

SEAL

DO NOT OPEN THE SEAL UNTIL INSTRUCTED TO DO SO

Invigilator's signature

Question Booklet No.

730088

2018

PGT — PAPER - I : CHEMISTRY

Time : 2 Hours

Maximum Marks : 100

ROLL NO.

--	--	--	--	--

INSTRUCTIONS FOR CANDIDATES

1. This Question Booklet contains 50 optional questions. Each question comprises four responses (answers). You will select ONLY ONE response which you consider the best and darken the bubble on the OMR RESPONSE SHEET.
2. DO NOT write your Name or anything else except Roll No. and the actual answers to the question, anywhere on the OMR RESPONSE SHEET.
3. DO NOT handle your OMR RESPONSE SHEET in such a manner as to mutilate, fold, etc.
4. No candidate shall be admitted to the Examination Hall **20 minutes** after commencement of distribution of the Test Booklet. The invigilator of the Examination Hall will be the time-keeper and his decision in this regard is final.
5. No candidate shall have in his/her possession inside the Examination Hall any book, notebook or loose paper, calculator, mobile phone, etc., except his/her admit card and other things paper permitted by the Commission.
6. Immediately after the final bell indicating the closure of the examination, stop bubbling. Be seated till the OMR RESPONSE SHEET is collected by the invigilator, thereafter you may leave the Examination Hall.
7. Violation of any of the above rules will render the candidate liable to expulsion from the examination and disqualification from the examination, and according to the nature and gravity of his/her offence, he/she may be debarred from future examinations and interviews to be conducted by the Commission and other such organization (i.e., UPSC, SSC and SPSCs).

NB : CANDIDATES ARE ALLOWED TO TAKE THIS QUESTION BOOKLET ONLY AFTER COMPLETION OF 2 (TWO) HOURS OF EXAMINATION TIME.

DO NOT OPEN THE SEAL UNTIL INSTRUCTED TO DO SO

SEAL

SEAL

1. Which of the following is **not** an aromatic hydrocarbon?

- (A) Imidazole
- (B) Furan
- (C) Tetrahydrofuran
- (D) Pyridine

2. The compound having only sp^2 hybridized carbon atoms is

- (A) propene
- (B) propyne
- (C) butadiene
- (D) propane

3. The most suitable reagent for conversion of



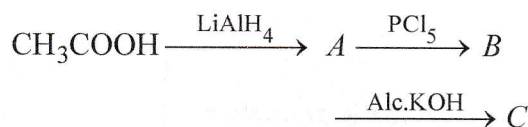
is

- (A) $KMnO_4$
- (B) $K_2Cr_2O_7$
- (C) CrO_3
- (D) PCC (pyridinium chlorochromate)

4. Which one of the following bases is **not** present in DNA?

- (A) Quinoline
- (B) Adenine
- (C) Cytosine
- (D) Thymine

5. In the reaction



the product C is

- (A) acetaldehyde
- (B) acetylene
- (C) ethylene
- (D) acetyl chloride

6. Out of the following, the alkene that exhibits optical isomerism is

- (A) 3-methyl-2-pentene
- (B) 4-methyl-1-pentene
- (C) 3-methyl-1-pentene
- (D) 2-methyl-2-pentene

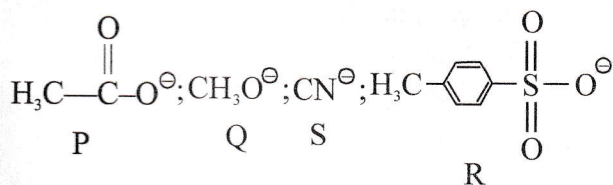
7. The nature of intermediate involved in Friedel-Crafts alkylation reaction is

- (A) carbanion
- (B) carbocation
- (C) radical
- (D) carbene

8. The reaction of toluene with Cl_2 in the presence of $FeCl_3$ gives predominantly

- (A) benzoyl chloride
- (B) benzyl chloride
- (C) *o*- and *p*-chlorobenzaldehyde
- (D) *m*-chlorobenzaldehyde

9. Which of the following is the correct order of decreasing S_N2 reactivity? (X = halide)
- (A) $RCH_2X > R_3CX > R_2CHX$
 (B) $RCH_2X > R_2CHX > R_3CX$
 (C) $R_3CX > R_2CHX > RCH_2X$
 (D) $R_2CHX > R_3CX > RCH_2X$
10. The secondary structure of protein refers to
- (A) α -helical backbone
 (B) hydrophobic interactions
 (C) sequence of α -amino acids
 (D) fixed configuration of the polypeptide backbone
11. Among the following the most basic compound is
- (A) *p*-nitroaniline
 (B) acetanilide
 (C) aniline
 (D) benzylamine
12. The decreasing order of nucleophilicity among the nucleophiles



is

- (A) $S > Q > P > R$
 (B) $Q > S > P > R$
 (C) $R > S > Q > P$
 (D) $P > Q > S > R$
13. Which of the following cyano complexes would exhibit diamagnetic behavior? (Atomic Number Cr = 24, Mn = 25, Fe = 26, Co = 27)
- (A) $[\text{Co}(\text{CN})_6]^{3-}$
 (B) $[\text{Fe}(\text{CN})_6]^{3-}$
 (C) $[\text{Mn}(\text{CN})_6]^{3-}$
 (D) $[\text{Cr}(\text{CN})_6]^{3-}$

14. Which of the following has a square planar geometry? (Atomic Number Co = 27, Ni = 28, Fe = 26, Pt = 78)
- (A) $[\text{CoCl}_4]^{2-}$
 (B) $[\text{FeCl}_4]^{2-}$
 (C) $[\text{NiCl}_4]^{2-}$
 (D) $[\text{PtCl}_4]^{2-}$
15. Which of the following will be named as dibromo-bis(ethylenediamine) chromium (III) bromide?
- (A) $[\text{Cr}(\text{en})_3]\text{Br}_3$
 (B) $[\text{Cr}(\text{en})_2\text{Br}_2]\text{Br}$
 (C) $[\text{Cr}(\text{en})\text{Br}_4]^-$
 (D) $[\text{Cr}(\text{en})\text{Br}_2]\text{Br}$
16. Aspirin is known as
- (A) acetyl salicylic acid
 (B) phenyl salicylate
 (C) acetyl salicylate
 (D) methyl salicylic acid
17. The correct order sequence which shows decreasing order of the ionic radii of the elements is
- (A) $\text{Al}^{3+} > \text{Mg}^{2+} > \text{Na}^+ > \text{F}^- > \text{O}^{2-}$
 (B) $\text{Na}^+ > \text{Mg}^{2+} > \text{Al}^{3+} > \text{O}^{2-} > \text{F}^-$
 (C) $\text{Na}^+ > \text{F}^- > \text{Mg}^{2+} > \text{O}^{2-} > \text{Al}^{3+}$
 (D) $\text{O}^{2-} > \text{F}^- > \text{Na}^+ > \text{Mg}^{2+} > \text{Al}^{3+}$
18. Among the following the maximum covalent character is shown by the compound
- (A) FeCl_2
 (B) SnCl_2
 (C) AlCl_3
 (D) MgCl_2

19. Which of the following statements is **wrong**?
- (A) The stability of hydrides increases from NH_3 to BiH_3 in Group 15 of the periodic table.
- (B) Nitrogen cannot form $d\pi-p\pi$ bond.
- (C) Single N—N bond is weaker than the single P—P bond.
- (D) N_2O_4 has two resonance structures.
20. The structure of IF_7 is
- (A) square pyramid
- (B) trigonal bipyramidal
- (C) octahedral
- (D) pentagonal bipyramid
21. In which of the following pairs of molecules / ions, both the species are not likely to exist?
- (A) H_2^+ , He_2^{2-}
- (B) H_2^- , He_2^{2-}
- (C) H_2^{2+} , He_2
- (D) H_2^- , He_2^{2+}
22. The first ionization potential of Na is 5.1 eV. The value of electron gain enthalpy of Na^+ will be
- (A) -2.55 eV
- (B) -5.1 eV
- (C) -10.2 eV
- (D) +2.55 eV
23. The correct set of four quantum numbers for the valence electrons of rubidium atom ($Z = 37$) is
- (A) 5, 0, 0, +1/2
- (B) 5, 1, 0, +1/2
- (C) 5, 1, 1, +1/2
- (D) 5, 0, 1, +1/2
24. The octahedral complex of a metal ion M^{3+} with four monodentate ligands L1, L2, L3, L4 absorbs wavelengths in the region of red, green, yellow and blue respectively. The increasing order of ligand strength of the four ligand is
- (A) $\text{L4} < \text{L3} < \text{L2} < \text{L1}$
- (B) $\text{L1} < \text{L3} < \text{L2} < \text{L4}$
- (C) $\text{L3} < \text{L2} < \text{L4} < \text{L1}$
- (D) $\text{L1} < \text{L2} < \text{L4} < \text{L3}$
25. Two Faraday of electricity is passed through a solution of CuSO_4 . The mass of copper deposited at the cathode is (Atomic mass of Cu = 63.5u)
- (A) 0 g
- (B) 63.5 g
- (C) 2 g
- (D) 127 g
26. Sodium metal crystallizes in a body centered cubic lattice with a unit cell edge of 4.28 Å. The radius of sodium atom is approximately
- (A) 1.86 Å
- (B) 3.22 Å
- (C) 5.72 Å
- (D) 0.93 Å
27. Which of the following is an anionic detergent?
- (A) Sodium lauryl sulphate
- (B) Cetyltrimethylammonium bromide
- (C) Glyceryl oleate
- (D) Sodium stearate
28. Which of the following ores is best concentrated by froth floatation method?
- (A) Siderite
- (B) Galena
- (C) Malachite
- (D) Magnetite

29. The molarity of a solution obtained by mixing 750 ml of 0.5 M HCl with 250 ml of 2 M HCl will be
 (A) 0.875 M
 (B) 1.00 M
 (C) 1.75 M
 (D) 0.0975 M
30. What is the SI unit of viscosity coefficient (η)?
 (A) Pascal
 (B) Nsm^{-2}
 (C) km^{-2}S
 (D) Nm^{-2}
31. The kinetic theory of gases predicts that total kinetic energy of a gas depends on
 (A) pressure of the gas
 (B) temperature of the gas
 (C) volume of the gas
 (D) pressure, volume and temperature of the gas
32. The enthalpies of elements in their standard state are taken as zero. The enthalpy of formation of a compound
 (A) is always negative
 (B) is always positive
 (C) may be positive or negative
 (D) is never negative
33. Which of the following statements is *not* correct?
 (A) ΔG is zero for a reversible reaction
 (B) ΔG is positive for a spontaneous reaction
 (C) ΔG is negative for a spontaneous reaction
 (D) ΔG is positive for a non-spontaneous process
34. When NH_4Cl is added to NH_4OH solution, the dissociation of ammonium hydroxide is reduced. It is due to
 (A) common ion effect
 (B) hydrolysis
 (C) oxidation
 (D) reduction
35. Oswald's dilution law is applicable to
 (A) strong electrolytes only
 (B) weak electrolytes only
 (C) non-electrolytes
 (D) strong and weak electrolytes
36. Which molecule / ion out of the following *does not* contain unpaired electrons?
 (A) N_2^+
 (B) O_2
 (C) O_2^{2-}
 (D) B_2
37. The elements in which electrons are progressively filled in 4f-orbitals are
 (A) actinides
 (B) transition elements
 (C) lanthanides
 (D) halogens
38. The sizes of isoelectronic species; F^- , Ne and Na^+ are affected by
 (A) nuclear charge
 (B) valence principal quantum number (n)
 (C) electron-electron interaction in the outer orbitals
 (D) the number of neutron
39. Elements belonging to the same sub-group of periodic table have generally the same
 (A) electronic configuration
 (B) number of electrons in the valence shell
 (C) chemical properties
 (D) physical properties

40. The correct order of electronegativity of hybrid orbitals of carbon is
(A) $sp < sp^2 < sp^3$
(B) $sp > sp^2 < sp^3$
(C) $sp > sp^2 > sp^3$
(D) $sp < sp^2 > sp^3$
41. The radioactive isotope of hydrogen is
(A) hydrogen ion
(B) protium
(C) deuterium
(D) tritium
42. Which of the following orbitals has dumb-bell shape?
(A) s orbital
(B) p orbital
(C) f orbital
(D) d orbital
43. Azimuthal quantum number defines
(A) e/m ratio of electron
(B) spin of electron
(C) angular momentum of electron
(D) magnetic momentum of electron
44. The number of molecules in 16 g of methane is
(A) 3.0×10^{23}
(B) 6.022×10^{23}
(C) $16/6.022 \times 10^{23}$
(D) $16/3 \times 10^{23}$
45. The litres (L) of CO_2 represented by 4.4 g of CO_2 at standard temperature and pressure are
(A) 2.4 L
(B) 2.24 L
(C) 44 L
(D) 22.4 L
46. Which of the following gases is **not** a greenhouse gas?
(A) CO
(B) O_3
(C) CH_4
(D) H_2O vapour
47. The pollutant released in Bhopal gas tragedy was
(A) ammonia
(B) methyl isocyanate
(C) mustard gas
(D) nitrous gas
48. The highest boiling point is expected for
(A) isobutane
(B) n -octane
(C) 2,2,3,3-tetramethylbutane
(D) n -butane
49. Isopropyl bromide on Wurtz reaction gives
(A) hexane
(B) propane
(C) 2,3-dimethylbutane
(D) neohexane
50. An isomer of ethanol is
(A) methanol
(B) diethyl ether
(C) acetone
(D) dimethyl ether