JEE-MAIN EXAM APRIL, 2024
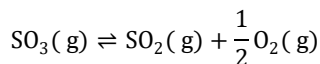
Date: - 04-04-2024 (SHIFT-2)
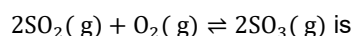
CHEMISTRY

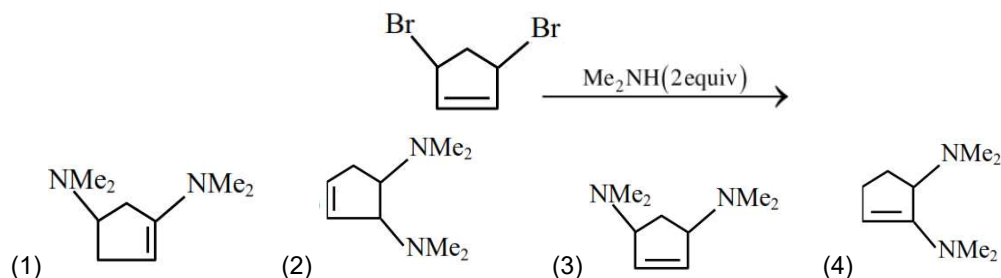## SECTION-A

1. The equilibrium constant for the reaction

$$SO_3(g) \rightleftharpoons SO_2(g) + \frac{1}{2}O_2(g)$$

is $K_C = 4.9 \times 10^{-2}$. The value of K_C for the reaction given below is

$$2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g) \text{ is}$$

(1) 4.9   (2) 41.6   (3) 49   (4) 416

2. Find out the major product formed from the following reaction. $[Me: -CH_3]$


3. When MnO_2 and H_2SO_4 is added to a salt (A), the greenish yellow gas liberated as salt (A) is :

(1) $NaBr$ (2) CaI_2 (3) KNO_3 (4) NH_4Cl

4. The correct statement/s about Hydrogen bonding is/are :

A. Hydrogen bonding exists when H is covalently bonded to the highly electro negative atom.

B. Intermolecular H bonding is present in o-nitro phenol

C. Intramolecular H bonding is present in HF.

D. The magnitude of H bonding depends on the physical state of the compound.

E. H-bonding has powerful effect on the structure and properties of compounds.
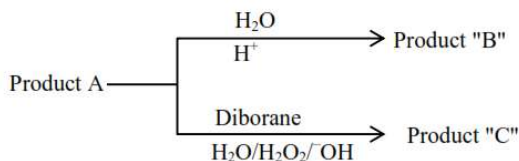
Choose the correct answer from the options given below :

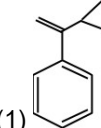(1) A only   (2) A, D, E only   (3) A, B, D only   (4) A, B, C only

5.
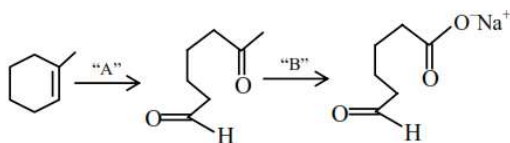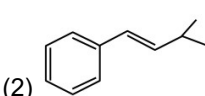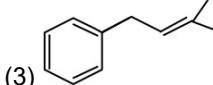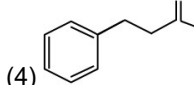

In the above chemical reaction sequence " A " and " B " respectively are :

(1) O_3, Zn/H_2O and $NaOH_{(alc.)}$ $/I_2$

(2) H_2O, H^+ and $NaOH_{(alc.)}$ $/I_2$

(3) H_2O, H^+ and $KMnO_4$

(4) O_3, Zn/H_2O and $KMnO_4$

6. Common name of Benzene-1, 2-diol is

(1) quinol   (2) resorcinol   (3) catechol   (4) o-cresol

7. $CH_3 - CH_2 - CH_2 - Br + NaOH \xrightarrow{C_2H_5OH}$ Product 'A'

Product A —
- $\xrightarrow[H^+]{H_2O}$ Product "B"
- $\xrightarrow[H_2O/H_2O_2/\ ^-OH]{Diborane}$ Product "C"

Consider the above reactions, identify product B and product C.

(1) B = C = 2-Propanol

(2) B = 2-Propanol C = 1-Propanol

(3) B = 1-Propanol C = 2-Propanol

(4) B = C = 1-Propanol

8. The adsorbent used in adsorption chromatography is/are

A. silica gel   B. alumina   C. quick lime   D. magnesia

Choose the most appropriate answer from the options given below :

(1) B only   (2) C and D only   (3) A and B only   (4) A only

9. $\xrightarrow[\Delta]{KOH(alc)}$ Product P is
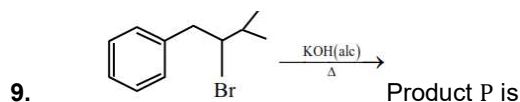
(1)   (2)   (3)   (4)

10. Correct order of stability of carbanion is
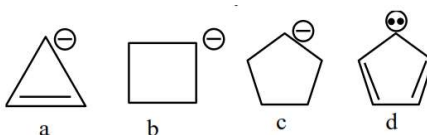
(1) c > b > d > a   (2) $a > b > c > d$ (3) $d > a > c > b$ (4) $d > c > b > a$

11. The correct order of the first ionization enthalpy is

(1) $Al > Ga > Tl$ (2) $Ga > Al > B$ (3) $B > Al > Ga$ (4) $Tl > Ga > Al$

12. If an iron (III) complex with the formula $\left[Fe(NH_3)_x(CN)_y\right]^-$ has no electron in its e_g orbital, then the value of $x + y$ is

(1) 5   (2) 6   (3) 3   (4) 4

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13. Fuel cell, using hydrogen and oxygen as fuels,

A. has been used in spaceship

B. has as efficiency of 40% to produce electricity

C. uses aluminium as catalysts

D. is eco-friendly

E. is actually a type of Galvanic cell only

(1) A,B,C only   (2) A,B,D only   (3) A,B,D,E only   (4) A,D,E only

14. Choose the Incorrect Statement about Dalton's Atomic Theory

(1) Compounds are formed when atoms of different elements combine in any ratio

(2) All the atoms of a given element have identical properties including identical mass

(3) Matter consists of indivisible atoms

(4) Chemical reactions involve recorganization of atoms

15. Match List I with List II

|	LIST I		LIST II
A.	α- Glucose and α-Galactose	I.	Functional isomers
B.	α- Glucose and β-Glucose	II.	Homologous
C.	α- Glucose and α-Fructose	III.	Anomers
D.	α- Glucose and α-Ribose	IV.	Epimers

Choose the correct answer from the options given below :

(1) A-III, B-IV, C-II, D-I   (2) A-III, B-IV, C-I, D-II

(3) A-IV, B-III, C-I, D-II   (4) A-IV, B-III, C-II, D-I

16. Given below are two statements:

Statement I : The correct order of first ionization enthalpy values of Li, Na, F and Cl is $Na < Li < Cl < F$.

Statement II : The correct order of negative electron gain enthalpy values of Li, Na, F and Cl is

$$Na < Li < F < Cl$$

In the light of the above statements, choose the correct answer from the options given below :

(1) Both Statement I and Statement II are true

(2) Both Statement I and Statement II are false

(3) Statement I is false but Statement II is true

(4) Statement I is true but Statement II is false

17. For a strong electrolyte, a plot of molar conductivity against (concentration) $^{1/2}$ is a straight line, with a negative slope, the correct unit for the slope is

(1) $Scm^2 \, mol^{-3/2} \, L^{1/2}$ (2) $Scm^2 \, mol^{-1} \, L^{1/2}$

(3) $Scm^2 \, mol^{-3/2} \, L$ (4) $Scm^2 \, mol^{-3/2} \, L^{-1/2}$

18. A first row transition metal in its +2 oxidation state has a spin-only magnetic moment value of $3.86 BM$. The atomic number of the metal is

(1) 25   (2) 26   (3) 22   (4) 23

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19. The number of unpaired d-electrons in

$[Co(H_2O)_6]^{3+}$ is

(1) 4   (2) 2   (3) 0   (4) 1

20. The number of species from the following that have pyramidal geometry around the central atom is

$S_2O_3^{2-}, SO_4^{2-}, SO_3^{2-}, S_2O_7^{2-}$

(1) 4   (2) 3   (3) 1   (4) 2

SECTION-B

21. The maximum number of orbitals which can be identified with $n = 4$ and $m_l = 0$ is

22. Number of compounds/species from the following with non-zero dipole moment is

$BeCl_2, BCl_3, NF_3, XeF_4, CCl_4, H_2OH_2 S, HBr, CO_2, H_2, HCl$

23. Three moles of an ideal gas are compressed isothermally from $60 L$ to $20 L$ using constant pressure of 5 atm. Heat exchange Q for the compression is Lit. atm.

24. From 6.55 g of aniline, the maximum amount of acetanilide that can be prepared will be $\times 10^{-1}$ g.

25. Consider the following reaction, the rate expression of which is given below

$A + B \rightarrow C$

$rate = k[A]^{1/2}[B]^{1/2}$

The reaction is initiated by taking 1M concentration A and B each. If the rate constant (k) is $4.6 \times 10^{-2} s^{-1}$, then the time taken for A to become 0.1M is sec. (nearest integer)

26. Phthalimide is made to undergo following sequence of reactions

$$Phthalimide \xrightarrow[\text{(ii)Benzylchloride}]{\text{(i)KOH}} 'P'$$
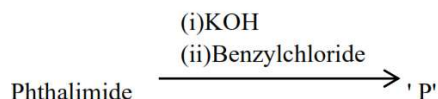
Total number of π bonds present in product 'P' is/are

27. The total number of 'sigma' and 'Pi' bonds in 2-oxohex-4-ynoic acid is

28. A first row transition metal with highest enthalpy of atomisation, upon reaction with oxygen at high temperature forms oxides of formula M_2O_n (where $n = 3,4,5$). The 'spin-only' magnetic moment value of the amphoteric oxide from the above oxides is BM (near integer)

(Given atomic number: Sc : 21, Ti : 22, V : 23,

Cr: 24, Mn: 25, Fe: 26, Co: 27, Ni: 28, Cu: 29, Zn: 30)

29. 2.7Kg of each of water and acetic acid are mixed, The freezing point of the solution will be $-x\,°C$.

Consider the acetic acid does not dimerise in water, nor dissociates in water x = (nearest integer)

[Given : Molar mass of water $= 18$ g mol^{-1}, acetic acid $= 60$ g mol^{-1}]

$^{K_f}H_2O$: 1.86 K kg mol^{-1}

^{K_f} acetic acid : 3.90 K kg mol^{-1}

freezing point : $H_2O = 273$ K, acetic acid $= 290$ K]

30. Vanillin compound obtained from vanilla beans, has total sum of oxygen atoms and π electrons is

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NTA ANSWERS

1.	(4)	2.	(2)	3.	(4)	4.	(2)	5.	(1)	6.	(3)	7.	(2)
8.	(3)	9.	(2)	10.	(4)	11.	(4)	12.	(2)	13.	(4)	14.	(1)
15.	(3)	16.	(1)	17.	(1)	18.	(4)	19.	(3)	20.	(3)	21.	(4)
22.	(5)	23.	(200)	24.	(95)	25.	(50)	26.	(8)	27.	(18)	28.	(0)
29.	(31)	30.	(11)										

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