CHEMISTRY

1. Assuming 2*s*-2*p* mixing is **NOT** operative, the paramagnetic species among the following is

[JEE (Adv)-2014 (Paper-2)]

(A) Be_2 (B) B_2

(C) C_2 (D) N_2

2. The standard state Gibbs free energies of formation of C(graphite) and C(diamond) at T = 298 K are

$\Delta_f G°[C(graphite)] = 0 \text{ kJ mol}^{-1}$

$\Delta_f G°[C(diamond)] = 2.9 \text{ kJ mol}^{-1}$

The standard state means that the pressure should be 1 bar, and substance should be pure at a given temperature. The conversion of graphite [C(graphite)] to diamond [C(diamond)] reduces its volume by 2×10^{-6} m^3 mol^{-1}. If C(graphite) is converted to C(diamond) isothermally at T = 298 K, the pressure at which C(graphite) is in equilibrium with C(diamond), is

[Useful information : 1 J = 1 kg m^2s^{-2}; 1 Pa = 1 kg m^{-1} s^{-2}; 1 bar = 10^5 Pa]

[JEE (Adv)-2017 (Paper-2)]

(A) 14501 bar (B) 29001 bar

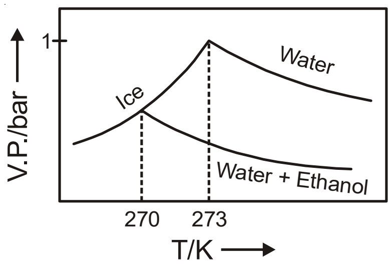
(C) 1450 bar (D) 58001 bar

3. Pure water freezes at 273 K and 1 bar. The addition of 34.5 g of ethanol to 500 g of water changes the freezing point of the solution. Use the freezing point depression constant of water as 2 K kg mol^{-1}. The figures shown below represent plots of vapour pressure (V.P.) versus temperature (T). [molecular weight of ethanol is 46 g mol^{-1}]

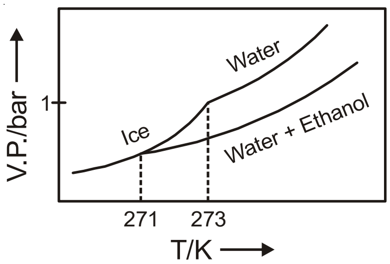
Among the following, the option representing change in the freezing point is

[JEE (Adv)-2017 (Paper-2)]

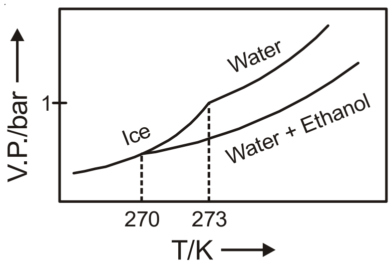
(A)



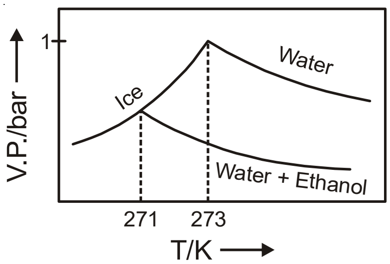
(B)



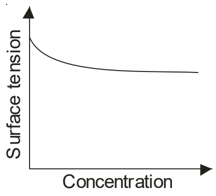
(C)

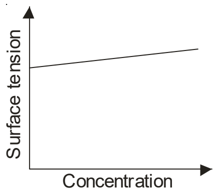


(D)



4. The qualitative sketches **I**, **II** and **III** given below show the variation of surface tension with molar concentration of three different aqueous solutions of KCl, CH_3OH and $CH_3(CH_2)_{11}OSO_3^-Na^+$ at room temperature. The correct assignment of the sketches is **[JEE (Adv)-2016 (Paper-2)]**

I.


II.


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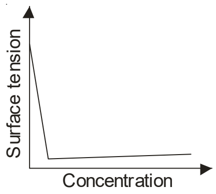


(A) **I :** KCl

II : CH_3OH

III : $CH_3(CH_2)_{11}OSO_3^-Na^+$

(B) **I :** $CH_3(CH_2)_{11}OSO_3^-Na^+$

II : CH_3OH

III : KCl

(C) **I :** KCl

II : $CH_3(CH_2)_{11}OSO_3^-Na^+$

III : CH_3OH

(D) **I :** CH_3OH

II : KCl

III : $CH_3(CH_2)_{11}OSO_3^-Na^+$

5. Among the following complexes (K – P), $K_3[Fe(CN)_6]$(K), $[Co(NH_3)_6]Cl_3$(L), $Na_3[Co(oxalate)_3]^{-3}$(M), $[Ni(H_2O)_6]Cl_2$(N), $K_2[Pt(CN)_4]$(O) and $[Zn(H_2O)_6](NO_3)_2$(P), the diamagnetic complexes are **[IIT-JEE-2011 (Paper-2)]**

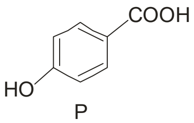
(A) K, L, M, N

(B) K, M, O, P

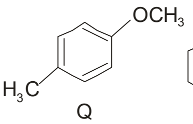
(C) L, M, O, P

(D) L, M, N, O

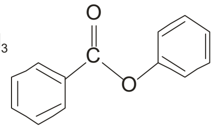
6. The compounds P, Q and S



P

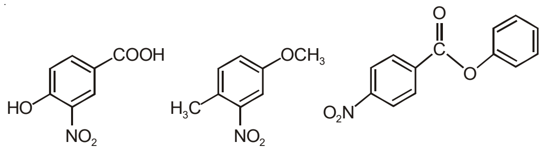


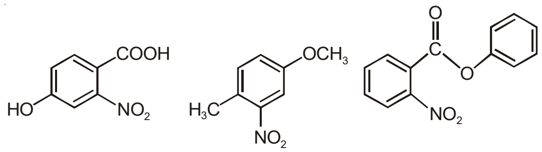
Q



S

were separately subjected to nitration using HNO_3/H_2SO_4 mixture. The major product formed in each case respectively, is **[IIT-JEE-2010 (Paper-2)]**

(A)


(B)


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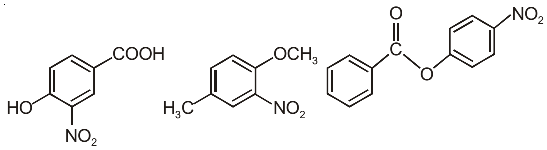

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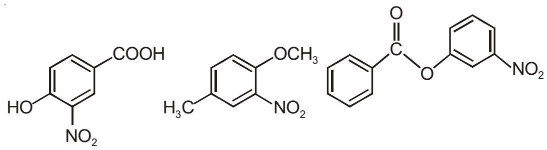
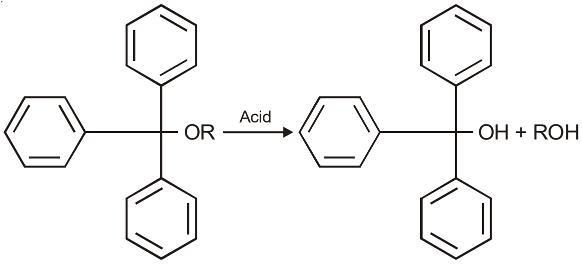


7. The acidic hydrolysis of ether (X) shown below is fastest when **[JEE (Adv)-2014 (Paper-2)]**



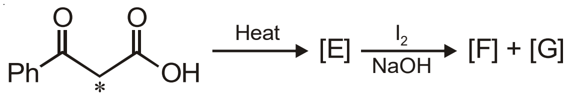
(A) One phenyl group is replaced by a methyl group

(B) One phenyl group is replaced by a *para*-methoxyphenyl group

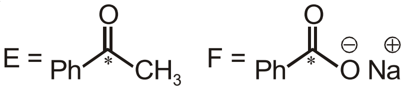
(C) Two phenyl groups are replaced by two *para*-methoxyphenyl groups

(D) No structural change is made to X

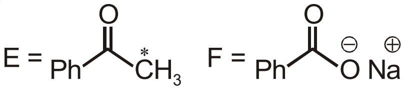
8. In the following reaction sequence, the correct structures of **E, F** and **G** are



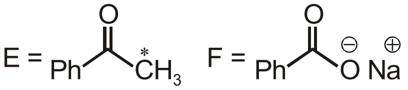
(∗ implies ^{13}C labelled carbon) **[IIT-JEE-2008 (Paper-2)]**

(A) 

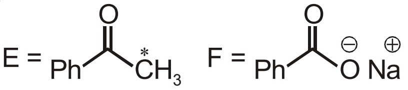
G = CHI_3

(B) 

G = CHI_3

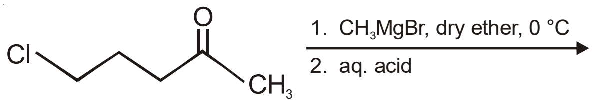
(C) 

G = $\overset{*}{C}HI_3$

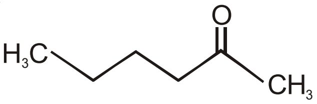
(D) 

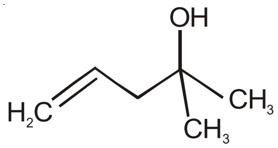
G = $\overset{*}{C}H_3I$

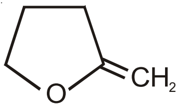
9. The major product in the following reaction is

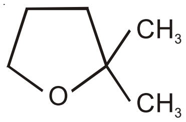


[JEE (Adv)-2014 (Paper-2)]

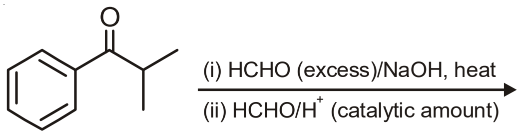
(A) 

(B) 

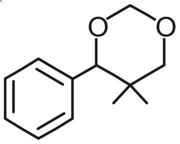
(C) 

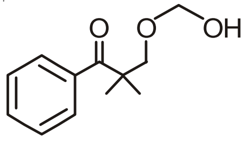
(D) 

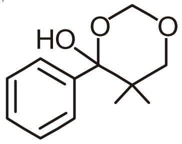
10. The major product of the following reaction sequence is



[JEE (Adv)-2016 (Paper-2)]

(A) 

(B) 

(C) 

(D)