TEST PAPER OF JEE(MAIN) EXAMINATION – 2019

(Held On Saturday 12th JANUARY, 2019) TIME : 9 : 30 AM To 12 : 30 PM

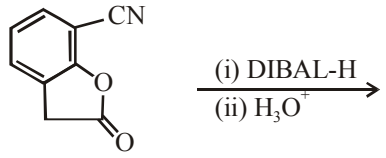
CHEMISTRY

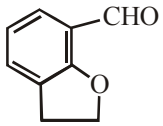
1. Iodine reacts with concentrated HNO_3 to yield Y along with other products. The oxidation state of iodine in Y, is :-

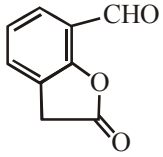
(1) 5 (2) 3 (3) 1 (4) 7

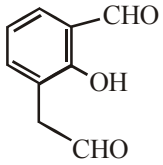
Ans. (1)

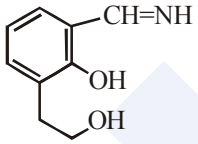
2. The major product of the following reaction is:



(1) 

(2) 

(3) 

(4) 

Ans. (3)

3. In a chemical reaction, $A + 2B \overset{K}{\rightleftharpoons} 2C + D$, the initial concentration of B was 1.5 times of the concentration of A, but the equilibrium concentrations of A and B were found to be equal. The equilibrium constant(K) for the aforesaid chemical reaction is :

(1) 16 (2) 4 (3) 1 (4) $\frac{1}{4}$

Ans. (2)

4. Two solids dissociate as follows

$A(s) \rightleftharpoons B(g) + C(g)$; $K_{p_1} = x\ atm^2$

$D(s) \rightleftharpoons C(g) + E(g)$; $K_{p_2} = y\ atm^2$

The total pressure when both the solids dissociate simultaneously is :-

(1) $(x + y)$ atm (2) $x^2 + y^2$ atm

(3) $2\left(\sqrt{x+y}\right)$atm (4) $\sqrt{x+y}$ atm

Ans. (3)

5. Freezing point of a 4% aqueous solution of X is equal to freezing point of 12% aqueous solution of Y. If molecular weight of X is A, then molecular weight of Y is :-

(1) A

(2) 3A

(3) 4A

(4) 2A

Ans. (2)

6. Poly-β-hydroxybutyrate-co-β-hydroxyvalerate(PHBV) is a copolymer of___.

(1) 3-hydroxybutanoic acid and 4-hydroxypentanoic acid

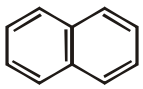
(2) 2-hydroxybutanoic acid and 3-hydroxypentanoic acid

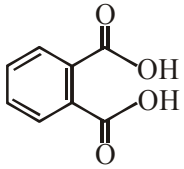
(3) 3-hydroxybutanoic acid and 2-hydroxypentanoic acid

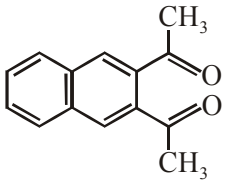
(4) 3-hydroxybutanoic acid and 3-hydroxypentanoic acid

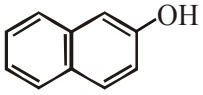
Ans. (4)

7. Among the following four aromatic compounds, which one will have the lowest melting point ?

(1) 

(2) 

(3) 

(4) 

Ans. (1)

8. $CH_3CH_2-\underset{\underset{Ph}{|}}{\overset{\overset{OH}{|}}{C}}-CH_3$ cannot be prepared by :

(1) $HCHO + PhCH(CH_3)CH_2MgX$

(2) $PhCOCH_2CH_3 + CH_3MgX$

(3) $PhCOCH_3 + CH_3CH_2MgX$

(4) $CH_3CH_2COCH_3 + PhMgX$

Ans. (1)

9. The volume of gas A is twice than that of gas B. The compressibility factor of gas A is thrice than that of gas B at same temperature. The pressures of the gases for equal number of moles are :

(1) $2P_A = 3P_B$

(2) $P_A = 3P_B$

(3) $P_A = 2P_B$

(4) $3P_A = 2P_B$

Ans. (1)

10. The element with Z = 120 (not yet discovered) will be an/a :

(1) transition metal

(2) inner-transition metal

(3) alkaline earth metal

(4) alkali metal

Ans. (3)

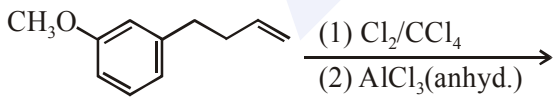
11. Decomposition of X exhibits a rate constant of 0.05 μg/year. How many years are required for the decomposition of 5 μg of X into 2.5 μg ?

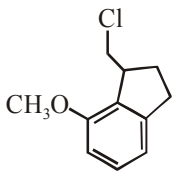
(1) 50 (2) 25

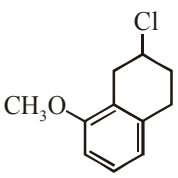
(3) 20 (4) 40

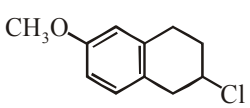
Ans.(1)

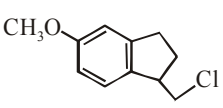
12. The major product of the following reaction is :



(1) 

(2) 

(3) 

(4) 

Ans. (4)

13. Given

Gas	H_2	CH_4	CO_2	SO_2
Critical Temperature/K	33	190	304	630

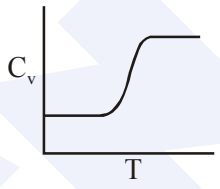
On the basis of data given above, predict which of the following gases shows least adsorption on a definite amount of charcoal ?

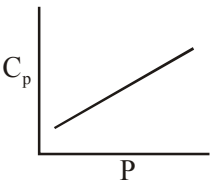
(1) H_2 (2) CH_4

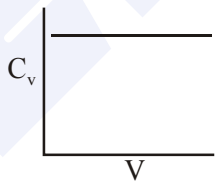
(3) SO_2 (4) CO_2

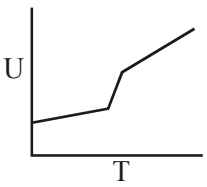
Ans. (1)

14. For diatomic ideal gas in a closed system, which of the following plots does not correctly describe the relation between various thermodynamic quantities ?

(1) 

(2) 

(3) 

(4) 

Ans. (2)

15. The standard electrode potential $E^{\ominus}$ and its temeprature coefficient $\left(\frac{dE^{\ominus}}{dT}\right)$ for a cell are 2V and -5×10^{-4} VK^{-1} at 300 K respectively. The cell reaction is

$Zn(s) + Cu^{2+}(aq) \rightarrow Zn^{2+}(aq) + Cu(s)$

The standard reaction enthalpy $\left(\Delta_r H^{\ominus}\right)$ at 300 K in kJ mol^{-1} is,

[Use R = $8JK^{-1}$ mol^{-1} and F = 96,000 $Cmol^{-1}$]

(1) –412.8 (2) –384.0

(3) 206.4 (4) 192.0

Ans. (1)

16. The molecule that has minimum/no role in the formation of photochemical smog, is :

(1) $CH_2 = O$ (2) N_2

(3) O_3 (4) NO

Ans. (2)

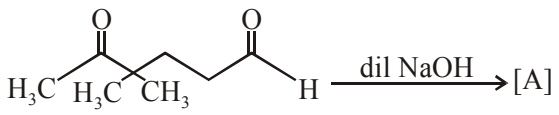
17. In the Hall-Heroult process, aluminium is formed at the cathode. The cathode is made out of :
(1) Platinum
(2) Carbon
(3) Pure aluminium
(4) Copper

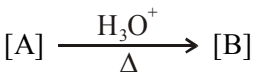
Ans. (2)

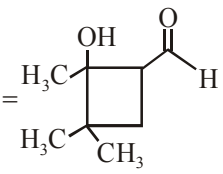
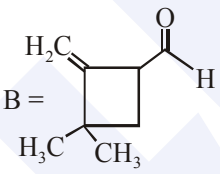
18. Water samples with BOD values of 4 ppm and 18 ppm, respectively, are :
(1) Highly polluted and Clean
(2) Highly polluted and Highly polluted
(3) Clean and Highly polluted
(4) Clean and Clean

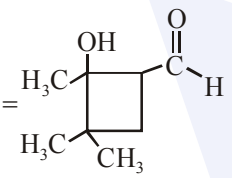
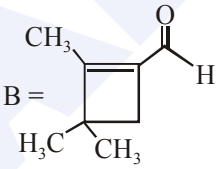
Ans. (3)

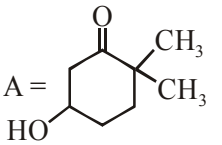
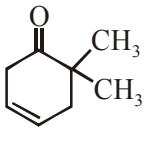
19. In the following reactions, products A and B are :

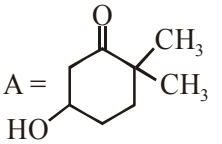
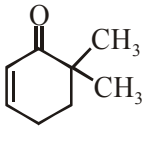




(1) A =  ; B = 

(2) A =  ; B = 

(3) A =  ; B = 

(4) A =  ; B = 

Ans. (4)

20. What is the work function of the metal if the light of wavelength 4000 Å generates photoelectrons of velocity 6×10^5 ms^{-1} form it ?
(Mass of electron = 9×10^{-31} kg
Velocity of light = 3×10^8 ms^{-1}
Planck's constant = 6.626×10^{-34} Js
Charge of electron = 1.6×10^{-19} JeV^{-1})
(1) 0.9 eV
(2) 4.0 eV
(3) 2.1 eV
(4) 3.1 eV

Ans. (3)

21. Among the following compounds most basic amino acid is :
(1) Lysine
(2) Asparagine
(3) Serine
(4) Histidine

Ans. (1)

22. The metal d-orbitals that are directly facing the ligands in $K_3[Co(CN)_6]$ are :
(1) d_{xz}, d_{yz} and d_{z^2}
(2) d_{xy}, d_{xz} and d_{yz}
(3) d_{xy} and $d_{x^2-y^2}$
(4) $d_{x^2-y^2}$ and d_{z^2}

Ans. (4)

23. The hardness of a water sample (in terms of equivalents of $CaCO_3$) containing 10^{-3} M $CaSO_4$ is :
(molar mass of $CaSO_4$ = 136 g mol^{-1})
(1) 100 ppm
(2) 50 ppm
(3) 10 ppm
(4) 90 ppm

Ans. (1)

24. The correct order for acid strength of compounds
CH≡CH, CH_3–C≡CH and CH_2=CH_2
is as follows :
(1) CH ≡ CH > CH_2 = CH_2 > CH_3–C ≡ CH
(2) HC ≡ CH > CH_3 –C ≡ CH > CH_2 = CH_2
(3) CH_3–C ≡ CH > CH_2 = CH_2 > HC ≡ CH
(4) CH_3–C ≡ CH > CH ≡ CH > CH_2 = CH_2

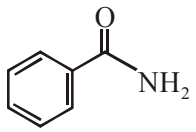
Ans. (2)

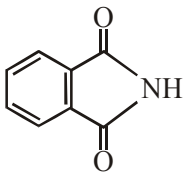
25. $Mn_2(CO)_{10}$ is an organometallic compound due to the presence of :

(1) Mn – Mn bond
(2) Mn – C bond
(3) Mn – O bond
(4) C – O bond

Ans. (2)

26. The increasing order of reactivity of the following compounds towards reaction with alkyl halides directly is :


(A)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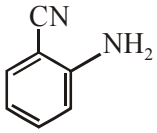
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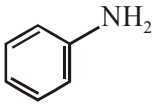
(D)

(1) (B) < (A) < (D) < (C)
(2) (B) < (A) < (C) < (D)
(3) (A) < (C) < (D) < (B)
(4) (A) < (B) < (C) < (D)

Ans. (2)

27. The pair of metal ions that can give a spinonly magnetic moment of 3.9 BM for the complex $[M(H_2O)_6]Cl_2$, is :

(1) Cr^{2+} and Mn^{2+} (2) V^{2+} and Co^{2+}
(3) V^{2+} and Fe^{2+} (4) Co^{2+} and Fe^{2+}

Ans. (2)

28. In the following reaction

$$\text{Aldehyde} + \text{Alcohol} \xrightarrow{HCl} \text{Acetal}$$

Aldehyde	Alcohol
HCHO	^{t}BuOH
CH_3CHO	MeOH

The best combinations is :
(1) HCHO and MeOH
(2) HCHO and ^{t}BuOH
(3) CH_3CHO and MeOH
(4) CH_3CHO and ^{t}BuOH

Ans. (1)

29. 50 mL of 0.5 M oxalic acid is needed to neutralize 25 mL of sodium hydroxide solution. The amount of NaOH in 50 mL of the given sodium hydroxide solution is :
(1) 40 g (2) 20 g (3) 80 g (4) 10 g

Ans. (Bonus)

30. A metal on combustion in excess air forms X, X upon hydrolysis with water yields H_2O_2 and O_2 along with another product. The metal is :
(1) Rb (2) Na (3) Mg (4) Li

Ans. (1)