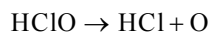
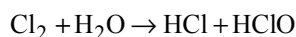


ANSWER KEYS

1	(d)	7	(d)	13	(a)	19	(d)	25	(b)	31	(c)	37	(d)	43	(b)	49	(b)	55	(c)
2	(d)	8	(c)	14	(b)	20	(c)	26	(b)	32	(b)	38	(b)	44	(c)	50	(a)		
3	(b)	9	(b)	15	(b)	21	(b)	27	(b)	33	(c)	39	(a)	45	(a)	51	(a)		
4	(b)	10	(a)	16	(b)	22	(a)	28	(b)	34	(b)	40	(c)	46	(b)	52	(d)		
5	(d)	11	(c)	17	(a)	23	(a)	29	(b)	35	(b)	41	(d)	47	(a)	53	(d)		
6	(d)	12	(d)	18	(c)	24	(b)	30	(a)	36	(b)	42	(c)	48	(a)	54	(b)		

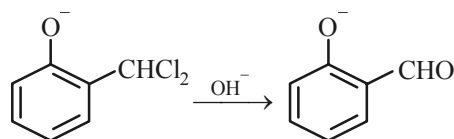
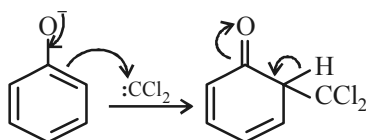
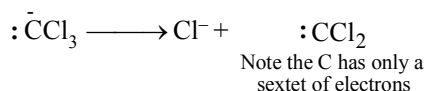
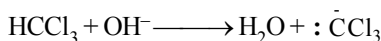
SOLUTIONS

1. (d) Bleaching action of chlorine is due to oxidation in presence of moisture.



Colouring matter + |O| → Colourless matter

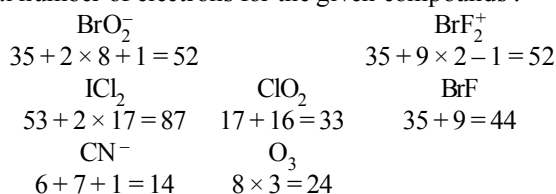
2. (d) Riemer-Tiemann reaction involves electrophilic substitution on the highly reactive phenoxide ring.



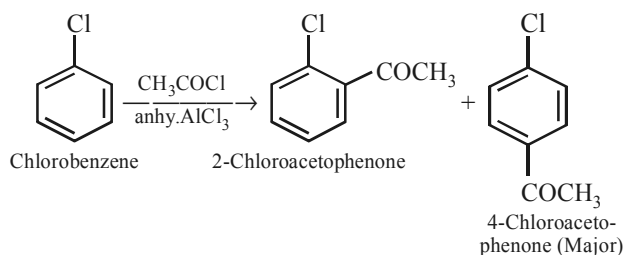
A benzal chloride

3. (b) $\text{CH}_3 - \text{CH}_2 - \text{CH}_2\text{Br} \xrightarrow[\text{- HBr}]{\text{ethanolic KOH}} \text{CH}_3 - \text{CH} = \text{CH}_2$
n- Propyl bromide Propene
4. (b) Isoelectronic pair have same number of electrons

Total number of electrons for the given compounds :



5. (d) Addition of a solute increases the boiling point of solution.
6. (d) Statement (d) is not correct. Some proteins also contain S, with C, H, O and N.
7. (d) NO_2 is reddish brown coloured gas. Rest of the oxides are colourless.
8. (c)



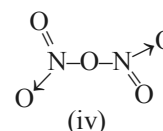
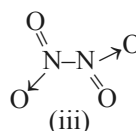
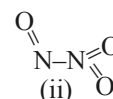
Ortho-Product is minor because of steric hindrance.

9. (b) Octahedral sites in fcc are present at each edge centre as well as at body centre.
10. (a) Given : $w = 10 \text{ g}$; Mol. mass = 40
 Weight of solvent = $1250 \times 0.8 \text{ g} = 1000 \text{ g} = 1 \text{ kg}$

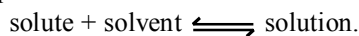
$$\therefore \text{Molality} = \frac{10}{40 \times 1} = 0.25$$

11. (c)

12. (d) $\text{N} \equiv \text{N} \rightarrow \text{O}$
 (i)

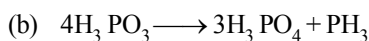
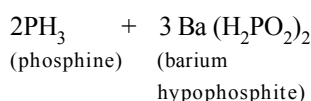
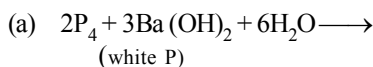


13. (a) Iodine molecules belongs to a class of non – polar molecular solids in which constituents molecule are held together by London or dispersion forces.
14. (b) Number of solute particles going into solution will be equal to the solute particles separating out and a state of dynamic equilibrium is reached.

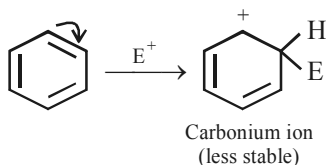
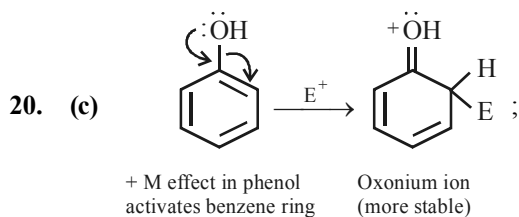
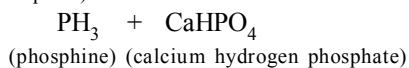


i.e., rate of dissolution = rate of unsaturation.

15. (b) Crystalline solids has a regular arrangement of constituent particles observed over a long distance in the crystal lattice due to which they exhibit sharp melting point.
16. (b) If carbon atom has all four valencies with four different groups then it is called as asymmetric/chiral carbon.
17. (a) Synthesis of polypeptide is known as translation. For this process three type of RNA are essential.
18. (c) The substitution is faster if the electron withdrawing group is at ortho and para position to –Cl group. Compounds (ii) and (iii) both have one electron withdrawing group but in compound (ii) electron withdrawing (—NO₂) group is present at ortho position, so rate of reaction in compound (ii) is more than that of (iii), while (i) has no electron withdrawing group.
19. (d) PH₃ is not obtained when metaphosphoric acid is heated.



(calcium hypophosphite)



High stability of oxonium ion (oxocation) is because here every atom (except H) has a complete octet of electrons, while in carbocations, carbon bearing positive charge is having six electrons.

21. (b) Packing efficiency in different types of unit cells is as follows :

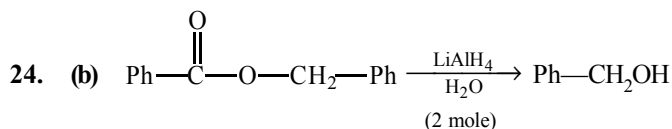
Unit cell	Packing efficiency
<i>fcc</i>	74%
<i>bcc</i>	68%
Simple cubic	52%

Thus, the correct order of packing efficiency is:
fcc (74%) > *bcc* (68%) > simple cubic (52%).

22. (a) $\text{C}_4\text{H}_{10}\text{O} \xrightarrow{\text{excess of HI}} \text{only RI}$

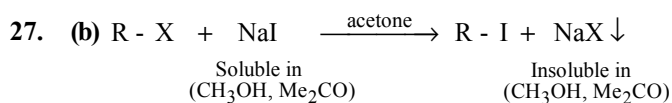
Since the compound (C₄H₁₀O) does not react with sodium, oxygen must be in the form of ether (R–OR). Further since a single alkyl halide is formed, the two alkyl groups must be same, hence ether is C₂H₅OC₂H₅.

23. (a) The interparticle forces in between CHCl₃ and acetone increase due to H-bonding and thus $\Delta_{\text{mixing}} V$ becomes negative.



25. (b) H₄P₂O₅ is pyrophosphorous acid it contains P–O–P bond.

26. (b) The secondary structure of a protein refers to the shape in which a long peptide chain can exist. There are two different conformations of the peptide linkage present in protein, these are α -helix and β -conformation. The α -helix always has a right handed arrangement. In β -conformation, all peptide chains are stretched out to nearly maximum extension and then laid side by side and held together by intermolecular hydrogen bonds. The structure resembles the pleated folds of drapery and therefore is known as β -pleated sheet.



(where X = Cl or Br)

28. (b) A good nucleophile possesses two properties

- (i) It is a good leaving group
(ii) It is a good attacking reagent

'F' is not a good leaving group, hence to convert R–F into R–OH, first it is treated with NaI to convert it into R–I (I is good base) and then R–I is treated with NaOH to produce R–OH (I is good leaving group)

29. (b) $2\text{KMnO}_4 + 16\text{HCl} \rightarrow 2\text{KCl} + 2\text{MnCl}_2 + 8\text{H}_2\text{O} + 5\text{Cl}_2$

30. (a) Given vapour pressure of pure solvent (P°) = 121.8 mm Hg; Weight of solute (w) = 15 g

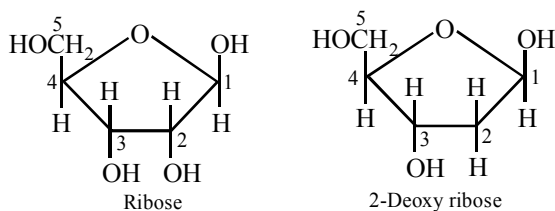
Weight of solvent (W) = 250 g; Vapour pressure of solution (P) = 120.2 mm Hg and Molecular weight of solvent (M) = 78

$$\text{From Raoult's law } = \frac{P^{\circ} - P}{P^{\circ}} = \frac{w}{m} \times \frac{M}{W}$$

$$\frac{121.8 - 120.2}{121.8} = \frac{15}{m} \times \frac{78}{250}$$

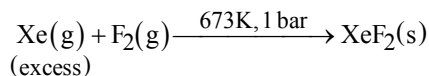
$$\text{or } m = \frac{15 \times 78}{250} \times \frac{121.8}{1.6} = 356.2$$

31. (c)
32. (b) RNA has D (-) - Ribose and the DNA has 2-Deoxy D (-) - ribose as the carbohydrate unit.

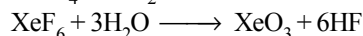
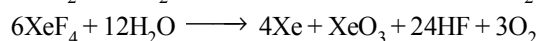
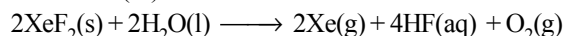


From the structures it is clear that 2nd carbon in DNA does not have OH group.

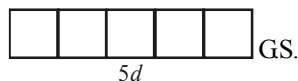
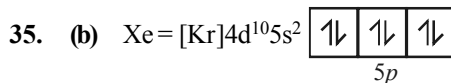
33. (c) For statement (iii) preparation of XeF₂ requires Xe in excess amount



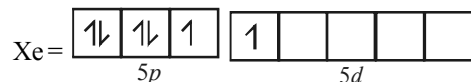
For statements (iv)



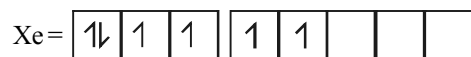
34. (b) Primary alcohol will favour S_N2 pathway as primary C[⊕] ion is less stable.



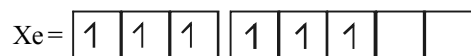
In first excited state, Xe can form XeF₂



In second excited state, Xe can form XeF₄



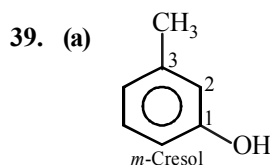
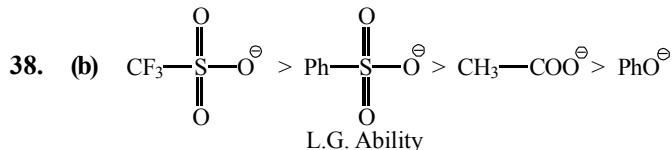
In third excited state, Xe can form XeF₆



Hence, xenon can combine with only even number of fluorine atoms.

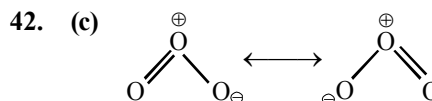
36. (b) $M = \frac{K_b \times w \times 1000}{\Delta T_b \times W} = \frac{2.16 \times 0.11 \times 1000}{0.1 \times 15} = 158.4$

37. (d) H₃PO₄ is tribasic so, N = M × nf = 1 × 3 = 3N



Its IUPAC name is 3-methylphenol.

40. (c) Fibrous proteins are generally insoluble in water.
41. (d) *tert*-Alkyl halides undergo S_N1 reactions, hence they involve the formation of quite stable carbocations, and not the transition state. In S_N1 reactions, the nucleophile is not involved in rate determining (first) step, hence its stronger or weaker nature does not influence the reaction rate. In S_N1, the product has more percentage of the inverted configuration than the retained configuration, i.e. only partial racemization takes place, hence the product will be having some optical activity.



Ozone is diamagnetic in nature (due to presence of paired electron) and both the O - O bond length are equal. It has a bent structure.

43. (b) Solid AB crystallizes as NaCl structure, so it has coordination number 6 and its r⁺/r⁻ ranges from 0.414 - 0.732. For maximum radius of anion, we have to take the lower

$$\text{limit of the range } 0.414 - 0.732. \text{ So, } \frac{r^+}{r^-} = 0.414$$

$$\Rightarrow r^- = \frac{0.100}{0.414} \text{ nm} = 0.241 \text{ nm}$$

44. (c) S_N2 and S_N1 same, if C[⊕] not rearrange.

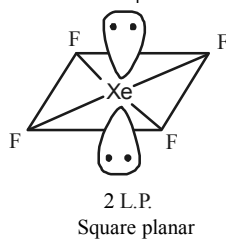
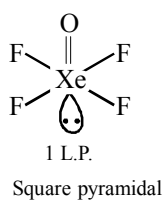
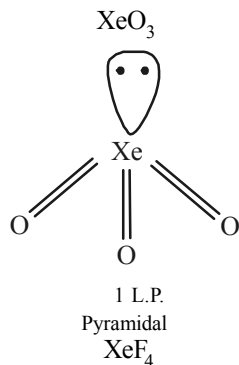
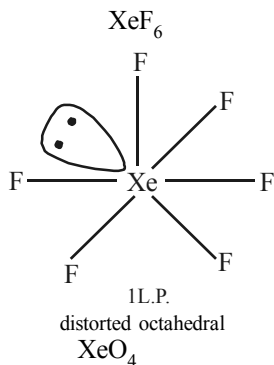
45. (a) 46. (b)

47. (a) 2-Cyclohexenol is dehydrated more readily than 3-cyclohexenol because the carbocation formed from the former is more stable than the latter.

48. (a) Because of small size of F atoms, there is repulsion of electrons in F₂ molecule. Thus, F-F bond in F₂ molecule is weak.

49. (b) Since some of the lattice site are vacant, therefore it results into decrease in the density of the substance.

50. (a)



51. (a)

52. (d) In DNA, Adenine pairs with thymine and Guanine pairs with cytosine with the help of H-bonding.

53. (d) If in an ionic crystal of the type $A^+ B^-$, equal number of cations and anions are missing from their lattice sites so that the electrical neutrality is maintained, the defect is called Schottky defect.

54. (b) More is the Schottky defect in crystal, more is the decrease in density of the crystal.

55. (c) Frenkel and Schottky defects are crystal defects. It arises due to dislodgement of cation or anion from their places in the crystal lattice.