

PRACTICE PAPERS CHEMISTRY OLYMPIADS

STAGE – 2

Paper – 12 Part – A

TIME: 1HR 30MIN

MAX MARKS: 180

- Attempt all the Questions.
- All questions carry +3 for right answer and -1 for wrong answer.
- Use of Calculator is allowed.

PERIODIC TABLE OF THE ELEMENTS

1 1A																		18 8A					
1 H 1.008												13 B 10.81	14 C 12.01	15 N 14.01	16 O 16.00	17 F 19.00	2 He 4.003						
3 Li 6.941	4 Be 9.012											5 B 10.81	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.18						
11 Na 22.99	12 Mg 24.31	3 B 10.81	4 C 12.01	5 N 14.01	6 O 16.00	7 F 19.00	8 Ne 20.18	9 Na 22.99	10 Mg 24.31	11 Al 26.98	12 Si 28.09	13 P 30.97	14 S 32.07	15 Cl 35.45	16 Ar 39.95								
19 K 39.10	20 Ca 40.08	21 Sc 44.96	22 Ti 47.88	23 V 50.94	24 Cr 52.00	25 Mn 54.94	26 Fe 55.85	27 Co 58.93	28 Ni 58.69	29 Cu 63.55	30 Zn 65.39	31 Ga 69.72	32 Ge 72.61	33 As 74.92	34 Se 78.97	35 Br 79.90	36 Kr 83.80						
37 Rb 85.47	38 Sr 87.62	39 Y 88.91	40 Zr 91.22	41 Nb 92.91	42 Mo 95.95	43 Tc (98)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3						
55 Cs 132.9	56 Ba 137.3	57 La 138.9	72 Hf 178.5	73 Ta 180.9	74 W 183.8	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)						
87 Fr (223)	88 Ra (226)	89 Ac (227)	104 Rf (261)	105 Db (262)	106 Sg (263)	107 Bh (262)	108 Hs (265)	109 Mt (266)	110 Ds (281)	111 Rg (272)	112 Cn (285)	113 Nh (286)	114 Fl (289)	115 Mc (289)	116 Lv (293)	117 Ts (294)	118 Og (294)						
58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm (145)	62 Sm 150.4	63 Eu 152.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0										
90 Th 232.0	91 Pa 231.0	92 U 238.0	93 Np (237)	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (252)	100 Fm (257)	101 Md (258)	102 No (259)	103 Lr (262)										

Name:

Correct Questions =

Wrong Questions =

Unattempt Questions =

Marks =

1. Fe_2O_3 reacts with excess CO at a high temperature according to the equation below.
- $$\text{Fe}_2\text{O}_3 + 3\text{CO} \rightarrow 2\text{Fe} + 3\text{CO}_2$$
- If 6.50 g of Fe_2O_3 yields 3.85 g of Fe what is the percentage yield of the reaction?
- (A) 59.2% (B) 69.9% (C) 76.3% (D) 84.7%
2. What is the final $[\text{Na}^+]$ in a solution prepared by mixing 70.0 mL of 3.00 M Na_2SO_4 with 30.0 mL of 1.00 M NaCl ?
- (A) 2.00 M (B) 2.40 M (C) 4.00 M (D) 4.50 M
3. The mass percentage of O in a potassium salt, $\text{K}_2\text{S}_2\text{O}_x$, is 36.0%. What is the formula of the polyatomic ion?
- (A) $\text{S}_2\text{O}_3^{2-}$ (B) $\text{S}_2\text{O}_5^{2-}$ (C) $\text{S}_2\text{O}_7^{2-}$ (D) $\text{S}_2\text{O}_8^{2-}$
4. Cu reacts with HNO_3 according to the equation
- $$\text{Cu} + \text{HNO}_3 \rightarrow \text{Cu}(\text{NO}_3)_2 + \text{NO} + \text{NO}_2 + \text{H}_2\text{O}$$
- If NO and NO_2 are formed in a 2:3 ratio, what is the coefficient for Cu when the equation is balanced with the simplest whole numbers?
- (A) 2 (B) 3 (C) 6 (D) 9
5. The active ingredient in commercial bleach is sodium hypochlorite, NaOCl , which can be determined by iodometric analysis as indicated in these equations.
- $$\text{OCl}^- + 2\text{H}^+ + 2\text{I}^- \rightarrow \text{I}_2 + \text{Cl}^- + \text{H}_2\text{O}$$
- $$\text{I}_2 + 2\text{S}_2\text{O}_3^{2-} \rightarrow \text{S}_4\text{O}_6^{2-} + 2\text{I}^-$$
- If 1.356 g of a bleach sample requires 19.50 mL of 0.100 M $\text{Na}_2\text{S}_2\text{O}_3$ solution, what is the percentage by mass of NaOCl in the bleach?
- (A) 2.68% (B) 3.70% (C) 5.35% (D) 10.7%
6. A 12.0 M acid solution that contains 75.0% acid by mass has a density of 1.57 g/mL. What is the identity of the acid?
- (A) HCl ($M = 36.5$) (B) $\text{CH}_3\text{CO}_2\text{H}$ ($M = 60.0$)
 (C) HBr ($M = 80.9$) (D) H_3PO_4 ($M = 98.0$)
7. Which solid is much more soluble in 1 M HCl than in H_2O ?
- (A) CaHPO_4 (B) CaCl_2
 (C) BaBr_2 (D) BaSO_4
8. Which experimental procedure is best suited to determine the H_2O_2 concentration in an aqueous solution?
- (A) precipitation with standard MgCl_2 solution
 (B) reaction with excess Zn to form H_2
 (C) titration with standard H_2SO_4
 (D) titration with standard KMnO_4
9. When equal volumes of 0.2 M solutions of the following compounds are mixed, which combination forms a red precipitate?
- (A) $\text{AgNO}_3 + \text{Na}_2\text{S}$ (B) $\text{AgNO}_3 + \text{K}_2\text{CrO}_4$
 (C) $\text{NiCl}_2 + \text{NaOH}$ (D) $\text{CuSO}_4 + \text{NH}_3$
10. Which combination represents an n-type semiconductor?
- (A) Si doped with Ge (B) Si doped with As
 (C) Si doped with Ga (D) As doped with Ga
11. In an experiment to determine the empirical formula of magnesium oxide, a student weighs an empty crucible then adds a strip of magnesium metal and reweighs the crucible. The crucible and magnesium are heated with a burner flame, which ignites the magnesium and forms a gray-white solid. After cooling, the crucible and solid are reweighed and the data are analyzed to give an empirical formula of Mg_5O_4 . Which could account for the observed Mg_5O_4 result rather than the expected MgO ?
- (A) Some of the magnesium reacts with atmospheric nitrogen to produce magnesium nitride.
 (B) A mixture of magnesium oxide and magnesium peroxide forms during combustion.
 (C) The piece of magnesium ribbon is shorter than recommended in the procedure.
 (D) The crucible and magnesium are heated longer than recommended in the procedure.
12. An acidic solution of methyl red has an absorbance of 0.451 at 530 nm in a 5.00 mm cell. Calculate the molarity of methyl red in this solution.
 [molar absorptivity = $1.06 \times 10^5 \text{ L}\cdot\text{mol}^{-1}\cdot\text{cm}^{-1}$ at 530 nm]
- (A) $2.13 \times 10^{-6} \text{ M}$ (B) $4.26 \times 10^{-6} \text{ M}$
 (C) $8.51 \times 10^{-6} \text{ M}$ (D) $1.05 \times 10^{-5} \text{ M}$

13. A sample of H_2 collected over H_2O at 23°C and a pressure of 732 mm Hg has a volume of 245 mL. What volume would the dry H_2 occupy at 0°C and 1 atm pressure?

[vp H_2O at $23^\circ\text{C} = 21$ mm Hg]

- (A) 211 mL (B) 218 mL
(C) 224 mL (D) 249 mL
14. Two samples of gas, one of argon and one of helium, have the same pressure, temperature and volume. Which statement is true assuming both gases behave ideally?
- (A) The helium sample contains more atoms than the argon sample and the helium atoms have a higher average speed.
(B) The two samples have the same number of atoms but the helium atoms have a higher average speed.
(C) The two samples have the same number of atoms and both types of atoms have the same average speed.
(D) The two samples have the same number of atoms but the argon atoms have a higher average speed.

15. For a sample of liquid in a closed container, which aspect(s) of vaporization depend on the surface area of the liquid?

I rate of vaporization II vapor pressure

- (A) I only (B) II only
(C) Both I and II (D) Neither I nor II
16. The formulas and boiling points of three compounds are given in this table.

Formula	$\text{CH}_3\text{CH}_2\text{CH}_3$	CH_3OCH_3	CH_3CHO
BP, K	231	250	294

The trend in boiling points is best attributed to variations in

- (A) covalent bonding. (B) dipole forces.
(C) dispersion forces. (D) hydrogen bonding.
17. Which statement about the triple point of a substance is correct?
- (A) The triple point for a substance varies with the pressure.
(B) The three phases (solid, liquid, gas) have the same density.
(C) The three phases (solid, liquid, gas) are in equilibrium.
(D) The three phases (solid, liquid, gas) are indistinguishable in appearance.

18. Diethyl ether has a normal boiling point of 34.6°C and a boiling point of -1.5°C at 100 mm Hg. What is the value of $\Delta H^\circ_{\text{vaporization}}$ in kJ/mol?

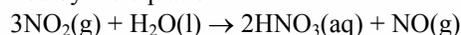
(A) 33.4 (B) 39.1 (C) 64.2 (D) 72.7

19. An ice cube at an unknown temperature is added to 25.0 g of liquid H_2O at 40.0°C . The final temperature of the 29.3 g equilibrated mixture is 21.5°C . What was the original temperature of the ice cube?

[C_p (J/g $\cdot^\circ\text{C}$) water = 4.184, ice = 2.06, $\Delta H^\circ_{\text{fusion}} = 333$ J/g]

(A) -6.5°C (B) -13.1°C
(C) -35.3°C (D) -56.8°C

20. One of the steps in the manufacture of nitric acid is represented by the equation



for which $\Delta H^\circ = -136.5$ kJ/mol. Determine $\Delta H^\circ_{\text{formation}}$ for NO_2 in kJ/mol.

Substance	$\text{NO}_2(\text{g})$	$\text{H}_2\text{O}(\text{l})$	$\text{HNO}_3(\text{aq})$	$\text{NO}(\text{g})$
$\Delta H^\circ_{\text{formation}}$?	-285.8	-207.0	91.3

(A) 33.2 (B) 99.6 (C) 102.2 (D) 157.0

21. For the reaction, $2\text{H}(\text{g}) \rightarrow \text{H}_2(\text{g})$, what are the signs of ΔH° and ΔS° ?

(A) $\Delta H^\circ < 0, \Delta S^\circ < 0$ (B) $\Delta H^\circ < 0, \Delta S^\circ > 0$
(C) $\Delta H^\circ > 0, \Delta S^\circ > 0$ (D) $\Delta H^\circ > 0, \Delta S^\circ < 0$

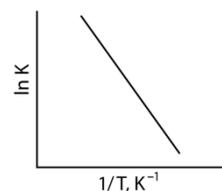
22. Which substance has the greatest molar entropy at 298 K?

(A) $\text{NO}_2(\text{g})$ (B) $\text{N}_2\text{O}_4(\text{l})$
(C) $\text{N}_2\text{O}_4(\text{g})$ (D) $\text{N}_2\text{O}_5(\text{s})$

23. For the process, $\text{CH}_3\text{OH}(\text{l}) \rightarrow \text{CH}_3\text{OH}(\text{g})$ $\Delta G^\circ = 4.30$ kJ/mol at 25°C . What is the vapor pressure of $\text{CH}_3\text{OH}(\text{l})$ at 25°C in mm Hg?

(A) 0.176 mm Hg (B) 14.0 mm Hg
(C) 134 mm Hg (D) 759 mm Hg

24. What quantity is represented by the slope of the line in this graph of the temperature dependence of the natural log of an equilibrium constant?



(A) $-\Delta G^\circ$ (B) $-\Delta G^\circ/R$
(C) $-\Delta H^\circ$ (D) $-\Delta H^\circ/R$

25. Which elementary reaction characteristic(s) change(s) significantly for a 10 °C temperature increase for a reaction carried out near room temperature?

- I fraction of molecules with required E_a
 II fraction of molecules with correct orientation

- (A) I only (B) II only
 (C) Both I and II (D) Neither I nor II

26. Hemoglobin (Hb) reacts with carbon monoxide according to the equation $4\text{Hb} + 3\text{CO} \rightarrow \text{Hb}_4(\text{CO})_3$. What is the rate law for this reaction at 20 °C?

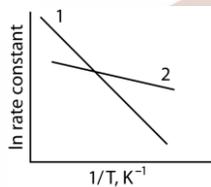
Trial	[Hb], M	[CO], M	Initial rate of disappearance of Hb $\text{M}\cdot\text{s}^{-1}$
1	1.50×10^{-6}	1.00×10^{-6}	9.20×10^{-7}
2	3.00×10^{-6}	1.00×10^{-6}	1.84×10^{-6}
3	3.00×10^{-6}	3.00×10^{-6}	5.52×10^{-6}

- (A) Rate = $k[\text{Hb}][\text{CO}]$ (B) Rate = $k[\text{Hb}][\text{CO}]^2$
 (C) Rate = $k[\text{Hb}]^2[\text{CO}]$ (D) Rate = $k[\text{Hb}][\text{CO}]^3$

27. What is the first-order rate constant for a reaction that is 36.5% complete in 0.0200 seconds?

- (A) 50.4 s^{-1} (B) 27.7 s^{-1} (C) 22.7 s^{-1} (D) 9.86 s^{-1}

28.



The diagram above depicts the temperature behavior of the rate constant, k , for two reactions, 1 and 2. Which statement about the k values at low temperatures and the activation energies, E_a , for these reactions is correct?

	k values at low T	E_a values
(A)	$k_{\text{rxn 1}} < k_{\text{rxn 2}}$	$E_{a \text{ rxn 1}} < E_{a \text{ rxn 2}}$
(B)	$k_{\text{rxn 1}} < k_{\text{rxn 2}}$	$E_{a \text{ rxn 1}} > E_{a \text{ rxn 2}}$
(C)	$k_{\text{rxn 1}} > k_{\text{rxn 2}}$	$E_{a \text{ rxn 1}} < E_{a \text{ rxn 2}}$
(D)	$k_{\text{rxn 1}} > k_{\text{rxn 2}}$	$E_{a \text{ rxn 1}} > E_{a \text{ rxn 2}}$

29. The hypothetical reaction $2\text{A} + \text{B} \rightarrow \text{C} + \text{D}$ is catalyzed by E as indicated in the possible mechanism below.

- (Step 1) $\text{A} + \text{E} \rightleftharpoons \text{AE}$ (fast)
 (Step 2) $\text{AE} + \text{A} \rightarrow \text{A}_2 + \text{E}$ (slow)
 (Step 3) $\text{A}_2 + \text{B} \rightarrow \text{C} + \text{D}$ (fast)

Which rate law best agrees with this mechanism?

- (A) Rate = $k[\text{A}][\text{B}]$ (B) Rate = $k[\text{A}][\text{E}]$
 (C) Rate = $k[\text{A}]^2[\text{E}]$ (D) Rate = $k[\text{A}]^2[\text{B}]$

30. Automobile catalytic converters are designed to

- (A) oxidize both CO and NO_x .
 (B) reduce both CO and NO_x .
 (C) oxidize CO and reduce NO_x .
 (D) reduce CO and oxidize NO_x .

31. A 1 M aqueous solution of which molecule has the lowest pH?

- (A) HOCl (B) H_2SO_3 (C) H_3PO_4 (D) H_2SO_4

32. If the initial pH values are the same for titrations of separate 25 mL samples of weak and strong monoprotic acids, which other value(s) is(are) also the same?

- I the pH at the equivalence point
 II the volume of base needed to reach the eq. point
 (A) I only (B) II only
 (C) Both I and II (D) Neither I nor II

33. The addition of 0.01 mol of which of the following to 100 mL of H_2O will give the most alkaline aqueous solution?

- (A) NH_3 (B) HONH_2
 (C) CH_3NH_2 (D) H_2NNH_2

34. What is the pH of a 1.00 L sample of a buffer solution containing 0.10 mol of benzoic acid and 0.10 mol of sodium benzoate to which 0.010 mol of NaOH has been added? [K_a benzoic acid = 6.5×10^{-5}]

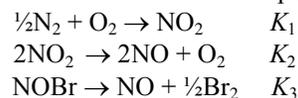
- (A) 4.27 (B) 4.23
 (C) 4.15 (D) 4.10

35. Equal volumes of 1×10^{-4} M solutions of Cd^{2+} and CO_3^{2-} ions are mixed in one flask and equal volumes of 1×10^{-4} M solutions of Ag^+ and CrO_4^{2-} ions are mixed in a second. Which substances precipitate?

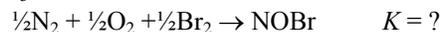
Formula	CdCO_3	Ag_2CrO_4
K_{sp}	5.2×10^{-12}	1.1×10^{-12}

- (A) CdCO_3 only (B) Ag_2CrO_4 only
 (C) Both (D) Neither

36. Consider these reactions and their corresponding K s.



Express the K value for the reaction below in terms of K_1 , K_2 , and K_3 .



- (A) $K_1 + K_2/2 - K_3$ (B) $K_1 + (K_2)^{1/2} - K_3$
 (C) $K_1K_2/2K_3$ (D) $K_1(K_2)^{1/2}/K_3$

37. What is the average oxidation state of copper in the superconductor $\text{YBa}_2\text{Cu}_3\text{O}_7$?
 (A) +2 (B) +2.33 (C) +2.67 (D) +3
38. $\text{Sn}^{4+}(\text{aq}) + 2\text{e}^- \rightarrow \text{Sn}^{2+}(\text{aq}) \quad E^\circ = 0.15 \text{ V}$
 $\text{Cr}^{3+}(\text{aq}) + \text{e}^- \rightarrow \text{Cr}^{2+}(\text{aq}) \quad E^\circ = -0.41 \text{ V}$
 According to the standard reduction potentials above, what is the value of E° for the reaction below?
 $2\text{Cr}^{3+}(\text{aq}) + \text{Sn}^{2+}(\text{aq}) \rightarrow 2\text{Cr}^{2+}(\text{aq}) + \text{Sn}^{4+}(\text{aq})$
 (A) -0.97 V (B) -0.56 V
 (C) $+0.56 \text{ V}$ (D) $+0.97 \text{ V}$
39. $\text{Ag}^+(\text{aq}) + \text{e}^- \rightarrow \text{Ag}(\text{s}) \quad E^\circ = 0.80 \text{ V}$
 $\text{Mg}^{2+}(\text{aq}) + 2\text{e}^- \rightarrow \text{Mg}(\text{s}) \quad E^\circ = -2.73 \text{ V}$
 Use the equations above to calculate the value of ΔG° (in kJ/mol) for the reaction:
 $\text{Mg}(\text{s}) + 2\text{Ag}^+(\text{aq}) \rightarrow \text{Mg}^{2+}(\text{aq}) + 2\text{Ag}(\text{s})$
 (A) 681 (B) 341 (C) -341 (D) -681
40. What is the $[\text{Fe}^{2+}]$ in a cell at 25°C for which $E = -0.458 \text{ V}$ vs a standard hydrogen electrode?
 $\text{Fe}^{2+}(\text{aq}) + 2\text{e}^- \rightarrow \text{Fe}(\text{s}) \quad E^\circ = -0.440 \text{ V}$
 (A) 0.246 M (B) 0.496 M
 (C) 2.01 M (D) 4.06 M
41. Rechargeable batteries include which of those below?
 I dry cell
 II lead-acid storage battery
 III nickel-cadmium battery
 (A) II only (B) I and II only
 (C) II and III only (D) I, II, and III
42. How many liters of chlorine gas, Cl_2 , measured at 0°C and 1 atm (STP) are released by the passage of 6.25 amperes for 1.85 hours through molten magnesium chloride?
 (A) 0.0805 L (B) 0.161 L
 (C) 4.83 L (D) 9.67 L
43. How many radial nodes does a 3d orbital possess?
 (A) 0 (B) 1 (C) 2 (D) 3
44. The successive ionization energies (in kJ/mol) for an element are shown below.
- | E_1 | E_2 | E_3 | E_4 | E_5 |
|-------|-------|-------|-------|-------|
| 577 | 1820 | 2740 | 11600 | 14800 |
- What is the electron configuration of this element?
 (A) $1s^2 2s^2 2p^6 3s^1$ (B) $1s^2 2s^2 2p^6 3s^2 3p^1$
 (C) $1s^2 2s^2 2p^6 3s^2 3p^3$ (D) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^3$
45. Albert Einstein's explanation of the photoelectric effect confirmed which of the following concepts?
 (A) Electrons can absorb energy and change levels in atoms.
 (B) Light energy can be converted into the mass of electrons.
 (C) Electrons have both particle and wave properties.
 (D) Light has both particle and wave properties.
46. Which gas phase ion in its ground state has the greatest number of unpaired electrons?
 (A) Cr^{3+} (B) Mn^{3+} (C) Fe^{3+} (D) Co^{3+}
47. For the element with the electron configuration $1s^2 2s^2 2p^6 3s^2$, one of the 3s electrons will be shielded from the nuclear charge most effectively by a
 (A) 1s electron (B) 2s electron
 (C) 2p electron (D) 3s electron
48. In which list are atoms of the elements Be, B, Mg and Al arranged from smallest to largest atomic radius?
 (A) $\text{Be} < \text{B} < \text{Mg} < \text{Al}$ (B) $\text{Mg} < \text{Be} < \text{Al} < \text{B}$
 (C) $\text{B} < \text{Be} < \text{Al} < \text{Mg}$ (D) $\text{Al} < \text{Mg} < \text{B} < \text{Be}$
49. Which ionic compound has the smallest lattice energy?
 (A) LiI (B) NaF (C) MgCl_2 (D) MgO
50. What is the geometry of BrF_3 ?
 (A) seesaw (B) T-shaped
 (C) trigonal planar (D) trigonal pyramidal
51. Three monosulfur fluorides are known: SF_2 , SF_4 and SF_6 . Of these, polar species include
 (A) SF_2 only. (B) SF_4 only.
 (C) SF_2 and SF_4 only. (D) SF_2 , SF_4 and SF_6 .
52. Which reaction forms a product with a trigonal planar geometry?
 (A) $\text{N}_2 + 3\text{H}_2 \rightarrow$ (B) $2\text{CO} + \text{O}_2 \rightarrow$
 (C) $\text{PCl}_3 + \text{Cl}_2 \rightarrow$ (D) $2\text{SO}_2 + \text{O}_2 \rightarrow$
53. What is the best description of the hybridization of each of the carbon atoms (from left to right) in the compound $\text{NCCH}_2\text{CO}_2\text{H}$?
 (A) sp, sp^3, sp^2 (B) sp, sp^2, sp^3
 (C) sp^2, sp^3, sp^2 (D) sp^2, sp^3, sp^3

54. How many isomers exist for the square planar species $\text{Pt}(\text{H}_2\text{O})(\text{NH}_3)\text{ClBr}$?
- (A) 1 (B) 2 (C) 3 (D) 4
55. Which polymer is manufactured by condensation?
- (A) Polyethylene terephthalate
(B) Polypropylene
(C) Polystyrene
(D) Polyvinylchloride
56. How many non-cyclic compounds have the formula C_4H_8 ?
- (A) 1 (B) 2 (C) 3 (D) 4
57. Which is a Grignard reagent?
- (A) $\text{Ag}(\text{NH}_3)_2^+$ (B) $\text{C}_2\text{H}_5\text{MgBr}$
(C) $\text{FeBr}_3 + \text{Br}_2$ (D) LiAlH_4
58. A racemic mixture consists of equal quantities of
- (A) cis-trans isomers. (B) diastereomers.
(C) enantiomers. (D) structural isomers.
59. How many carbon-carbon double bonds are present in linolenic acid, $\alpha\text{-C}_{17}\text{H}_{29}\text{COOH}$?
- (A) 1 (B) 2 (C) 3 (D) 4
60. Recently scientists reported a bacterium that they believe incorporates arsenic into its DNA by substituting it for another element. Which element in DNA is arsenic most likely to replace?
- (A) carbon (B) nitrogen
(C) oxygen (D) phosphorus

KEY

Number	Answer	Number	Answer
1.	D	31.	D
2.	D	32.	D
3.	B	33.	C
4.	D	34.	A
5.	C	35.	A
6.	D	36.	D
7.	A	37.	B
8.	D	38.	B
9.	B	39.	D
10.	B	40.	A
11.	A	41.	C
12.	C	42.	C
13.	A	43.	A
14.	B	44.	B
15.	A	45.	D
16.	B	46.	C
17.	C	47.	A
18.	B	48.	C
19.	B	49.	A
20.	A	50.	B
21.	A	51.	C
22.	C	52.	D
23.	C	53.	A
24.	D	54.	C
25.	A	55.	A
26.	A	56.	D
27.	C	57.	B
28.	B	58.	C
29.	C	59.	C
30.	C	60.	D