CHEMISTRY

09 Jan. 2020 [Morning]

JEE MAIN PAPER ONLINE

RED COLOUR IS ANSWER IN JEE-MAIN

9 Jan Morning MCQ 1 4050361956 Coordination Compounds Inorganic Chemistry

1. $[Pd(F)(Cl)(Br)(I)]^{2-}$ has n number of geometrical isomers. Then, the spin–only magnetic moment and crystal field stabilisation energy [CFSE] of $[Fe(CN)_6]^{n-6}$, respectively, are :

[Note : Ignore the pairing energy]

(1) 2.84 BM and $-1.6\ \Delta_0$ (2*) 1.73 BM and $-2.0\ \Delta_0$

(3) 0 BM and $-2.4\ \Delta_0$ (4) 5.92 BM and 0

$[Pd(F)(Cl)(Br)(I)]^{2-}$ के ज्यामितीय समावयवों की संख्या n है। तब $[Fe(CN)_6]^{n-6}$ का स्पिन मात्र चुम्बकीय आघुर्ण तथा क्रिस्टल क्षेत्र स्थायीकरण ऊर्जा [CFSE] क्रमशः हैं :

[नोट : युग्मन ऊर्जा को छोड़ दीजिए]

(1) 2.84 BM तथा $-1.6\ \Delta_0$ (2) 1.73 BM तथा $-2.0\ \Delta_0$

(3) 0 BM तथा $-2.4\ \Delta_0$ (4) 5.92 BM तथा 0

Question ID : 4050361956

Option 1 ID : 4050367031

Option 2 ID : 4050367030

Option 3 ID : 4050367029

Option 4 ID : 4050367032

Sol. Number of Geometrical Isomers in square planar $[PdFClBrI]^{2-}$ are = 3

Hence, n = 3

$[Fe(CN)_6]^{3-}$

$Fe^{3+} = 3d^5$, According to CFT configuration is $t_{2g}^{221}e_g^{00}$

$$\mu = \sqrt{n(n+2)}$$

= 1.73 B.M.

$CFSE = -0.4\ \Delta_0 \times nt_{2g} + 0.6\ \Delta_0 \times n_{eg}$

$= -0.4\ \Delta_0 \times 5 = -2.0\ \Delta_0$

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2. If enthalpy of atomisation for $Br_2(\ell)$ is x kJ / mol and bond enthalpy for Br_2 is y kJ/mol, the relation between them :

(1) is x = y (2*) is x > y (3) is x < y (4) does not exist

यदि $Br_2(\ell)$ के लिए कणन एन्थैल्पी x kJ / mol हो तथा Br_2 के लिए आबन्ध एन्थैल्पी y kJ/mol हो, तो उनके बीच सम्बन्ध :

(1) x = y होगा (2) x > y होगा (3) x < y होगा (4) बनता नहीं है।

Question ID : 4050361946

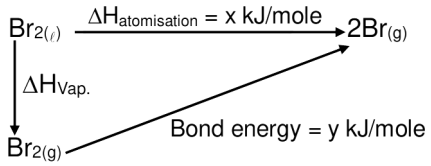
Option 1 ID : 4050366989

Option 2 ID : 4050366990

Option 3 ID : 4050366991

Option 4 ID : 4050366992

Sol.



$\Delta H_{atomisation} = \Delta H_{vap}$ + Bond energy

Hence x > y

9 Jan Morning MCQ 3 4050361953 Mole Concept-2 Physical Chemistry

3. The compound that cannot act both as oxidising and reducing agent is :

वह यौगिक जो उपचायक तथा अपचायक दोनों की तरह कार्य नहीं कर सकता, है :

(1) HNO_2 (2) H_2O_2 (3*) H_3PO_4 (4) H_2SO_3

Question ID : 4050361953

Option 1 ID : 4050367017

Option 2 ID : 4050367018

Option 3 ID : 4050367020

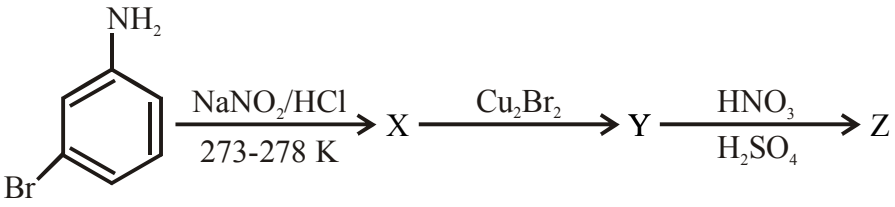
Option 4 ID : 4050367019

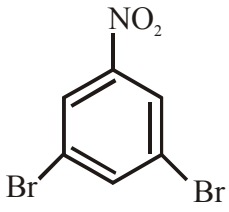
Sol. As in H_3PO_4 Phosphorous is present it's maximum oxidation number state hence it cannot act as reducing agent.

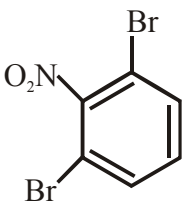
9 Jan Morning MCQ 4 4050361960 Aromatic Compounds organic chemistry

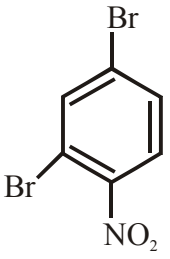
4. The major product Z obtained in the following reaction scheme is :

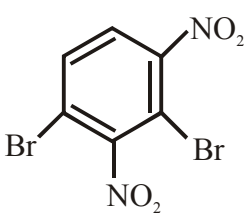
निम्न अभिक्रिया स्कीम में प्राप्त होने वाल मुख्य उत्पाद Z है :



(1) 

(2) 

(3*) 

(4) 

Question ID : 4050361960

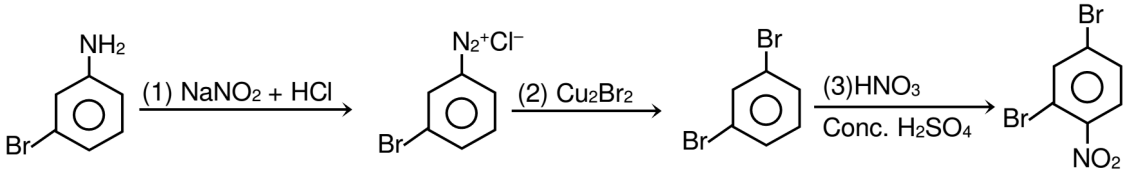
Option 1 ID : 4050367047

Option 2 ID : 4050367046

Option 3 ID : 4050367045

Option 4 ID : 4050367048

Sol.



9 Jan Morning MCQ 5 4050361955 Coordination Compounds Inorganic Chemistry

5. Complex X of compositon $Cr(H_2O)_6Cl_n$ has a spin only magnetic moment of 3.83 BM. It reacts with $AgNO_3$ and shows geometrical isomerism. The IUPAC nomenclature of X is :

(1*) Tetraaquadichlorido chromium (III) chloride dihydrate

(2) Dichloridotetraaqua chromium (IV) chloride dihydrate

(3) Tetraaquadichlorido chromium (IV) chloride dihydrate

(4) Hexaaqua chromium (III) chloride

$Cr(H_2O)_6Cl_n$ संघटन के संकुल X का स्पिन मात्र का चुम्बकीय आघूर्ण 3.83 BM है। यह $AgNO_3$ के साथ अभिक्रिया करता है और ज्यामितीय समावयवता प्रदर्शित करता है। X का आई यू पी ए सी नाम है :

(1) टेट्राऐक्वाडाइक्लोराइडो क्रोमियम (III) क्लोराइड डाइहाइड्रेट

(2) डाइक्लोराइडाटेट्राऐक्वा क्रोमियम (IV) क्लोराइड डाइहाइड्रेट

(3) टेट्राऐक्वाडाइक्लोराइडो क्रोमियम (IV) क्लोराइड डाइहाइड्रेट

(4) हेक्साएक्वाक्रोमियम (III) क्लोराइड

Question ID : 4050361955

Option 1 ID : 4050367027

Option 2 ID : 4050367028

Option 3 ID : 4050367026

Option 4 ID : 4050367025

Sol. $Cr(H_2O)_6Cl_n$ $(\mu_{complex})_{spin}$ = 3.83 B.M.

From data of magnetic moment oxidation number of Cr should be +3.

Hence complex is $Cr(H_2O)_6Cl_3$.

Complex shows geometrical isomerism therefore formula of complex is $[Cr(H_2O)_4Cl_2]Cl \cdot 2H_2O$.

It's IUPAC Name: Tetraaquadichloridochromium(III) chloride dihydrate.

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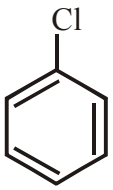
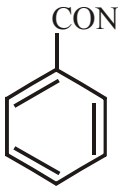
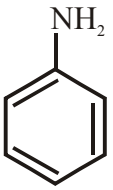
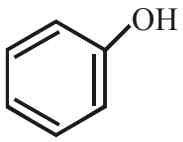
6. Which of these will produce the highest yield in Friedel Crafts reaction ?

फ्रीडल क्राफ्टस अभिक्रिया में इनमें से कौन अधिकतम उत्पाद देगा ?

(1*) 

(2) 

(3) 

(4) 

Question ID : 4050361957

Option 1 ID : 4050367036

Option 2 ID : 4050367035

Option 3 ID : 4050367033

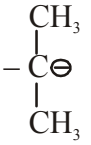
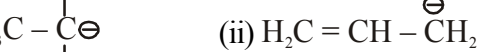
Option 4 ID : 4050367034

Sol. Aniline and phenol form complex with lewis acid so most reactive among the given compounds for Friedel Craft reaction is chlrobenzene.

9 Jan Morning MCQ 7 4050361958 General Organic Chemistry organic chemistry

7. The increasing order of basicity for the following intermediates is (from weak to strong)

निम्न मध्यवर्तियों के लिए क्षारीयता का बढ़ता क्रम है (दुर्बल से प्रबल) :

(i)  (ii)  (iii) (iv) (v)

(1*) (v) < (iii) < (ii) < (iv) < (i)

(2) (iii) < (i) < (ii) < (iv) < (v)

(3) (iii) < (iv) < (ii) < (i) < (v)

(4) (v) < (i) < (iv) < (ii) < (iii)

Question ID : 4050361958

Option 1 ID : 4050367038

Option 2 ID : 4050367039

Option 3 ID : 4050367040

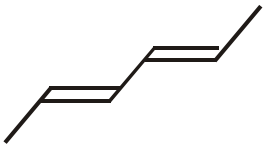
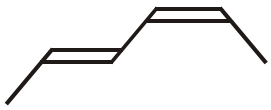
Option 4 ID : 4050367037

Sol. Basicity is inversely proportional to electronegativity.

9 Jan Morning MCQ 8 4050361962 General Organic Chemistry organic chemistry

8. The correct order of heat of combustion for following alkadienes is :

निम्न ऐल्काडाइन्स के लिए दहन ऊष्मा का सही क्रम है :

(a)  (b)  (c) 

(1) (a) < (c) < (b) (2) (c) < (b) < (a) (3) (b) < (c) < (a) (4*) (a) < (b) < (c)

Question ID : 4050361962

Option 1 ID : 4050367055

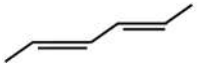
Option 2 ID : 4050367053

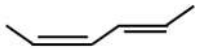
Option 3 ID : 4050367054

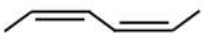
Option 4 ID : 4050367056

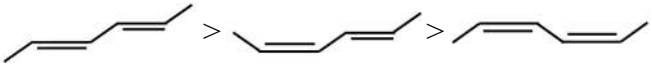
Sol. In isomers of hydrocarbon heat of combustion depends upon their stabilities.

As the stability increases heat of combustion decreases.

 (Trans configuration along both double bond)

 (One double is Cis and one is trans)

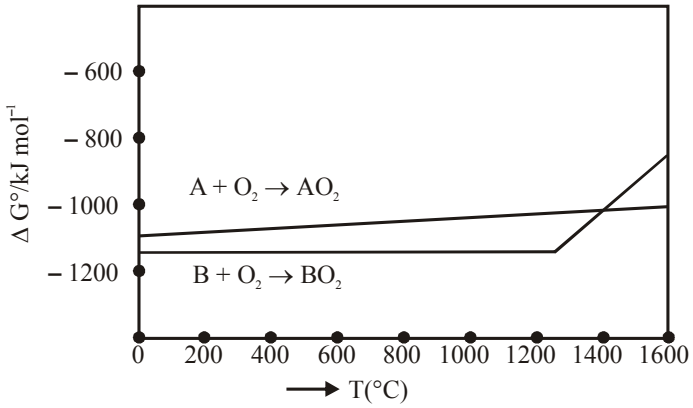
 (Both double bonds are in Cis configuration)

Stability order 

9 Jan Morning MCQ 9 4050361951 Metallurgy Inorganic Chemistry

9. According to the following diagram, A reduces BO_2 when the temperature is :

निम्न चित्र के अनुसार A, BO_2 का अपचयन करता है जब ताप है :



(1) <1200 ºC (2*) > 1400 ºC (3) < 1400 ºC (4) > 1200 ºC but < 1400 ºC

(1) <1200 ºC (2) > 1400 ºC (3) < 1400 ºC (4) > 1200 ºC परन्तु < 1400 ºC

Question ID : 4050361951

Option 1 ID : 4050367012

Option 2 ID : 4050367010

Option 3 ID : 4050367009

Option 4 ID : 4050367011

Sol. $A + BO_2 \longrightarrow B + AO_2$

$\Delta G = -ve$

Only above 1400°C.

9 Jan Morning MCQ 10 4050361954 Periodic Table Inorganic Chemistry

10. The electronic configurations of bivalent europium and trivalent cerium are :

(atomic number : Xe = 54, Ce = 58, Eu = 63)]

द्विसंयोजक यूरोपियम तथा त्रिसंयोज सीरियम के इलेक्ट्रॉनिक विन्यास हैं :

(परमाणु संख्या : Xe = 54, Ce = 58, Eu = 63)]

(1) $[Xe]\ 4f^7\ 6s^2$ and $[Xe]\ 4f^2\ 6s^2$ (2) $[Xe]\ 4f^2$ and $[Xe]\ 4f^9$

(3) $[Xe]\ 4f^2$ and $[Xe]\ 4f^7$ (4*) $[Xe]\ 4f^7$ and $[Xe]\ 4f^1$

द्विसंयोजक यूरोपियम तथा त्रिसंयोज सीरियम के इलेक्ट्रॉनिक विन्यास हैं :

(परमाणु संख्या : Xe = 54, Ce = 58, Eu = 63)]

(1) $[Xe]\ 4f^7\ 6s^2$ तथा $[Xe]\ 4f^2\ 6s^2$ (2) $[Xe]\ 4f^2$ तथा $[Xe]\ 4f^9$

(3) $[Xe]\ 4f^2$ तथा $[Xe]\ 4f^7$ (4) $[Xe]\ 4f^7$ तथा $[Xe]\ 4f^1$

Question ID : 4050361954

Option 1 ID : 4050367021

Option 2 ID : 4050367024

Option 3 ID : 4050367022

Option 4 ID : 4050367023

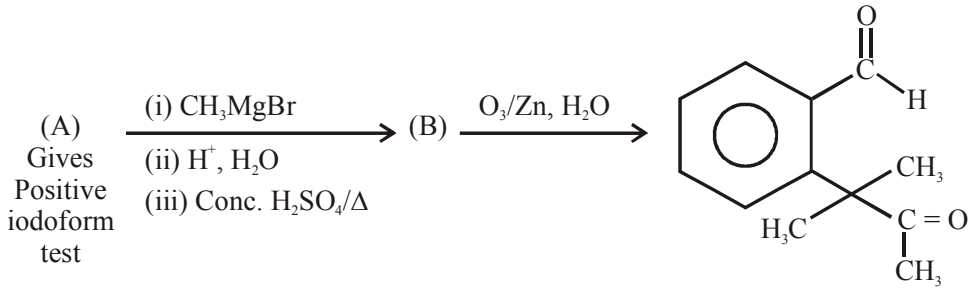
Sol. Eu^{2+} : $[Xe]4f^7$

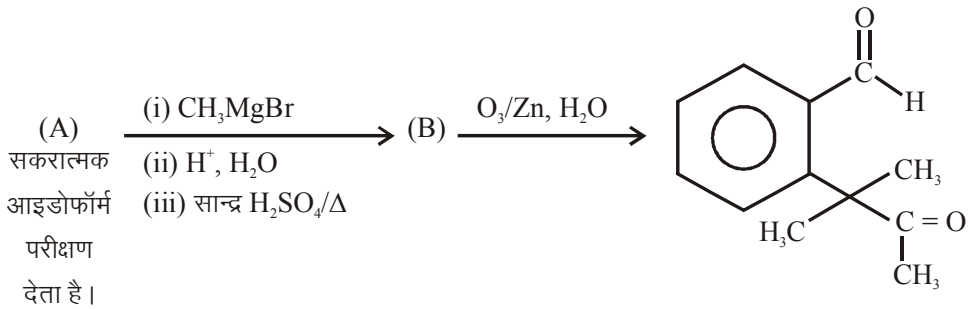
Ce^{3+} : $[Xe]4f^1$

9 Jan Morning MCQ 11 4050361963 Carbonyl Compounds organic chemistry

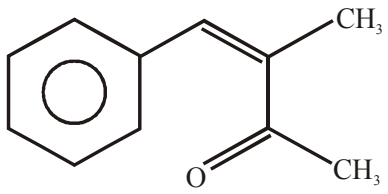
11. Identify (A) in the following reaction sequence :

निम्न अभिक्रिया अनुक्रम में (A) की पहचान कीजिए :

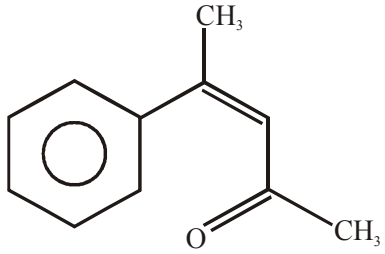




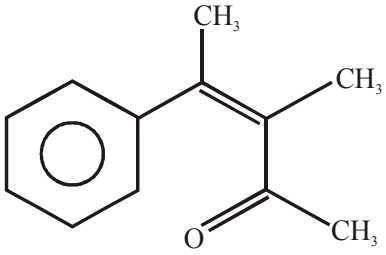
(1*)



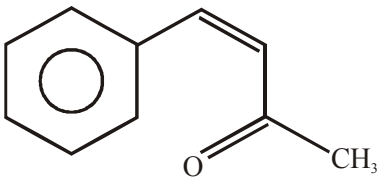
(2)



(3)



(4)



Question ID : 4050361963

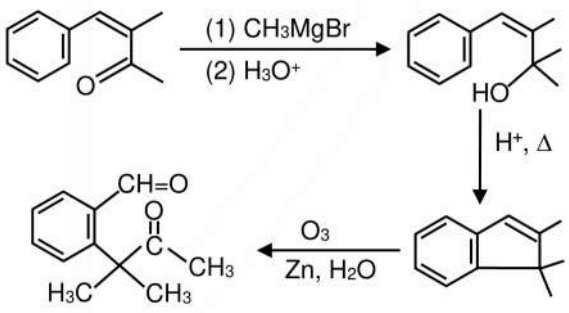
Option 1 ID : 4050367060

Option 2 ID : 4050367059

Option 3 ID : 4050367058

Option 4 ID : 4050367057

Sol.



9 Jan Morning MCQ 12 4050361947 Chemical Kinetics Physical Chemistry

12. For following reactions

निम्न अभिक्रियाओं के लिए

$A \xrightarrow{700\ K} Product$

$A \xrightarrow[catalyst]{500\ K} Product$

$A \xrightarrow{700\ K}$ उत्पाद

$A \xrightarrow[उत्प्रेरक]{500\ K}$ उत्पाद

it was found that the E_a is decreased by 30kJ/mol in the presence of catalyst. If the rate remains unchanged, the activation energy for catalysed reaction is (Assume pre exponential factor is same) :

यह पाया गया कि उत्प्रेरक की उपस्थिति में E_a, 30kJ/mol से घट गई । यदि दर अपरिवर्तित रहे तो उत्प्रेरित अभिक्रिया के लिए संक्रियण ऊर्जा होगी (मान लीजिये पूर्व चरघातांकी गुणक वही रहता है) :

(1*) 75 kJ/mol (2) 198 kJ/mol (3) 135 kJ/mol (4) 105 kJ / mol

Question ID : 4050361947

Option 1 ID : 4050366995

Option 2 ID : 4050366996

Option 3 ID : 4050366994

Option 4 ID : 4050366993

Sol. $K_{cat} = K$

$$Ae^{-\frac{Ea_1}{RT_1}} = Ae^{-\frac{Ea_2}{RT_2}}$$

$$\frac{Ea_1}{T_1} = \frac{Ea_2}{T_2}$$

$$Ea_1 = Ea_2 - 30$$

$$\frac{Ea_2 - 30}{500} = \frac{Ea_2}{700}$$

$$5Ea_2 = 7Ea_2 - 210$$

$$Ea_2 = \frac{210}{2} = 105\,kJ/mole$$

Activation energy of the catalysed reaction = 105 – 30 = 75 kJ/mole.

9 Jan Morning MCQ 13 4050361949 Chemical Bonding-2 Inorganic Chemistry

13. 'X' melts at low temperature and is a bad conductor of electricity in both liquid and solid state. X is :

(1*) Carbon tetrachloride (2) Zinc sulphide

(3) Silicon carbide (4) Mercury

'X' निम्न ताप पर पिघलता है तथा द्रव तथा ठोस दोनों अवस्थाओं में विद्युत का कुचालक है । X है :

(1) कार्बन टेट्राक्लोराइड (2) जिंक सल्फाइड

(3) सिलकान कार्बाइड (4) मर्करी

Question ID : 4050361949

Option 1 ID : 4050367002

Option 2 ID : 4050367001

Option 3 ID : 4050367003

Option 4 ID : 4050367004

Sol. $CCl_4 \rightarrow$ Non-conductor in solid and liquid phase.

9 Jan Morning MCQ 14 4050361944 Atomic Structure Physical Chemistry

14. The de Broglie wavelength of an electron in the 4th Bohr orbit is :

चौथी बोर कक्षा में एक इलेक्ट्रॉन की डी–ब्रोग्ली तरंगदैर्ध्य होगी :

(1) $6\pi a_0$ (2) $2\pi a_0$ (3*) $8\pi a_0$ (4) $4\pi a_0$

Question ID : 4050361944

Option 1 ID : 4050366983

Option 2 ID : 4050366984

Option 3 ID : 4050366982

Option 4 ID : 4050366981

Sol. $2\pi r = n\lambda$

$$2\pi \times \frac{n^2}{Z} a_0 = n\lambda$$

$$2\pi \times \frac{4^2}{1} a_0 = 4\lambda$$

$$\lambda = 8\pi a_0$$

9 Jan Morning MCQ 15 4050361959 Biomolecules/Chemistry in everyday Life organic chemistry

15. A chemist has 4 samples of artificial sweetener A, B, C and D. To identify these samples, he performed certain experiments and noted the following observations :

(i) A and D both form blue – violet colour with ninhydrin.

(ii) Lassaigne extract of C given positive $AgNO_3$ test and negative $Fe_4[Fe(CN)_6]_3$ test.

(iii) Lassaigne extract of B and D gives positive sodium nitroprusside test .

(1) A : Alitame; B : Saccharin;
C : Aspartame; D : Sucralose

(2*) A : Aspartame; B : Saccharin;
C : Sucralose; D : Alitame

(3) A : Aspartame; B : Alitame;
C : Saccharin; D : Sucralose

(4) A : Saccharin; B : Alitame ;
C : Sucralose; D : Aspartame

एक केमिस्ट के पास कृत्रिम मधुरकों A, B, C तथा D का 4 प्रतिदर्श हैं। इन प्रतिदर्शों का पहचानने के लिए उसने कुछ प्रयोग किये तथा निम्न प्रेक्षणों को नोट किया :

(i) A तथा D दोनों निनहाइड्रिन के साथ नीला–बैंगनी रंग देते हैं।

(ii) C का लैसें सारकत्त $AgNO_3$ के साथ सकारातमक तथा $Fe_4[Fe(CN)_6]_3$ के साथ नकारात्मक परीक्षण देता है ।

(iii) B तथा D का लैसें सारकत्त सोडियम नाइट्रोप्रूसाइड के साथ सकारात्मक परीक्षण देता है।

(1) A : ऐलीटेम; B : सैकरीन;
C : ऐस्परटेम; D : सुक्रालोज

(2) A : ऐस्परटेम; B : सैकरीन;
C : सुक्रालोज ; D : ऐलीटेम

(3) A : ऐस्परटेम ; B : ऐलीटेम;
C : सैकरीन; D : सुक्रालोज

(4) A : सैकरीन; B : ऐलीटेम ;
C : सुक्रालोज; D : ऐस्परटेम

Question ID : 4050361959

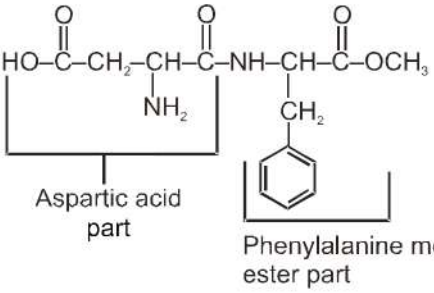
Option 1 ID : 4050367041

Option 2 ID : 4050367042

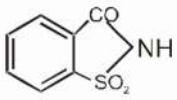
Option 3 ID : 4050367043

Option 4 ID : 4050367044

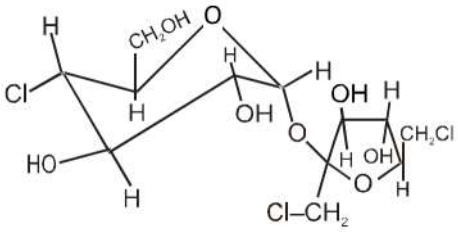
Sol. A – Aspartame



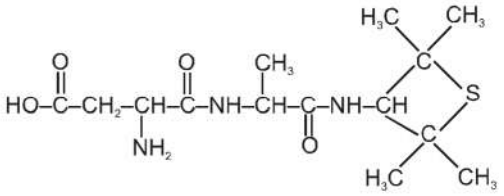
B – Saccharine



C – Sucralose



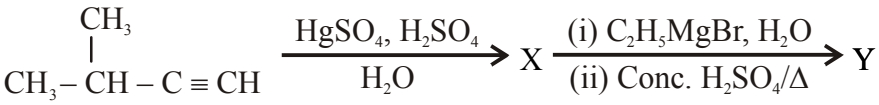
D – Alitame

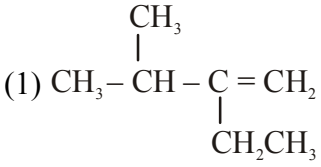


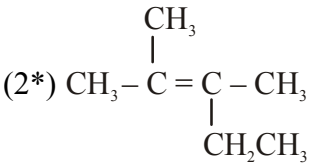
9 Jan Morning MCQ 16 4050361961 Carbonyl Compounds organic chemistry

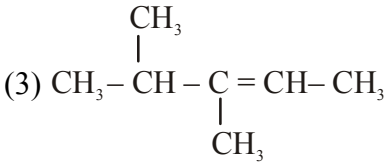
16. The major product (Y) in the following reactions is :

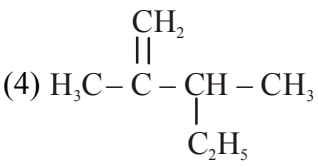
निम्न अभिक्रियाओं में मुख्य उत्पाद (Y) है :



(1) 

(2*) 

(3) 

(4) 

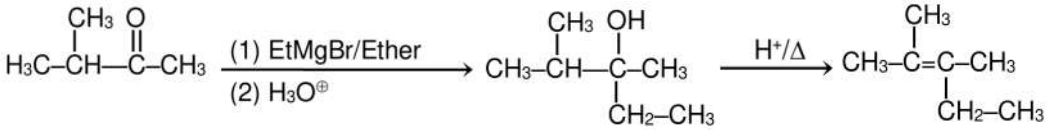
Question ID : 4050361961

Option 1 ID : 4050367050

Option 2 ID : 4050367049

Option 3 ID : 4050367051

Option 4 ID : 4050367052

Sol. 

9 Jan Morning MCQ 17 4050361952 Periodic Table Inorganic Chemistry

17. The acidic, basic and amphoteric oxides, respectively, are :

अम्लीय, क्षारीय तथा उभयधर्मी ऑक्साइडें क्रमशः हैं :

(1*) N_2O_3, Li_2O, Al_2O_3

(2) Cl_2O, CaO, P_4O_{10}

(3) Na_2O, SO_3, Al_2O_3

(4) MgO, Cl_2O, Al_2O_3

Question ID : 4050361952

Option 1 ID : 4050367014

Option 2 ID : 4050367015

Option 3 ID : 4050367016

Option 4 ID : 4050367013

Sol. Non-metal oxides are acidic in nature.

alkali metal oxides are basic in nature.

Al_2O_3 is amphoteric.

9 Jan Morning MCQ 18 4050361945 Chemical Bonding-2 Inorganic Chemistry

18. If the magnetic moment of a dioxygen species is 1.73 B.M, it may be :

एक डाईऑक्सीजन स्पीशीज का चुम्बकीय आघूर्ण 1.73 B.M है, यह हो सकती है :

(1*) O_2^- or O_2^+ (2) O_2 or O_2^+ (3) O_2, O_2^- or O_2^+ (4) O_2 or O_2^-

Question ID : 4050361945

Option 1 ID : 4050366987

Option 2 ID : 4050366986

Option 3 ID : 4050366988

Option 4 ID : 4050366985

Sol. $O_2 = \sigma 1s^2\ \sigma^* 1s^2\ \sigma 2s^2\ \sigma^* 2s^2\ \sigma 2p_z^2\ \pi 2p_x^2 = \pi 2p_y^2\ \pi^* 2p_x^1 = \pi^* 2p_y^1$

$O_2^- = \sigma 1s^2\ \sigma^* 1s^2\ \sigma 2s^2\ \sigma^* 2s^2\ \sigma 2p_z^2\ \pi 2p_x^2 = \pi 2p_y^2\ \pi^* 2p_x^2 = \pi^* 2p_y^1$

$O_2^+ = \sigma 1s^2\ \sigma^* 1s^2\ \sigma 2s^2\ \sigma^* 2s^2\ \sigma 2p_z^2\ \pi 2p_x^2 = \pi 2p_y^2\ \pi^* 2p_x^1 = \pi^* 2p_y^0$

9 Jan Morning MCQ 19 4050361948 Ionic Equilibrium Physical Chemistry

19. The K_{sp} for the following dissociation is 1.6×10^{-5}

निम्न वियोजन के लिए K_{sp} का मान 1.6×10^{-5} है,

$PbCl_{2(s)} \rightleftharpoons Pb^{2+}_{(aq)} + 2Cl^-_{(aq)}$

Which of the following choices is correct for a mixture of 300 mL 0.134 M $Pb(NO_3)_2$ and 100 mL 0.4M NaCl ?

0.134 M $Pb(NO_3)_2$ के 300 mL तथा 0.4 M NaCl के 100 mL को मिलाकर बनाये गये मिश्रण के लिए निम्न में से कौन सा विकल्प सही है ?

(1) Not enough data provided / पर्याप्त आँकड़ा उपलब्ध नहीं (2*) $Q > K_{sp}$

(3) $Q < K_{sp}$ (4) $Q = K_{sp}$

Question ID : 4050361948

Option 1 ID : 4050366999

Option 2 ID : 4050366997

Option 3 ID : 4050367000

Option 4 ID : 4050366998

Sol. $Q = [Pb^{2+}][Cl^-]^2$

$$= \frac{300 \times 0.134}{400} \times \left[\frac{100 \times 0.4}{400}\right]^2$$

$$= \frac{3 \times 0.134}{4} \times (0.1)^2$$

$= 0.105 \times 10^{-2}$

$= 1.005 \times 10^{-3}$

$Q > K_{sp}$

9 Jan Morning MCQ 20 4050361950 Periodic Table Inorganic Chemistry

20. B has a smaller first ionization enthalpy than Be. Consider the following statements :

(I) it is easier to remove 2p electron than 2s electron

(II) 2p electron of B is more shielded from the nucleus by the inner core of electrons than the 2s electrons of Be

(III) 2s electron has more penetration power than 2p electron

(IV) atomic radius of B is more than Be (atomic number B = 5, Be = 4)

The correct statements are :

(1) (II), (III) and (IV) (2*) (I), (II) and (III)

(3) (I), (II) and (IV) (4) (I), (III) and (IV)

B की प्रथम आयनन एन्थैल्पी Be से कम है। निम्न कथनों पर विचार कीजिए :

(I) 2s इलेक्ट्रॉन की तुलना में 2p इलेक्ट्रॉन हटाना आसान है।

(II) B के 2s इलेक्ट्रॉनों की तुलना में B के 2p इलेक्ट्रॉन आंतरिक कोर इलेक्ट्रनों द्वारा नाभिक से ज्यादा परिरक्षित है।

(III) 2p इलेक्ट्रानों की तुलना में 2s इलेक्ट्रॉन की प्रवेशी सामर्थ्य ज्यादा है।

(IV) B की परमाणु त्रिज्या, Be से ज्यादा है। (परमाणु संख्या B = 5, Be = 4)

सही कथन हैं :

(1) (II), (III) तथा (IV) (2) (I), (II) तथा (III)

(3) (I), (II) तथा (IV) (4) (I), (III) तथा (IV)

Question ID : 4050361950

Option 1 ID : 4050367007

Option 2 ID : 4050367005

Option 3 ID : 4050367006

Option 4 ID : 4050367008

Sol. Theory Based.

9 Jan Morning SA 21 4050361967 Mole Concept-2 Physical Chemistry

21. The hardness of a water sample containing 10^{-3} M $MgSO_4$ expressed as $CaCO_3$ equivalents (in ppm) is _____.

(molar mass of $MgSO_4$ is 120.37 g/mol)

10^{-3} M $MgSO_4$ वाले जल के प्रतिदर्श की कठोरता जिसको $CaCO_3$ समतुल्य (ppm में) अभिव्यक्त किये जाने पर, होगी _____।

($MgSO_4$ का मोलर संहति 120.37 g/mol)

Question ID : 4050361967

Ans 100

Sol. 10^{-3} molar $MgSO_4 \equiv 10^{-3}$ moles of $MgSO_4$ present in 1 L solutions.

$n_{CaCO_3} \equiv n_{MgSO_4}$

$$ppm_{(\text{in term of } CaCO_3)} = \frac{10^{-3} \times 100}{1000} \times 10^6$$

$$ppm_{(\text{in term of } CaCO_3)} = 100 \text{ ppm}$$

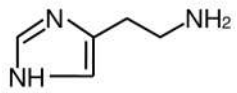
9 Jan Morning SA 22 4050361968 Biomolecules/Chemistry in everyday Life organic chemistry

22. The mass percentage of nitrogen in histamine is _____.

हिस्टैमिन में नाइट्रोजन की द्रव्यमान प्रतिशतता है _____ ।

Question ID : 4050361968

Ans 37.80 to 38.2

Sol. Structure of Histamine is 

Molecular formula of Histamine is $C_5H_9N_3$

Molecular mass of Histamine is 111

Percentage nitrogen by mass in Histamine = $\frac{42}{111} \times 100 = 37.84\%$

9 Jan Morning SA 23 4050361965 Solution and Colligative Properties Physical Chemistry

23. How much amount of NaCl should be added to 600 g of water ($\rho = 1.00$g/ml) to decrease the freezing point of water to –0.2ºC ? _____. (The freezing point depression constant for water = 2 K kg mol^{-1})

600 g पानी ($\rho = 1.00$g/ml) में NaCl की कितनी मात्रा मिलायी जाय कि उसका हिमांक घटकर –0.2ºC हो जाय ? _____ । (पानी के लिए हिमांक अवनमन स्थिरांक = 2 K kg mol^{-1})

Question ID : 4050361965

Ans 1.74 to 1.76

Sol. $\Delta T_f = 0.2°C$

$\Delta T_f = ik_f m$

$$0.2 = 2 \times 2 \times \frac{w}{58.5} \times \frac{1000}{600}$$

$$w = \frac{0.2 \times 58.5 \times 600}{1000 \times 4}$$

$$= \frac{1.2 \times 58.5}{40}$$

$= 1.76$g

9 Jan Morning SA 24 4050361964 Mole Concept-1 Physical Chemistry

24. The molarity of HNO_3 in a sample which has density 1.4g/mL and mass percentage of 63% is _____.
(Molecular Weight of $HNO_3 = 63$)
उस प्रतिदर्श में, जिसका घनत्व 1.4g/mL तथा द्रव्यमान प्रतिशतता 63% की हो, HNO_3 की मोलरता होगी _____
(HNO_3का अणुभार = 63)

Question ID : 4050361964

Ans 14

Sol. $63\%\ w/w \longrightarrow HNO_3$ solution

$$M = \frac{63\times1.4}{63\times100}\times 1000 \text{ mole/L} = 14 \text{ mole/L}$$

9 Jan Morning SA 25 4050361966 Electrochemistry Physical Chemistry

25. 108 g of silver (molar mass 108 g mol^{-1}) is deposited at cathode from $AgNO_3$ (aq) solution by certain quantitty of electricity. The volume (in L) of oxygen gas produced at 273 K and 1 bar pressure from water by the same quantity of electricity is _____.
एक निश्चित विद्युत मात्रा द्वारा $AgNO_3$ (जलीय)से 108 g सिलवर (मोलर द्रव्यमान 108 g mol^{-1}) कैथोड पर निक्षेपित किया गया । विद्युत की उसी मात्रा द्वारा 273 K तथा 1 बार दाब पर बनायी गई ऑक्सीजन का आयतन (L में) होगा _____ ।

Question ID : 4050361966

Ans 5.66 to 5.67

Sol. $\left(n_{Ag}\right)_{deposit} = \frac{108}{108} = 1 \text{ mole}$

$Ag^+ + e^- \longrightarrow Ag$

1F charge is required to deposit 1 mole of Ag.

$$H_2O \longrightarrow \frac{1}{2}O_2 + 2H^+ + 2e^-$$

$$2F \text{ charge deposit} \longrightarrow \frac{1}{2} \text{ mole}$$

$$1F \text{ charge will deposit} \longrightarrow \frac{1}{4} \text{ mole}$$

$$V_{O_2} = \frac{nRT}{P}$$

$$= \frac{1}{4}\times\frac{0.08314\times273}{1}$$

$$V_{O_2} = 5.674 \text{ L}$$