

Salt Analysis

Single Correct Option Type Questions

- Q.1 Rinnmann's green is -
(A) $[\text{Ni}(\text{NH}_3)_6] \text{SO}_4$ (B) $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ (C) CoZnO_2 (D) $\text{Fe}(\text{BO}_2)_2$
- Q.2 A metal salt solution when treated with dimethyl glyoxime and NH_4OH give a rose red complex the metal is
(A) Ni (B) Zn (C) Co (D) Mn
- Q.3 Which of the following tests can you identify K^+ in a salt ?
(A) Flame test (violet) and precipitation (yellow) with sodium cobaltinitrite
(B) Flame test (violet) and precipitation (violet) with sodium nitroprusside
(C) Flame test (crimson) and precipitation (yellow) with sodium cobaltinitrite
(D) Flame test (golden yellow) and precipitation (violet) with sodium nitroprusside
- Q.4 Which of the following combination of reagents does not produce black precipitate
(A) CuSO_4 soln. + $\text{PH}_3(\text{g})$ (B) AgNO_3 + warm soln. of $\text{Na}_2\text{S}_2\text{O}_3$
(C) BiCl_3 + KI (D) CdCl_2 + KI soln.
- Q.5 When CS_2 layer containing both Br_2 and I_2 (2 : 1) is shaken with excess of Cl_2 water, the violet colour due to I_2 disappears and a pale yellow colour appears in the solution. The disappearance of violet colour and appearance of pale yellow colour is due to the formation of:
(A) I_3^- and Br_2 (B) HIO_3 and BrCl
(C) ICl and BrCl (D) I^- and Br^-
- Q.6 $\text{FeCr}_2\text{O}_4 + \text{Na}_2\text{CO}_3 + \text{O}_2 \xrightarrow{\text{Fusion}} [\text{X}] \xrightarrow[\text{H}_2\text{O}]{\text{H}^+} [\text{Y}] \xrightarrow[\text{H}_2\text{O}_2]{\text{H}^+} [\text{Z}]$
Which of the following statement is true for the compounds [X], [Y] and [Z] ?
(A) In all three compounds, the chromium is in +6 oxidation state
(B) [Z] is a deep blue-violet coloured compound which decomposes rapidly in aqueous solution into Cr^{3+} and dioxygen
(C) Saturated solution of [Y] gives bright orange compound, chromic anhydride, with concentrated H_2SO_4
(D) All of these
- Q.7 Alkaline solution of NaNO_2 on heating with Zn powder produces a gas. The gas is
(A) Colourless and acidic (B) Colorless and neutral
(C) Light fumes and acidic (D) Colourless and basic

- Q.8 Which of the following chromate salt is insoluble in water as well as in CH_3COOH and soluble in dil. HNO_3 as well as in dil. HCl ?
(A) BaCrO_4 (B) PbCrO_4 (C) K_2CrO_4 (D) Ag_2CrO_4
- Q.9 In equilibrium : $\text{SCN}^- + \text{Fe}^{3+}(\text{aq}) \rightleftharpoons [\text{Fe}(\text{SCN})_2]^{2+}(\text{aq})$
(colourless) (yellow) (deepred)
If thiocyanate ions are added in equilibrium mixture then
(A) the solution becomes colourless (B) solution becomes yellow coloured
(C) the deep red colour solution (D) the conc. of $[\text{Fe}(\text{SCN})_2]^{2+}(\text{aq})$ ion decreases
- Q.10 Among the following species which one does NOT give any colour change with $\text{FeCl}_3(\text{aq})$?
(A) NaOH (B) NaSCN (C) Na_2SO_4 (D) Phenol
- Q.11 Acidified $\text{K}_2\text{Cr}_2\text{O}_7$ will fail to distinguish between :
(A) CO and CO_2 (B) $\text{C}_2\text{O}_4^{2-}$ and CO_3^{2-} (C) CO and SO_2 (D) $\text{C}_2\text{O}_4^{2-}$ and F^-
- Q.12 K^+ and NH_4^+ can be separated by using
(A) $\text{Na}_3[\text{Co}(\text{NO}_2)_6]$ (B) H_2PtCl_6
(C) $\text{NaHC}_4\text{H}_4\text{O}_6$ (Sodium hydrogen tartrate) (D) (i) HClO_4 (ii) NaOH
- Q.13 In which of the following process, the number of electrons exchanged per molecule of substrate is maximum ?
(A) Oxidation of FeS_2 to Fe^{3+} and SO_2 .
(B) Oxidation of As_2S_3 to As^{5+} and SO_4^{2-}
(C) Oxidation of $\text{K}_4[\text{Fe}(\text{CN})_6]$ by KMnO_4/H^+ .
(D) Oxidation of phenol by $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$.

Statement Based Questions

- Q.14 **Statement-1:** HgCl_2 does not respond chromyl chloride test.
Statement-2: HgCl_2 being covalent compound ionises upto 2 %.
(A) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1.
(B) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1.
(C) Statement-1 is True, Statement-2 is False.
(D) Statement-1 is False, Statement-2 is True.

Multiple Correct Option Type Questions

- Q.15 Which of the following sulphates are soluble in water ?
(A) CuSO_4 (B) PbSO_4 (C) Ag_2SO_4 (D) BaSO_4
- Q.16 Which of the following combination in an aqueous medium will give a blue color or precipitate -
(A) $\text{Fe}^{2+} + [\text{Fe}(\text{CN})_6]^{3-}$ (B) $\text{Fe}^{3+} + [\text{Fe}(\text{CN})_6]^{4-}$ (C) $\text{Co}^{2+} + \text{SCN}^-$ (D) $\text{Fe}^{3+} + \text{SCN}^-$

- Q.17** Statement(s) which favour zinc metal to be used as solvent in Parke's process.
 (A) For any composition, Zinc and lead do not attain a common melting point.
 (B) Zinc can be recovered from zinc-silver layer by distillation
 (C) Zinc is less denser than lead
 (D) Silver is more soluble in lead than in zinc

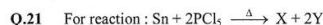


- If aqueous solution of Y is acidic then correct statement(s) is/are
 (A) One of the hydrolysed product of 'Y' undergoes tautomerism
 (B) On passing NH_3 gas into solution of 'X', its colour is intensified
 (C) 'X' gives chocolate brown colour ppt with $\text{K}_4[\text{Fe}(\text{CN})_6]$
 (D) 'X' produces precipitate with NH_4SCN

- Q.19** Blue colouration is observed in presence of starch for which of the following reaction(s).



- Q.20** Which of the following compound(s) can give precipitate with solution of chrome alum :
 (A) BaCl_2 (B) Na_2CO_3 (C) $(\text{NH}_4)_2\text{S}$ (D) excess KOH

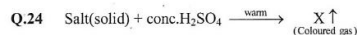


- Correct statement(s) is/are
 (A) HgCl_2 changes to black residue with excess of X
 (B) Oxyacid obtained from hydrolysis of Y, can undergo tautomeric change
 (C) 'X' is soluble in excess of NaOH
 (D) Y is polar and has plane of symmetry

- Q.22** Pair(s) of cations that can be separated by NH_4OH solution.



Which of the following cation(s) respond to the above reaction.



- If gas 'X' undergoes disproportionation in NaOH solution, then which of the following salt(s) can respond to the above reaction.
 (A) NaCl (B) NaNO_2 (C) NaNO_3 (D) NaBr

- Q.25** Which of the following cation gives deep blue colouration with starch and KI solution
 (A) $\text{Cu}^{2+}(\text{aq})$ (B) $\text{Fe}^{3+}(\text{aq})$ (C) $\text{Pb}^{2+}(\text{aq})$ (D) $\text{Hg}_2^{2+}(\text{aq})$

- Q.26** Which of the following combination will give black ppt

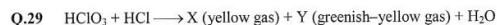


- Q.27** Which of the following salts impart a colour to the flame ?



- Q.28** Select the incorrect statement(s)

- (A) Ammonium ions produce yellow colour solution with sodium hexanitrocobaltate (III)
 (B) Ammonia gas develops a brown colour on filter paper moistened with a solution of MnCl_2 and H_2O_2
 (C) Ammonium ions produce white precipitate with saturated sodium hydrogen tartrate solution
 (D) Ammonium salts in presence of sodium hydroxide solution produces red precipitate with 4-nitrobenzene diazonium chloride reagent



Select the correct statement with respect to (X) and (Y)

- (A) 'X' is paramagnetic where as 'Y' is diamagnetic
 (B) Gas 'Y' liberates the reddish brown gas from an aqueous solution of bromide
 (C) Both are used for purifying drinking water
 (D) Both undergo disproportionation reactions when dissolved in alkali

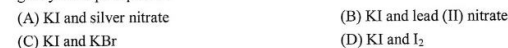
- Q.30** Which of the following statement(s) is/are true.

- (A) Only strontium sulphate being insoluble is precipitated by the addition of ammonium sulphate; CaSO_4 dissolves in $(\text{NH}_4)_2\text{SO}_4$ forming soluble complex
 (B) Barium chromate is insoluble in dil. acetic acid
 (C) $\text{Cr}(\text{OH})_3$ is soluble in NaOH and Br_2 water while $\text{Fe}(\text{OH})_3$ is insoluble
 (D) Cu and Cd separation is based upon the fact that in presence of KCN , only Cd is precipitated as sulphide on passing H_2S

- Q.31** A solution containing Br^- ions is treated with each of the following. Which of these will not liberate bromine gas ?



- Q.32** Which of the following pairs contain species, which react with each other on mixing their aqueous solution to give yellow precipitate ?



- Q.33 Which of the following statement is correct?
 (A) Fe^{2+} gives brown colour with ammonium thiocyanate
 (B) Fe^{2+} gives blue precipitate with potassium ferricyanide
 (C) Fe^{3+} gives brown colour with potassium ferricyanide
 (D) Fe^{3+} gives red colour with potassium ferrocyanide

Passage Based Questions

Passage # 1 (Ques. 34 - 36)

A white crystalline solid 'A' on boiling with caustic soda solution gives a gas 'B', which on passing through an alkaline solution of potassium, tetraiodomercurate (II) solution gives brown ppt. The substance 'A' on heating evolves a neutral gas 'C', which is inert at room temperature and reactive in presence of catalyst and does not give brown fumes with nitric oxide.

- Q.34 The gas 'B' is -
 (A) H_2S (B) NH_3 (C) HCl (D) CO_2
- Q.35 The gas 'C' is -
 (A) N_2O (B) O_2 (C) NO (D) N_2
- Q.36 The substance 'A' is -
 (A) NH_4Cl (B) NH_4NO_3 (C) NH_4NO_2 (D) NaNO_3

Passage # 2 (Ques. 37 - 39)

Borax Bead Test is carried out when the original mixture is coloured. It is done with the help of a clean platinum wire on which a small loop is made at the end. When borax is heated on platinum wire loop a transparent glass like bead is obtained. The hot bead is brought in contact with salt till it reacts with fused borax and colour is imparted to the bead. Bead colour is noted.

Colour of the Bead	Ion
1. Blue green	Cu^{2+}
2. Yellow	Fe^{3+}
3. Green	Cr^{3+}
4. Violet	Mn^{2+}
5. Dark blue	Co^{2+}
6. Brown	Ni^{2+}

- Q.37 Glassy bead is of -
 (A) $\text{B}_2\text{O}_3 + \text{NaBO}_2$ (B) $\text{NaBO}_2 + \text{Na}_3\text{BO}_3$ (C) $\text{Na}_2\text{B}_4\text{O}_7 + \text{B}_2\text{O}_3$ (D) $\text{SiO}_2 + \text{B}_2\text{O}_3$
- Q.38 Blue bead can be of -
 (A) $\text{Cu}(\text{BO}_2)_2$ (B) $\text{Co}(\text{BO}_2)_2$ (C) Both (A) and (B) (D) None of these
- Q.39 The flame used in Borax Bead Test is -
 (A) Reducing (B) Oxidising (C) Both (A) and (B) (D) Neither (A) nor (B)

Passage # 3 (Ques. 40 - 41)

(A) is one of the substance formed when SO_2 and PCl_5 react together. It is a fuming liquid which dissolves in water to give a pungent smelling liquid which turns blue litmus red. 5.95 g of (A) were dissolved in water and the solution was made upto 1 dm^3 . Dilute HNO_3 and excess of AgNO_3 solution was added to 100 cm^3 of this solution and the precipitate was collected dried and weighed. Dilute HCl followed by BaCl_2 solution was added to a second 100 cm^3 portion of solution. No precipitate formed, but on further addition of H_2O_2 solution to the mixture, a white precipitate was obtained. After collecting and drying, the precipitate was weighed.

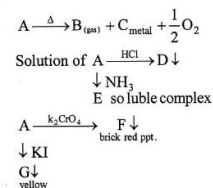
- Q.40 The fuming liquid dissolves in water to give a pungent smelling liquid which turns blue litmus red. The fuming liquid is :
 (A) SO_2Cl_2 (B) SOCl_2 (C) HCl (D) SO_2
- Q.41 The weight of precipitate obtained in first case is
 (A) 0.2 g (B) 1.435 g (C) 0.05 g (D) None of these

Passage # 4 (Ques. 42 - 43)

A colourless salt (A), soluble in water, gives a mixture of three gases B, C and D along with water vapours. (B) is blue, (C) is red and gas (D) is neutral to litmus paper. Gas (B) is also obtained when (A) is heated with NaOH and gives brown precipitate with $\text{K}_2[\text{HgI}_4]$, solution thus obtained gives white precipitate (E) with CaCl_2 solution in presence of acetic acid. (E) decolourises $\text{MnO}_4^- | \text{H}^+$. Gas (C) turns lime - water milky while gas (D) burns with blue flame and is fatal when inhaled. Now, answer the following questions :

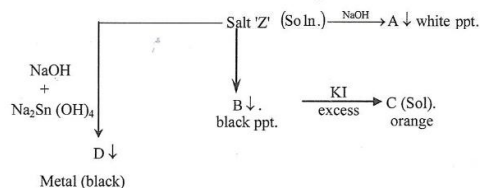
- Q.42 In which of the following manufacturing processes gas (B) is not at all involved neither as reactant nor as product
 (A) Solvay's process for the manufacturing of washing soda
 (B) Ostwald's process for the manufacture of nitric acid
 (C) Haber's process for the manufacture of ammonia
 (D) Birkeland-Eyde process for the manufacture of nitric acid
- Q.43 Gas (D) $\xrightarrow[\text{(ii) } \Delta]{\text{(i) NaOH}}$ Product (F) : F is :
 (A) sodium formate (B) sodium carbonate (C) sodium oxalate (D) none of these

Passage # 5 (Ques. 44 - 45)



- Q.44 Compound 'F' is
 (A) CuCrO_4 (B) ZnCrO_4 (C) CrO_2Cl_2 (D) Ag_2CrO_4
- Q.45 Compound 'G' is
 (A) Cu_2I_2 (B) CuI (C) AgI (D) ZnI_2

Passage # 6 (Ques. 46 - 47)



- Q.46 If Ppt. 'A' is boiled it turns yellowish white. This yellowish white compound is ?
 (A) S (B) ZnO (C) $\text{BiO} \cdot \text{OH}$ (D) HgO
- Q.47 Solution of salt (Z) + $\text{H}_2\text{S} \rightarrow$ E black ppt. E is ?
 (A) ZnS (B) NiS (C) HgS (D) Bi_2S_3

Passage # 7 (Ques. 48- 50)

An organic Lewis acid (A) which gives fumes in moist air and intensity of fumes is increased when a rod dipped in NH_4OH is brought near to it. An acidic solution of (A) on addition of NH_4Cl and NH_4OH gives a precipitate (B) which dissolves in NaOH solution. An acidic solution of A does not give precipitate with H_2S .

- Q.48 What will be structure of (A) ?
 (A) Planar (B) Trigonal planar (C) Pyramidal (D) Octahedral
- Q.49 What will be (A) in above sequence ?
 (A) BF_3 (B) AlCl_3 (C) GaCl_2 (D) ZnCl_2
- Q.50 The intensity of fumes increase due to the formation of—
 (A) NH_4OH (B) HCl (C) NH_4Cl (D) NaAlO_2

Column Matching Type Questions

- Q.51
- | Column – I
(Observations) | Column – II
(Compounds) |
|--|--|
| (A) Coloured fumes are evolved on warming with conc. H_2SO_4 | (P) $\text{Na}(\text{NH}_4)\text{HPO}_4 \cdot 4\text{H}_2\text{O}$ |
| (B) Ammonia gas is evolved on heating | (Q) NH_4I |
| (C) Precipitate is formed with AgNO_3 solution | (R) KBr |
| (D) Coloured residue is obtained on heating | (S) $\text{Pb}(\text{NO}_3)_2$ |

- Q.52
- | Column – I
(Observations) | Column – II
(Salts) |
|--|---------------------------------------|
| (A) Conc. H_2SO_4 plays its two roles | (P) NaBr |
| (B) Liberation of coloured gas/vapour with $\text{K}_2\text{Cr}_2\text{O}_7(\text{s})$ + Hot conc. H_2SO_4 | (Q) Na_2S |
| (C) Acidified KMnO_4 is decolourised | (R) $\text{Na}_2\text{C}_2\text{O}_4$ |
| (D) Vapour/gas is evolved on warming with dil H_2SO_4 and MnO_2 | (S) NaCl |

- Q.53
- | Column – I
(Compound) | Column – II
(Observations of Thermal decomposition) |
|--|--|
| (A) FeC_2O_4 | (P) Coloured metal oxide is obtained as residue |
| (B) $\text{Mg}(\text{NO}_3)_2$ | (Q) Metal cation is involved in redox reaction |
| (C) FeSO_4 | (R) paramagnetic gas is evolved |
| (D) $\text{HgCO}_3 \cdot \text{Hg}(\text{OH})_2$ | (S) Metallic residue is obtained finally |

- Q.54
- | Column – I | Column – II |
|--|--|
| (A) Diamagnetic gas is evolved on warming with conc. H_2SO_4 | (P) $\text{Br}^-(\text{aq})$ |
| (B) Acidified solution of given ion turns (KI+ starch) solution blue | (Q) $\text{S}_2\text{O}_3^{2-}(\text{aq})$ |
| (C) Reacts with Cl_2 water | (R) $\text{NO}_2^-(\text{aq})$ |
| (D) Ag^+ salt of given ion dissolves in excess NH_3 solution | (S) $\text{S}^{2-}(\text{aq})$ |
| | (T) $\text{C}_2\text{O}_4^{2-}(\text{aq})$ |

- Q.55
- | Column – I | Column – II |
|--|----------------------------------|
| (A) Chemical change is observed with excess Na_2O_2 | (P) FeSO_4 |
| (B) Metal sulphide ppt is formed with $(\text{NH}_4)_2\text{S}$ solution | (Q) $\text{Pb}(\text{NO}_3)_2$ |
| (C) Precipitate is formed with excess NaOH | (R) MnSO_4 |
| (D) White ppt with is formed BaCl_2 solution | (S) AgNO_3 |
| | (T) $\text{Cr}_2(\text{SO}_4)_3$ |

- Q.56 Match List I with List II :
- | List-I | List-II |
|---|--|
| (P) $\text{Rb}_2\text{CO}_3 > \text{K}_2\text{CO}_3 > \text{Na}_2\text{CO}_3$ | (1) Solubility in H_2O |
| (Q) $\text{SrSO}_4 > \text{CaSO}_4 > \text{MgSO}_4$ | (2) Thermal stability |
| (R) $\text{Rb} > \text{K} > \text{Na}$ | (3) Softness of metal |
| (S) $\text{Be} > \text{Mg} > \text{Ca}$ | (4) Ionization energy of metal |

Codes :

	P	Q	R	S
(A)	1	2	3	4
(B)	2	1	3	4
(C)	2	1,2	4	3
(D)	1,2	2	3	4

Numeric Response Type Questions

- Q.57** From the following cations, find out total number of metal cation(s) which produce black sulphide passing H_2S gas into their aqueous salt solution.
 $\text{Hg}^{2+}(\text{aq})$, $\text{Pb}^{2+}(\text{aq})$, $\text{Cu}^{2+}(\text{aq})$, $\text{Cd}^{2+}(\text{aq})$, $\text{Mn}^{2+}(\text{aq})$, $\text{Fe}^{2+}(\text{aq})$, $\text{Ni}^{2+}(\text{aq})$, $\text{Co}^{2+}(\text{aq})$, $\text{Fe}^{3+}(\text{aq})$
- Q.58** When Cl_2 water is dropwise added into KI solution, initially brown colouration appears, further on adding excess Cl_2 water brown colouration disappears due to formation of colorless compound (X) predict oxidation state of central atom in compound (X).
- Q.59** Consider the following reaction and predict the number of d –electrons in t_{2g} set of d-orbitals in purple complex $\text{Na}_2[\text{Fe}(\text{CN})_5\text{NO}] + \text{Na}_2\text{S} \rightarrow \text{purple complex}$
- Q.60** Total number of radicals which give coloured product on observation with conc. H_2SO_4
 CO_3^{2-} , NO_2^- , Cl^- , Br^- , I^- , NO_3^- , PO_4^{3-} , CrO_4^{2-} , SO_3^{2-}
- Q.61** Among the following metal sulphides, find the number of metal sulphides which are not soluble in yellow ammonium sulphide (YAS).
 CuS , Bi_2S_3 , As_2S_3 , SnS_2 , CdS , SnS , Sb_2S_3 , PbS , Sb_2S_5
- Q.62** HgS , PbS , CuS , CdS , SnS , Bi_2S_3
 (i) Among above sulphides, the no. of sulphides which are more soluble in water than MnS is x.
 (ii) $\text{Pb}(\text{OH})_2$, $\text{Ba}(\text{OH})_2$, $\text{Zn}(\text{OH})_2$, $\text{Ca}(\text{OH})_2$, $\text{Cu}(\text{OH})_2$, $\text{Fe}(\text{OH})_2$. Among the given hydroxides, the no. of hydroxides which are less soluble in water than $\text{Mg}(\text{OH})_2$ is y. Find $(x + y)/2$
- Q.63** Sodium borohydride on reaction with iodine in the presence of diglyme solution gives a gas (X) which is used as an important rocket fuel. The gas (X) on heating with ammonia forms an adduct which on calculate the number of dichloro derivative of compound (Y).

ANSWER KEY

Single Correct Option type Questions

- | | | | | | | |
|--------|--------|---------|---------|---------|---------|--------|
| 1. (C) | 2. (A) | 3. (A) | 4. (D) | 5. (B) | 6. (D) | 7. (D) |
| 8. (A) | 9. (C) | 10. (C) | 11. (C) | 12. (D) | 13. (C) | |

Statement Based Questions

14. (A)

Multiple Correct Option type Questions

- | | | | | | | |
|---------------|---------------|-------------|---------------|---------------|-------------|-------------|
| 15. (A,C) | 16. (A,B,C) | 17. (A,B,C) | 18. (A,B,C,D) | 19. (A,B,C,D) | 20. (A,B,C) | 21. (B,C,D) |
| 22. (A,B,D) | 23. (B,D) | 24. (B,C,D) | 25. (A,B) | 26. (A,C,D) | 27. (A,B,D) | 28. (A,D) |
| 29. (A,B,C,D) | 30. (A,B,C,D) | 31. (B,C) | 32. (A,B) | 33. (B,C) | | |

Passage Based Questions

- | | | | | | | |
|---------|---------|---------|---------|---------|---------|---------|
| 34. (B) | 35. (D) | 36. (C) | 37. (A) | 38. (C) | 39. (C) | 40. (B) |
| 41. (B) | 42. (D) | 43. (C) | 44. (D) | 45. (B) | 46. (C) | 47. (D) |
| 48. (B) | 49. (B) | 50. (C) | | | | |

Column Matching Type Questions

51. [A \rightarrow Q,R,S ; B \rightarrow P,Q ; C \rightarrow P,Q,R,T ; D \rightarrow S,T]
52. [A \rightarrow P,Q,R,T ; B \rightarrow P,S,T ; C \rightarrow P,Q,R,S,T ; D \rightarrow P,Q,R,S,T]
53. [A \rightarrow P,T ; B \rightarrow R,T ; C \rightarrow P,Q,T ; D \rightarrow Q,R,S,T]
54. [A \rightarrow P,Q,S,T ; B \rightarrow R ; C \rightarrow P,Q,R,T ; D \rightarrow P,Q,R,T]
55. [A \rightarrow P,R,S,T ; B \rightarrow P,Q,R,S ; C \rightarrow P,R,S ; D \rightarrow P,Q,R,S,T]
56. [D]

Numeric Response Type Questions

- | | | | | | | |
|---------|---------|---------|---------|---------|---------|---------|
| 57. (3) | 58. (5) | 59. (6) | 60. (5) | 61. (4) | 62. (2) | 63. (4) |
|---------|---------|---------|---------|---------|---------|---------|