

Aga Khan University

Resource: Chemistry Practice Questions

MBBS Programme

Note:

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1. When two electrons move in the same orbital, they do not have the same values of four quantum numbers. This is known as

- A. the Aufbau principle
- B. Pauli's Exclusion principle
- C. Hund's Rule
- D. the $n + 1$ rule

2. On the basis of VSEPR theory, the geometry of NH_3 molecule is

- A. trigonal pyramidal.
- B. trigonal planar.
- C. square planar.
- D. tetrahedral.

3. Which of the following pairs of molecules has greater forces of attraction?

- A. HF and CH_4
- B. HCl and CH_4
- C. CHCl_3 and H_2O
- D. NH_3 and H_2O

4. The direction of a chemical reaction can be predicted by means of its $\frac{[\text{Product}]}{[\text{Reactant}]}$ ratio. When this ratio is less than K_c , the reaction proceeds to

- A. forward direction.
- B. backward direction.
- C. at equilibrium.
- D. reactants do not exist.

5. Which of the following is a correct representation of Henderson's equation?

- A. $\text{pH} = \text{pK}_a - \log \frac{[\text{salt}]}{[\text{acid}]}$
- B. $\text{pH} = \text{pK}_a + \log \frac{[\text{salt}]}{[\text{acid}]}$
- C. $\text{pH} = \text{pK}_a - \log \frac{[\text{acid}]}{[\text{salt}]}$
- D. $\text{pH} = \text{pK}_a + \log \frac{[\text{acid}]}{[\text{salt}]}$

6. Which of the following is strongest oxy acid of chlorine?

- A. HClO
- B. HClO₂
- C. HClO₃
- D. HClO₄

7. Which of the following is obtained as a final product when acetylene is added to water in the presence of mercuric sulphate that is dissolved in sulphuric acid at 75 C°?

- A. $\begin{array}{c} \text{O} \\ || \\ \text{CH}_3 - \text{C} - \text{H} \end{array}$
- B. $\begin{array}{c} \text{O} \\ || \\ \text{CH}_3 - \text{C} - \text{CH}_3 \end{array}$
- C. $\text{CH}_2 = \text{CH} - \text{OH}$
- D. $\text{CH}_3 - \text{CH} = \text{CH}_2$

8. Which of the following molecules shows higher reactivity, towards nucleophilic addition reactions?

- A. $\begin{array}{c} \text{O} \\ || \\ \text{CH}_3 - \text{C} - \text{CH}_3 \end{array}$
- B. $\begin{array}{c} \text{O} \\ || \\ \text{CH}_3 - \text{C} - \text{H} \end{array}$
- C. $\begin{array}{c} \text{O} \\ || \\ \text{CH}_3 - \text{C} - \text{CH}_2 - \text{CH}_3 \end{array}$
- D. $\begin{array}{c} \text{O} \\ || \\ \text{H} - \text{C} - \text{H} \end{array}$

9. Which of the following properties is responsible for the more acidic behaviour of phenols than of aliphatic alcohols?

- i. Stability of phenoxide ion
- ii. Delocalization of π - electrons

- A. (i) only
- B. (ii) only
- C. (i) and (ii) both
- D. Neither (i) nor (ii).

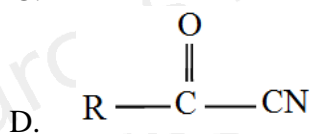
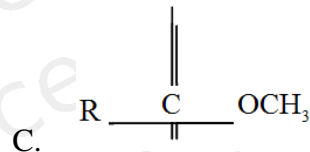
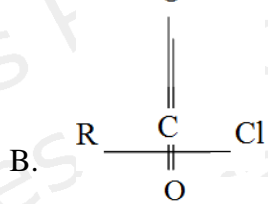
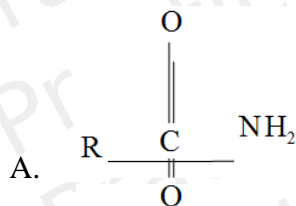
10. Which of the following carboxylic acids is more soluble in water? (2010,2014)

- A. $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{COOH}$
- B. $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{COOH}$
- C. $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{COOH}$
- D. $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{COOH}$

11. Which of the following can produce iodoform?

- A. Acetaldehyde.
- B. Formaldehyde.
- C. Benzaldehyde.
- D. Methanol

12. The derivative of carboxylic acid with highest reactivity is:



13. For the reaction $\text{N}_2 + 3\text{H}_2 \rightleftharpoons 2\text{NH}_3$ the value of K_c depends upon
- pressure
 - catalyst.
 - temperature.
 - initial concentration of reactant.
14. Diamond and graphite are two allotropic forms of carbon, their heat of combustions are $-395.41\text{Kj mol}^{-1}$ and -393.5Kj mol^{-1} respectively. Heat change in the conversion of graphite to diamond is
- -1.9Kj mol^{-1}
 - $+1.9\text{Kj mol}^{-1}$
 - $+788.9\text{Kj mol}^{-1}$
 - -788.9Kj mol^{-1}
15. In electrochemical series, the electrodes are compared with SHE and they are arranged in decreasing order of their
- cell voltage.
 - ionization potential.
 - reduction potential.
 - oxidation potential.
16. Which of the following groups has less dissociation energy and greater reactivity?
- $\text{C}-\text{I}$
 - $\text{C}-\text{Br}$
 - $\text{C}-\text{Cl}$
 - $\text{C}-\text{F}$
17. Which of the following intermediate states occurs in Williamson ether synthesis of alcohol? (2010,2014)
- Alkoxide ion
 - Carbocation
 - Oxide ion
 - Free radical

18. Reduction of aldehyde and ketones always gives

- A. acid chloride
- B. alcohols
- C. amide
- D. lactone

19. Which of the following reactions can not occur if α -hydrogen is NOT present in aldehydes and ketones?

- A. Reduction to alcohols
- B. Birch reduction
- C. Cope reaction
- D. Cannizzaro reaction

20. The boiling point of dimer of carboxylic acid is relatively higher than its monomer this is because of

- A. hydrogen bonding.
- B. dipole dipole forces.
- C. london forces.
- D. vanderwaal forces.

Question 21-40 refer to the following information:

Benzene, having the molecular formula of C_6H_6 , cannot be oxidized by alkaline $KMnO_4$ solution. Rather Benzene gives electrophilic substitution reactions with different electropiles in presence of a suitable Lewis acid catalyst. When an electrophilic substitution reaction takes place on a benzene ring, only one mono substituted benzene is obtained, showing that all six positions in the ring are equivalent. However, the introduction of a second group into the ring may give three isomeric disubstituted products; ortho, meta and para.

21. Which of the following species is the most active nitrating agent during the nitration of benzene?

- A. NO_3
- B. NO_2^+
- C. NO_2^-
- D. NO_2

22. Which of the following indication/statement is assumed, when benzene does not undergo oxidation reaction with alkaline KMnO_4 solution?

- A. Presence of unsaturation
- B. Absence of unsaturation
- C. Presence of carboxylic group
- D. Presence of acetyl group

23. Which of the following react with benzene in presence of Lewis acid catalyst to produce acetophenone?

- A. Acetone
- B. Acetic acid
- C. Acetyl chloride
- D. Acetic anhydride

24. You have been given benzene, bromine, nitric acid and sulphuric acid. Select the correct scheme to synthesize m-bromo nitrobenzene?

- A. Mix all except bromine
- B. Brominate the benzene and then nitrate
- C. Nitrate the benzene and then brominate
- D. Mix all except Sulphuric acid

25. Which of the following products are obtained when toluene undergoes nitration reaction?

- A. Meta nitro toluene only
- B. Ortho nitro toluene only
- C. Para nitro toluene only
- D. Mixture of ortho and para-nitro toluenes

26. When 2g of sugar is added to 1000ml of water, the boiling point of solution will be

- A. Increased
- B. Decreased
- C. Unaffected
- D. Doubled

27. Which is the correct percentage of Na in the mole of NaOH? Mol.wt of NaOH (40g)

- A. 40%
- B. 57.5%
- C. 59.5%
- D. 65.5%

28. Which of the following gases has the higher rate of diffusion?

- A. CH₄
- B. NH₃
- C. H₂S
- D. HCN

29. Which of the following molecule has linear shape?

- A. H₂S
- B. H₂O
- C. HCN
- D. NO₃ / NO₂

30. Which of the following molecule is expected to show hydrogen bonding?

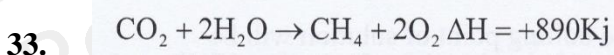
- A. CH₄
- B. H₂S
- C. CH₃OH
- D. CHCl₃

31. When 4g of NaOH is dissolved in one litre of aqueous solution, the concentration of this solution will be

- A. 1M
- B. 0.5M
- C. 0.25M
- D. 0.1M

32. For the reaction $\text{H}_2 + \text{I}_2 \rightarrow 2\text{HI}$, the rate = $K [\text{H}_2][\text{I}_2]$. What is the order of this reaction?

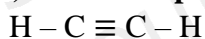
- A. First order
- B. Second order
- C. Third order
- D. Zero order



The given equation is an example of a/an

- A. Endothermic reaction
- B. Exothermic reaction
- C. Addition reaction
- D. Decomposition reaction

34. How many sigma (σ) bonds are present in the acetylene molecule shown below?

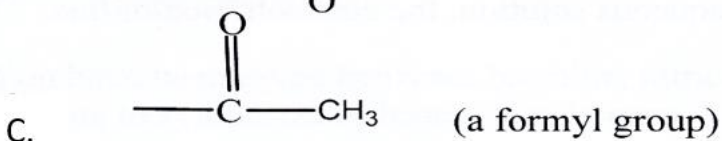
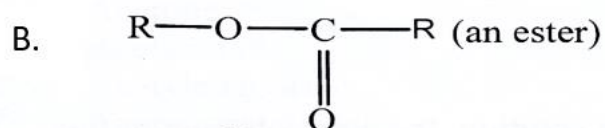
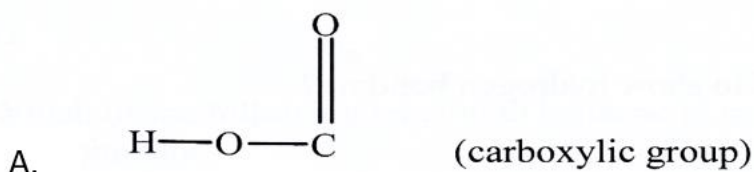


- A. 1
- B. 2
- C. 3
- D. 5

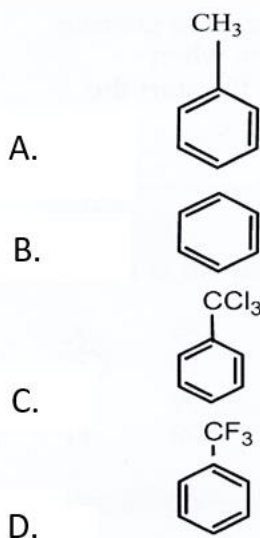
35. Phenols are more acidic than alcohols because anions of phenols are stabilized by

- A. Inductive effect
- B. Hyper conjugation
- C. Resonance effect
- D. Electromeric effect

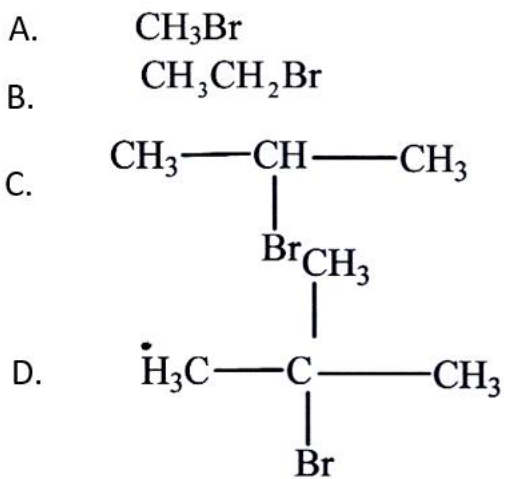
36. Which of the following functional groups is incorrectly identified?



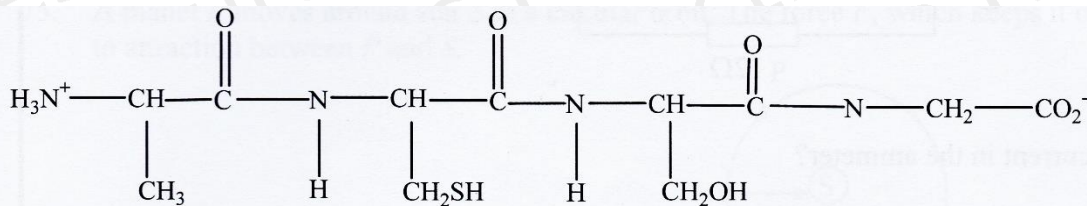
37. Which of the following molecules is more reactive for nitration?



38. Which of the following molecules show high reactivity towards S_N2 reaction?



39. The total number of peptide bonds present in the structure shown below is:



- A. 2
- B. 3
- C. 4
- D. 5

40. Polyvinyl chloride (pvc) is an important polymer and extensively used to form plastic things. Its formation takes place by:

- A. Cationic mechanism
- B. Anionic mechanism
- C. Radical mechanism
- D. Reduction mechanism

41. Which of the following statements is CORRECT for the given reaction?

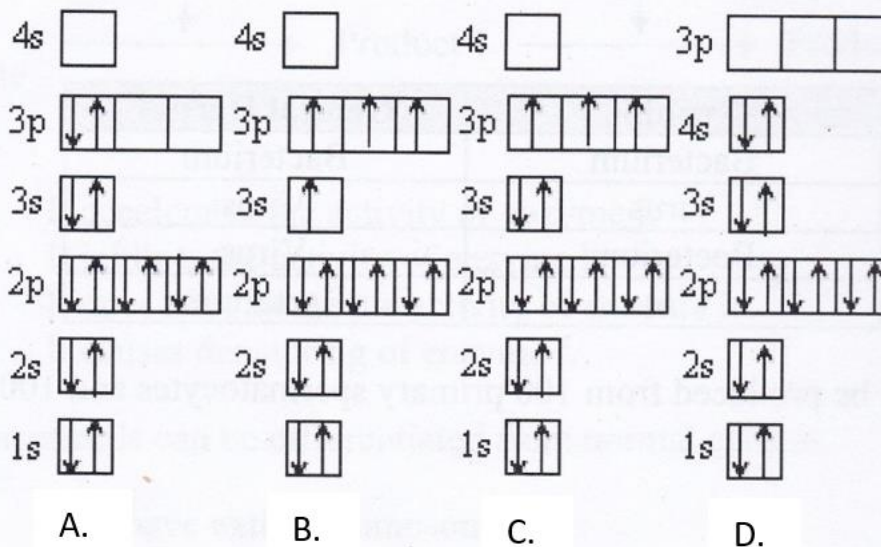


- A. Increase in pressure increases the rate of forward reaction.
- B. *Ozone formation* is an exothermic reaction.
- C. Ozone is highly unstable at room temperature.
- D. Increase in concentration of O_2 changes the value of K_c .

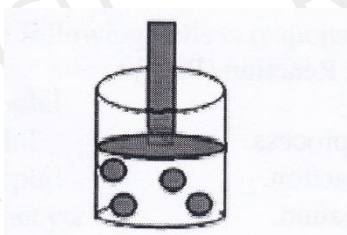
42. The hybridization of an oxygen atom in water is

- A. sp
- B. sp^2
- C. sp^3
- D. dsp³

43. Which of the following orbital box diagrams represents phosphorus?



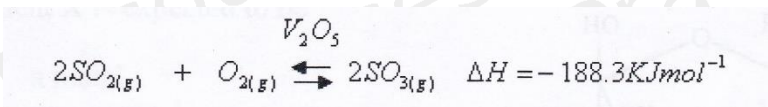
44. A cylinder of gas particles is shown below.



Which of the following causes an increase in the pressure of the gas when the piston is lowered?

- A. Increase in the volume of the gas
- B. Decrease in the volume of the gas
- C. Decrease in the pressure outside the cylinder
- D. Removal of some gas from the cylinder

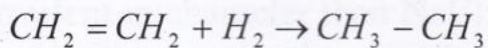
45. Which of the following statements is CORRECT for the following reaction at equilibrium?



- A. The value of K_p falls with increasing temperature.
B. The value of K_p falls with increasing pressure.
C. The value of K_p equals to K_c .
D. The addition of catalyst increases the equilibrium yield of SO_3 .
46. A buffer solution contains equal concentrations of X^- and HX . The K_b for X^- is 10^{-10} . The pH of the buffer is

- A. 4
B. 7
C. 10
D. 14

47. Which of the following shows the rate expression for the reaction given below?



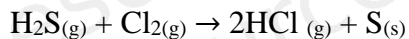
A. $\frac{dx}{dt} = k[\text{CH}_2 = \text{CH}_2][\text{H}_2]$

B. $\frac{dx}{dt} = k[\text{CH}_3 - \text{CH}_3]$

C. $\frac{dx}{dt} = k[\text{CH}_2 = \text{CH}_2]$

D. $\frac{dx}{dt} = k[\text{H}_2]$

48. Which of the following substances acts as an oxidizing agent?



- A. S
- B. Cl_2
- C. HCl
- D. H_2S

49. Which of the following is the end product of an acidic hydrolysis of methyl nitrile?

- A. Acetic acid
- B. Acetaldehyde
- C. Formalin
- D. Vinyl cyanide

50. Manure is used as a fertilizer for crop growth because it richly supplies plants with

- A. Sulphur and Zinc
- B. Oxygen and magnesium
- C. Nitrogen and phosphorus
- D. Carbon and hydrogen