NaCl

(b) R – F + KCl

(c) R – Cl + NaI

(d) R – F + AgBr

[Ans. (c) R – Cl + NaI**]**

4. An S_{N_2} reaction at an asymmetric carbon of a compound always gives

(a) an enantiomer of the substrate

(b) a product with opposite optical rotation

(c) a mixture of diastereomers

(d) a product with 100% inversion

[Ans. (d) a product with 100% inversion**]**

5. Grignard reagent is prepared by the reaction between

(a) Zinc and alkyl halide

(b) Magnesium and alkyl halide

(c) Magnesium and alkane

(d) Copper and aromatic hydrocarbon

[Ans. (b) Magnesium and alkyl halide**]**

6. Among the following, which is not an allylic halide?

(a) 3-bromo-2-methyl propene

(b) 4-bromo but-1-ene and

(c) 3-bromo-2-methyl but -1- ene

(d) All of these

[Ans. (a) 3-bromo-2-methyl propene**]**

7. Statement I : Primary alkyl halides on oxidation with DMSO gives aldehydes.

Statement II : DMSO is used as polar aprotic solvent.

(a) Both statement I and statement II are true individually and statement II explains statement I.

(b) Both statement I and statement II are true individually but statement II does not explain statement I.

(c) Only statement I is true, but statement II is false.

(d) Both statement I and II are false.

[Ans. (b) Both statement I and statement II are true individually but statement II does not explain statement I.**]**

8. When alkyl halides are heated with dry Ag_2O, they give,

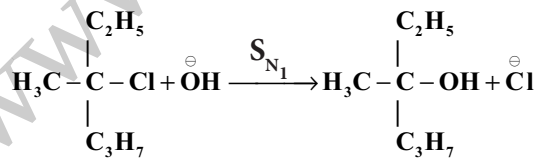
(a) diethyl ether (b) ester

(c) ketone (d) aldehyde

[Ans. (a) diethyl ether**]**

Reasoning Question & Answers (Hots)

1.



What is the stereo chemistry of the above reaction?

(a) complete racimisation

(b) complete inversion

(c) maximum inversion with partial racemisation

(d) maximum racemisation with partial inversion

[Ans. (d) maximum racemisation with partial inversion**]**

CHAPTER 15

ENVIRONMENTAL CHEMISTRY

EVALUATION

CHOOSE THE BEST ANSWER :

1. The gaseous envelope around the earth is known as atmosphere. The region lying between an altitudes of 11-50 km is _____

a) Troposphere b) Mesosphere
c) Thermosphere d) stratosphere

[Ans. (d) stratosphere**]**

2. Which of the following is natural and human disturbance in ecology?

a) Forest fire b) Floods
c) Acid rain d) Green house effect

[Ans. (a) Forest fire**]**

3. Bhopal Gas Tragedy is a case of _____

a) thermal pollution b) air pollution
c) nuclear pollution d) land pollution

[Ans. (b) air pollution**]**

4. Haemoglobin of the blood forms carboxy haemoglobin with

a) Carbon dioxide b) Carbon tetra chloride
c) Carbon monoxide d) Carbonic acid

[Ans. (c) Carbon monoxide**]**

5. Which sequence for green house gases is based on GWP?

a) CFC > N_2O > CO_2 > CH_4
b) CFC > CO_2 > N_2O > CH_4
c) CFC > N_2O > CH_4 > CO_2
d) CFC > CH_4 > N_2O > CO_2

[Ans. (c) CFC > N_2O > CH_4 > CO_2**]**

7. Which one of the following is not a property of classical smog?

(a) Secondary pollutants play significant role

(b) Occurs at low temperature.

(c) Contains SO_2

(d) Dark brown coloured.

[Ans. (a) Secondary pollutants play significant role**]**

8. Photochemical smog always contain

(a) SO_2 (b) HNO_3

(c) O_3 (d) All of these **[Ans. (c)** O_3**]**

9. Earth is protected from UV rays by

(a) N_2 (b) O_2

(c) SO_3 (d) O_3 **[Ans. (d)** O_3**]**

Reasoning Question & Answers (Hots)

1. In Antartica, ozone layer depletion is due to the formation of

(a) Peroxy acetyl nitrate (b) Acrolein

(c) Chlorine nitrate (d) SO_2 and SO_3

[Ans. (c) Chlorine nitrate**]**

2. Statement I : Ozone depletion potential is maximum is CFC's

Statement II : CFC looses active chlorine

(a) Both statement I and statement II are true and statement II explains statement I

(b) Both statement I and statement II are true but statement II does not explain statement I

(c) Statement I is true but statement II is false

(d) Both statement I and II are false

[Ans. (b) Both statement I and statement II are true but statement II does not explain statement I**]**

3. Statement I: Photochemical smog is also known as oxidizing smog.

Statement II: Photochemical smog is chiefly composed of O_3, PAN, etc.

(a) Both statement I and statement II are true and statement II explains statement I

(b) Both statement I and statement II are true but statement II does not explain statement I

(c) Statement I is true but statement II is false

(d) Both statement I and II are false

[Ans. (a) Both statement I and statement II are true and statement II explains statement I**]**

4. Identify the component of photochemical smog which is not the common one.

(a) Acrolein (b) Ozone

(c) Peroxyacetyl nitrate (d) CFCs **[Ans. (d)** CFCs**]**

5. Permissible level of nitrate ions in the drinking water is

(a) 20 ppm (b) 30 ppm (c) 40 ppm (d) 50 ppm

[Ans. (d) 50 ppm**]**

6. Which of the following is/are correct match?

(i) Photochemical smog : SO_2

(ii) Nitrate in drinking water : Blue baby syndrome

(iii) Phosphate fertilisers : BOD level of water in water increases.

(a) only (i) (b) (i), and (ii)

(c) (i), (ii) and (iii) (d) (i) and (iii)

[Ans. (c) (i), (ii) and (iii)**]**

7. Which causes water pollution?

(a) Jet planes (b) Herbicides

(c) Smoke (d) Combustion of fossils

[Ans. (b) Herbicides**]**