

Seat No.	
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M.Phil / Ph.D. Entrance Examination, July - 2022**CHEMISTRY/APPLIED CHEMISTRY/INDUSTRIAL CHEMISTRY****Day and Date : Friday, 15 - 07 - 2022****Total Marks : 100****Time : 02.00 p.m. to 04.00 p.m.**

- Instructions :**
- 1) All questions are compulsory.
 - 2) Each question carries 2 marks.
 - 3) Answers should be marked in the given OMR answer sheet by darkening the appropriate option.
 - 4) Use black ball point pen only for marking the circle. Do not make any stray mark on the OMR Answer Sheet.
 - 5) Follow the instructions given on OMR Sheet.
 - 6) Rough work shall be done on the sheet provided at the end of question paper.
 - 7) Only non-programmable calculators are allowed.

- 1) A research paper is a brief report of research work based on _____
 - a) Primary Data only
 - b) Secondary Data only
 - c) Both Primary and Secondary Data
 - d) None of the above

- 2) What is the collection of terms or records in MARC called?
 - a) System
 - b) Network
 - c) Website
 - d) Database

- 3) Conference proceedings are considered as _____ documents.
 - a) Conventional
 - b) Primary
 - c) Secondary
 - d) Tertiary

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- 4) UNESCO assisted Model Public Library in India is located at _____
- a) Kolkata
 - b) Delhi
 - c) Mumbai
 - d) Chennai
- 5) Which of the following is not a “Graphic representation”?
- a) Pie Chart
 - b) Bar Chart
 - c) Table
 - d) Histogram
- 6) Protocol means _____
- a) Interchange of data between two devices
 - b) Interchange of data between two computers
 - c) Linkage between two computers
 - d) Linkage between two devices
- 7) The purpose of research is _____.
- a) to produce work of publishable quality.
 - b) that the empirical work should be testing a theory.
 - c) primarily to get more data.
 - d) to extend the conceptual understanding of a topic.
- 8) Why is it important to read original articles when you are reviewing the literature?
- a) To examine the validity of the conclusions.
 - b) To obtain an overview of methods and procedures.
 - c) To look for flaws in the method.
 - d) All of these
- 9) Generalized conclusion on the basis of a sample is technically known as _____
- a) statistical, inference of external validity of the research
 - b) data analysis and interpretation
 - c) parameter inference
 - d) all of the above

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- 10) The research antagonistic to ex-post facto research is _____
- a) experimental studies
 - b) normative researches
 - c) library researches
 - d) all of the above
- 11) If a researcher selects only 10 members as a sample from the total population of 5000 and considers it good because _____
- a) he was a good researcher
 - b) he was guided by his supervisor
 - c) the population was homogeneous
 - d) all of the above
- 12) Field study is related to _____
- a) real life situations
 - b) experimental situations
 - c) laboratory situations
 - d) none of the above
- 13) A researcher divides the populations into PG, graduates and 10+2 students and using the random digit table he selects some of them from each. This is technically called _____
- a) stratified sampling
 - b) stratified random sampling
 - c) representative sampling
 - d) none of these
- 14) _____ of following is bottom up approach to synthesis of nanostructures.
- a) Chemical bath deposition
 - b) Vacuum evaporation
 - c) Sputtering technique
 - d) Laser ablation
- 15) Electrical conductivity in metal nanoparticles depends on their _____
- a) bulk size
 - b) shape and size
 - c) resistance
 - d) free electrons

16) Van deemter's equation is

- a) $H = A + Bu + Cu$
- b) $H = A + \frac{B}{u} + Cu$
- c) $H = A + B^2 + Cu$
- d) $H = Abc + \frac{B}{u} + Cu$

17) Neutron activation analysis (NAA) is a nuclear process used for determining the _____

- Number of neutrons in solution
- Concentration of the elements in solution
- Concentration of nucleus in solution
- None of the above

18) The advantage of the Graphite Furnace for atomization in AAS lies

- a) smaller sample (microliter range) required
- b) ability to destroy organic materials before the atomization
- c) the possibility of programming the heating cycles
- d) all the above

19) A technique which measures change in physical property as a function of temperature/time is called _____

- a) TGA b) DTA
c) DSC d) Thermal Analysis

20) Differential thermal analysis (DTA) is a technique in which the _____ difference between the sample tested and a reference material is measured while both are subjected to the controlled temperature program.

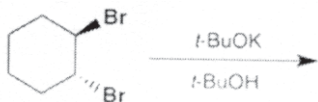
- a) heat
b) mass
c) temperature
d) enthalpy



21) Ion exchange chromatography principle is technologically applied for



- a) boiling water b) cooling water
c) purifying water d) removing organic pollutant

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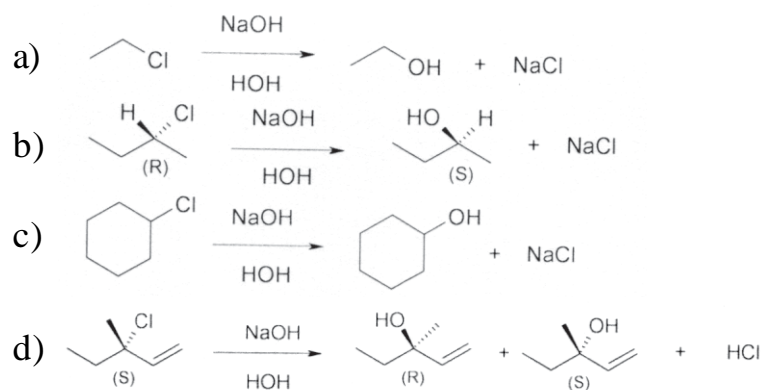
- 22)** How many alkenes are formed by E₂ elimination of HBr from 2-bromo-2,3-dimethylhexane using a strong base such as sodium methoxide?
- a) 1
c) 3
- b) 2
d) 4
- 23)** Which of the following statements is TRUE?
- a) To be diastereomers, a pair of molecules must have 2 or more chiral centers.
b) To be diastereomers, a pair of molecules must have at least 1 chiral center.
c) To be diastereomers, a pair of molecules must be stereoisomers.
d) To be diastereomers, a pair of molecules must be a racemate.
- 24)** Which of the following statements about hydroboration-oxidation is CORRECT?
- a) It is stereoselective and regioselective overall.
b) It is regioselective but not stereoselective overall.
c) It is stereoselective but not regioselective overall.
d) It is neither stereoselective nor regioselective
- 25)** Predict the product of the following reaction.
- $\text{CH}_3\text{COOH} + \text{LiAlH}_4 \rightarrow$
- a) CH₃CHO
c) CH₃CH₃
- b) no reaction
d) CH₃CH₂OH
- 26)** Which is the final main product of the following reaction of trans-1,2-dibromocyclohexane?



- a) 
- c) 

- b) 
- d) 

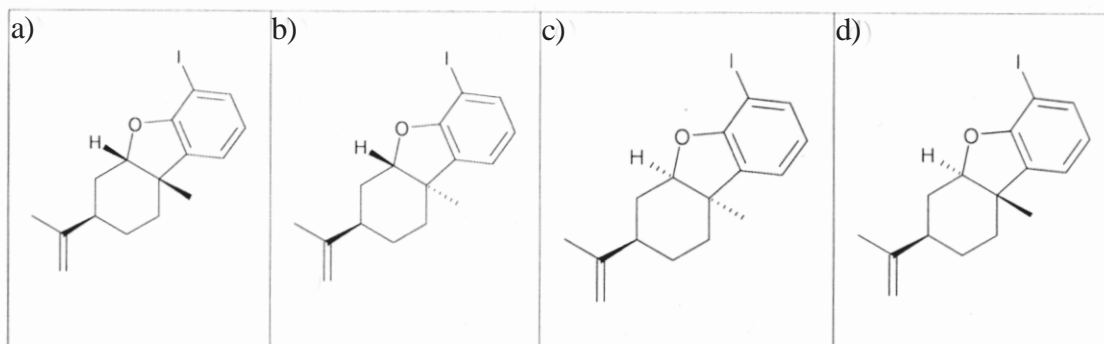
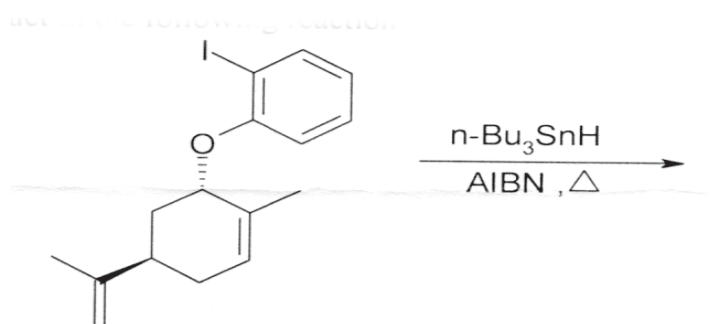
27) Which of the following is an S_N1 reaction?



28) Trimethyl silyl iodide is used for protection of _____

- a) Alcohol b) Amines
c) Acids d) Carbonyl group

29) The major product in the following reaction is,

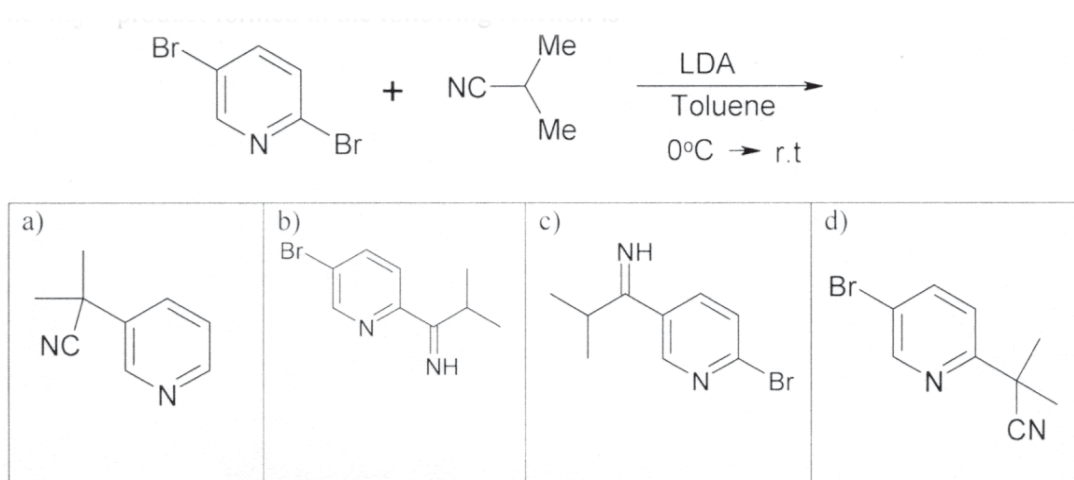


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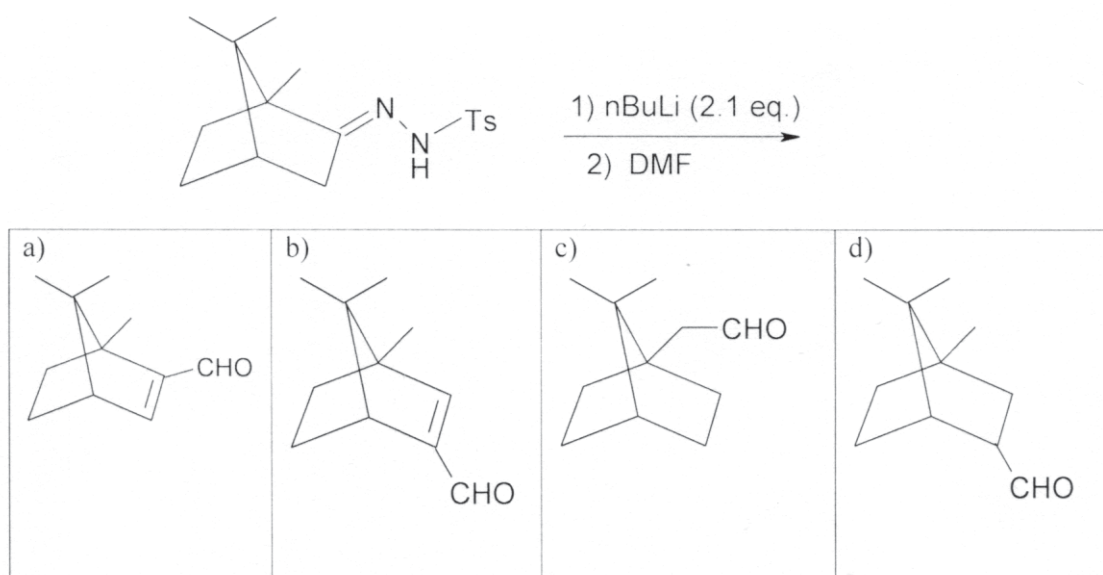
30) Protection- deprotection and coupling between two amino acids components are important steps in peptide synthesis. Identify which one of the following is not used as a protecting group in the peptide synthesis.

- a) Benzoyloxycarbonyl
- b) N, N'-dicyclohexylcarbodiimide (DCC)
- c) 9-Flourenylmethoxycarbonyl (Fmoc)
- d) tert-Butoxycarbonyl (BOC)

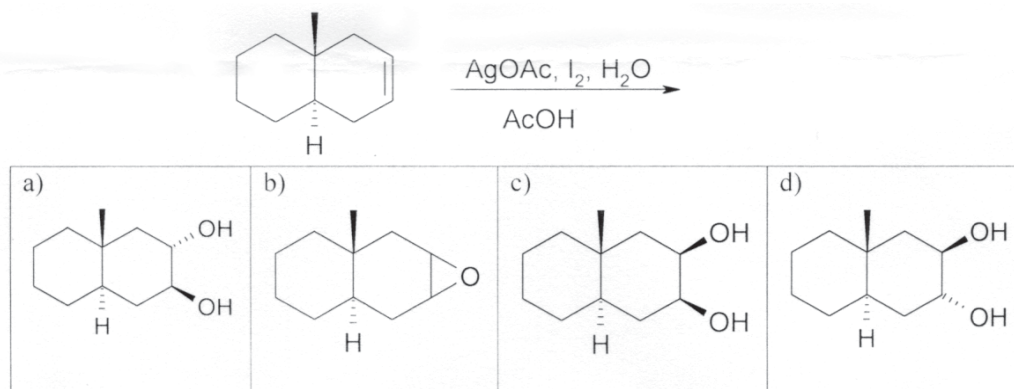
31) The major product formed in the following reaction is



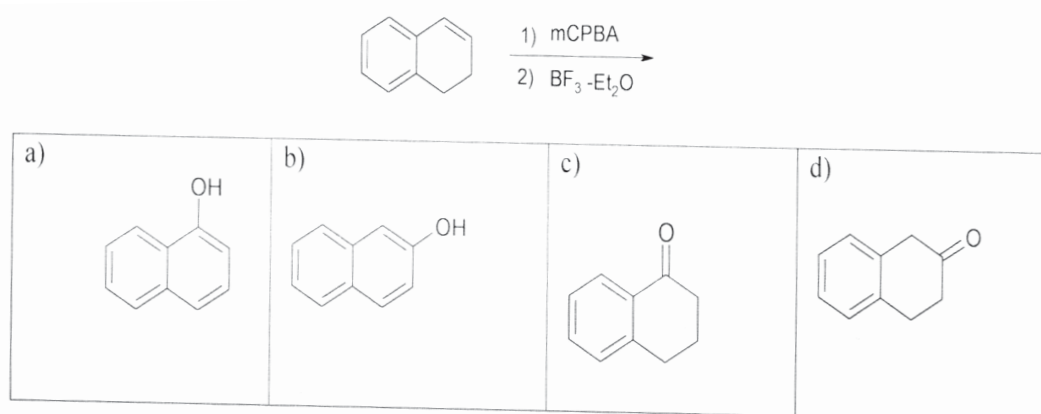
32) The major product in the following reaction is,



33) The product formed in the following Reaction sequence is,



34) The major product formed in the following reaction sequence is :



35) The x-rays generated in the x-ray tube, come out through which of the following?

- | | |
|---------------------|--------------------|
| a) Beryllium window | b) Tungsten window |
| c) Collimator | d) Target material |

36) XPS focuses on which of the following information?

- | | |
|-------------------------|-----------------------------------|
| a) Mass of the electron | b) Charge of the electron |
| c) Mass of atoms | d) Binding energy of the electron |

37) Which of the following species is resulting the zero-field splitting?

- | | |
|---|--|
| a) $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$ | b) $[\text{Cu}(\text{H}_2\text{O})_6]^+$ |
| c) $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$ | d) $[\text{Cu}(\text{NH}_3)_6]^{2+}$ |

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- 38)** The Mossbauer spectrum of $\text{Na}_2[\text{Fe}(\text{CN})_6]$ consists of a _____ while that of $[\text{Fe}(\text{CO})_5]$ Shows a quadruple _____
- a) doublet, singlet b) doublet, doublet
c) singlet, singlet d) singlet, doublet
- 39)** According to Stefan-Boltzmann law for black body emission :
- a) $E = \sigma T^4$ b) $E = h\nu$
c) $E = mc^2$ d) None of these
- 40)** Emission of which one of the following leaves both atomic number and mass number unchanged?
- a) positron b) neutron
c) gamma radiation d) alpha-particle
- 41)** The method of zone refining is used to prepare ultrapure sample of---
- a) Cu b) Ag
c) Au d) Ge
- 42)** Complete the equation : $(\delta S / \delta E)_V = ?$
- a) T^{-1} b) T
c) $T^{3/2}$ d) T^2
- 43)** The partial molar volume of ethanol and water are 18.0 and $55.0 \text{ cm}^3 \text{ mol}^{-1}$ respectively what will be the total volume of a liquid mixture containing one mole each of ethanol and water?
- a) 73 cm^3 b) 146 cm^3
c) 36.5 cm^3 d) 109.5 cm^3
- 44)** According to Rault's law $P_i = ?$
- a) $N_i P_i$ b) $N_i P_i^\circ$
c) $n_i P_i$ d) $n_i P_i^\circ$

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- 45) Appreciable activation energy is involved in the adsorption process. This statement is valid for
- a) Chemical adsorption b) Physical Adsorption
c) For both d) None of them
- 46) Which of the following is not an amino acid _____
- a) Alanine b) glycine
c) tryptophan d) benzidine
- 47) The ground-state configuration of the molecule is $1\pi^2 2\pi^2$, which corresponds to total π - electron energy of $4\alpha + 2 \times 5^{1/2} \beta$. The delocalization energy for this ground state configuration will be _____
- a) 0.602β b) 0.372β
c) 0.472β d) 0.618β
- 48) Free valence index is measure of
- a) π - bond energy b) Delocalization energy
c) Bond order d) Chemical reactivity
- 49) In X-ray Fluorescence spectroscopy the energy of the exciting radiation must be greater than the _____ energy of the atom of the material.
- a) rotational b) vibrational
c) Ionization d) kinetic
- 50) In Polarographic technique _____ current is used for quantitative analysis.
- a) Diffusion b) Residual
c) Migration d) All of them



Rough Work

Rough Work