CHEMISTRY

10 APRIL 2019 [Phase : I]

JEE MAIN PAPER ONLINE

1. Consider the following statements

(a) The pH of a mixture containing 400 mL of 0.1 M H_2SO_4 and 400 mL of 0.1 M NaOH will be approximately 1.3.

(b) Ionic product of water is temperature dependent.

(c) A monobasic acid with $K_a = 10^{-5}$ has a pH = 5. The degree of dissociation of this acid is 50%.

(d) The Le Chatelier's principle is not applicable to common-ion effect.

The correct statements are :

निम्न कथनों पर विचार कीजिये,

(a) उस मिश्रण का pH, जिसमें 400 mL 0.1 M H_2SO_4 तथा 400 mL, 0.1 M NaOH है, लगभग 1.3 होगा।

(b) जल का आयनी गुणनफल ताप पर आश्रित है।

(c) $K_a = 10^{-5}$ वाले एक एकक्षारकी अम्ल का pH = 5 है, इस अम्ल की वियोजन मात्रा 50% है।

(d) लि शतालिये सिद्धान्त सम आयन प्रभाव पर नहीं लागू होता है।

सही कथन हैं :

(1) (a), (b) and (d) (2) (b) and (c) (3) (a) and (b) (4) (a), (b) and (c)

A. 4

sol. (a) $H_2SO_4 + 2NaOH \rightarrow Na_2SO_4 + 2H_2O$

0.04 0.04

0.02 0 0.02

$$[H^+] = \frac{2 \times 0.02}{0.8} = 0.05\,M$$

pH = 1.3

(b) Ionic product of water increases with increase of temperature because ionisation of water is endothermic.

(c) $HA \rightleftharpoons H^+ + A^-$

$C(1-\alpha)$ $C\alpha$ $C\alpha$ pH = 5 & $K_a = 10^{-5}$

$$10^{-5} = \frac{C\alpha^2}{1-\alpha}$$

pH = 5 $\Rightarrow$ $[H^+] = 10^{-5} = C\alpha$

then $\alpha = 0.5$

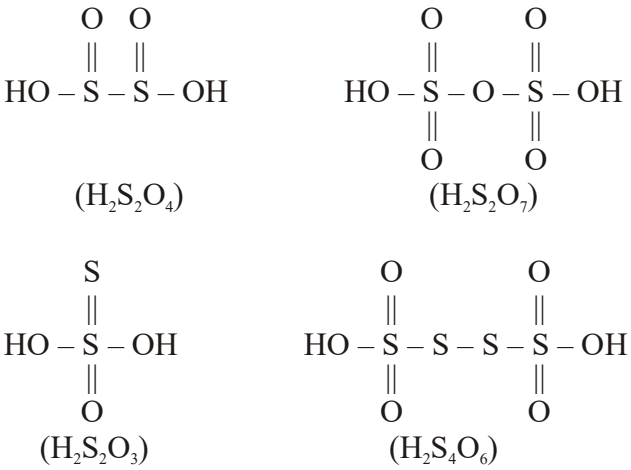
2. The oxoacid of sulphur that does not contain bond between sulphur atoms is :

सल्फर का वह आक्सोएसिड जिसमें सल्फर के परमाणुओं के बीच आबन्ध नहीं होता, है :

(1) $H_2S_4O_6$ (2) $H_2S_2O_4$ (3) $H_2S_2O_7$ (4) $H_2S_2O_3$

A. 3

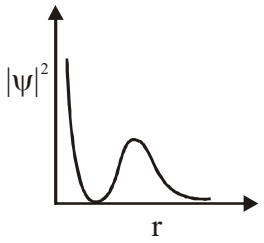
sol.



$(H_2S_2O_4)$ $(H_2S_2O_7)$ $(H_2S_2O_3)$ $(H_2S_4O_6)$

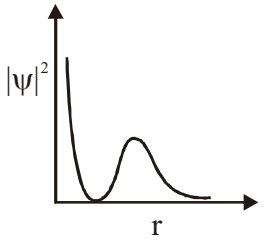
$H_2S_2O_7$ does not have S – S linkage

3. The graph between $|\Psi|^2$ and r(radial distance) is shown below. This represents :



(1) 1s orbital (2) 2s orbital (3) 2p orbital (4) 3s orbital

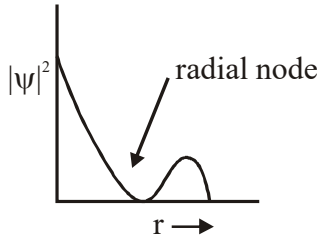
$|\Psi|^2$ तथा r(रेडियल दूरी) के बीच ग्राफ नीचे प्रदर्शित है। यह दर्शाता है :



(1) 1s कक्षक (2) 2s कक्षक (3) 2p कक्षक (4) 3s कक्षक

A. 2

sol. The given probability density curve is for 2s orbital because it has only one radial node. Among other given orbitals, 1s and 2p do not have any radial node and 3s has two radial nodes.



4. Which of the following is a condensation polymer ?

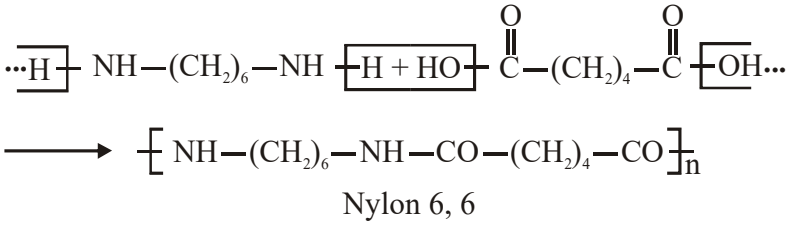
(1) Nylon 6, 6 (2) Teflon (3) Buna – S (4) Neoprene

निम्न में से कौन संघनन बहुलक है?

(1) नायलॉन 6, 6 (2) टेफ्लॉन (3) ब्यूना – S (4) निओप्रीन

A. 1

sol. Nylon 6, 6 is obtained by condensation polymerisation of hexamethylenediamine and adipic acid



Nylon 6, 6

So, Nylon 6, 6 is a condensation polymer. Other polymers given, i.e., Buna-S, Teflon and Neoprene are addition polymers.

5. The principle of column chromatography is :

(1) Differential adsorption of the substances on the solid phase.

(2) Gravitational force.

(3) Differential absorption of the substances on the solid phase.

(4) Capillary action.

स्तम्भ वर्णलेखिकी का सिद्धान्त है :

(1) ठोस प्रावस्था पर पदार्थों के अंतरात्मक अधिशोषण

(2) गुरूत्वीय बल

(3) ठोस प्रावस्था पर पदार्थों के अंतरात्मक अवशोषण

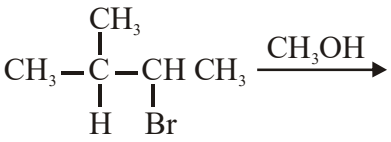
(4) कोशिका क्रिया

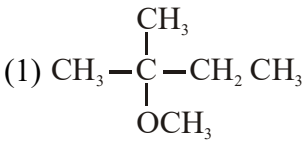
A. 1

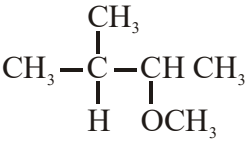
sol. In column chromatograph a solid adsorbent is packed in a column and a solution containing number of solute particles is allowed to flow down the column. The solute molecules get adsorbed on the surface of adsorbent. So it is differential adsorption of the substances on the solid phase.

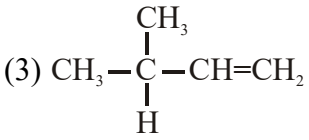
6. The major product of the following reaction is :

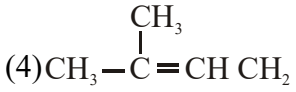
निम्नलिखित अभिक्रिया का मुख्य उत्पाद है –



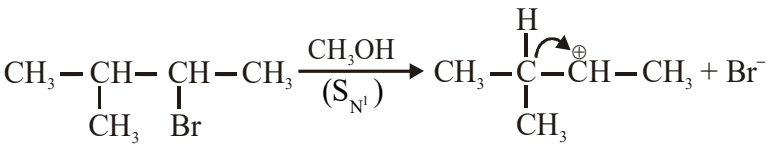
(1) 

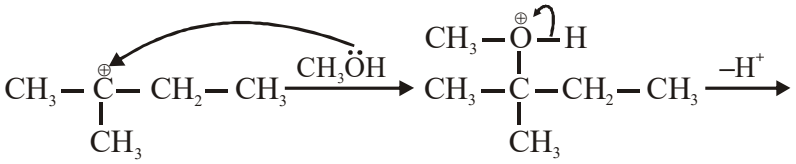
(2) 

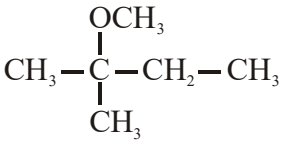
(3) 

(4) 

A. 1

sol. 





7. Consider the statements S1 and S2 :

S1 : Conductivity always increases with decrease in the concentration of electrolyte.

S2 : Molar conductivity always increases with decrease in the concentration of electrolyte.

The correct option among the following is :

(1) S1 is wrong and S2 is correct

(2) S1 is correct and S2 is wrong

(3) Both S1 and S2 are wrong

(4) Both S1 and S2 are correct

S1 तथा S2 कथनों पर विचार कीजिए :

S1 : विद्युत अपघट्य की सान्द्रता में कमी के साथ चालकता सदैव बढ़ती है।

S2 : विद्युत अपघट्य की सान्द्रता में कमी आने के साथ मोलर चालकता हमेशा बढ़ती है।

निम्न में से सही विकल्प होगा :

(1) S1 गलत है तथा S2 सही है।

(2) S1 सही है तथा S2 गलत है।

(3) S1 तथा S2 दोनों गलत है।

(4) S1 तथा S2 दोनों सही है।

A. 1

sol. Conductivity of an electrolyte is the conductance of 1 cm^3 of the given electrolyte. So, it increases with the increase of concentration of electrolyte. Molar conductivity (λ_m) is the conductance of a solution containing 1 mole of the electrolyte. It increases with the decrease of concentration (i) due to increase in interionic attraction for strong electrolytes and (ii) due to decrease in degree of ionisation for weak electrolytes. Therefore, (S_1) is wrong and (S_2) is correct.

8. Consider the following table :

Gas	**a/(k Pa dm^6 mol^{-1})**	**b/(dm^3 mol^{-1})**
A	642.32	0.05196
B	155.21	0.04136
C	431.91	0.05196
D	155.21	0.4382

a and b are van der Waals constants. The correct statement about the gases is :

(1) Gas C will occupy lesser volume than gas A; gas B will be lesser compressible than gas D

(2) Gas C will occupy more volume than gas A; gas B will be more compressible than gas D

(3) Gas C will occupy lesser volume than gas A; gas B will be more compressible than gas D

(4) Gas C will occupy more volume than gas A; gas B will be lesser compressible than gas D

निम्न तालिका पर विचार कीजिए :

गैस	**a/(k Pa dm^6 mol^{-1})**	**b/(dm^3 mol^{-1})**
A	642.32	0.05196
B	155.21	0.04136
C	431.91	0.05196
D	155.21	0.4382

a तथा b वान्डरवाल्स स्थिरांक हैं। गैसों के विषय में सही कथन है :

(1) गैस C, गैस A की तुलना में कम आयतन घेरेगी; गैस B, गैस D की तुलना में कम संपीड्य होगी।

(2) गैस C, गैस A की तुलना में ज्यादा आयतन घेरेगी; गैस B, गैस D की तुलना में ज्यादा संपीड्य होगी।

(3) गैस C, गैस A की तुलना में कम आयतन घेरेगी; गैस B गैस D की तुलना में ज्यादा संपीड्य होगी।

(4) गैस C, गैस A की तुलना में ज्यादा आयतन घेरेगी; गैस B, गैस D की तुलना में कम संपीड्य होगी।

A. 2

sol. If two gases have same value of 'b' but different values of 'a', then the gas having a larger value of 'a' will occupy lesser volume. This is because the gas having larger value of "a" will have larger force of attraction and hence lesser distance between its molecules.

If two gases have same value of 'a' but different values of 'b', then the smaller value of 'b' will occupy lesser volume and hence will be more compressible.

9. Amylopectin is composed of

(1) β-D-glucose, C_1 — C_4 and C_2 — C_6 linkages

(2) α-D-glucose, C_1 — C_4 and C_2 — C_6 linkages

(3) β-D-glucose, C_1 — C_4 and C_1 — C_6 linkages

(4) α-D-glucose, C_1 — C_4 and C_1 — C_6 linkages

एमिलोपेक्टिन इनसे निर्मित है :

(1) β-D-ग्लूकोज, C_1 — C_4 तथा C_2 — C_6 बंध

(2) α-D-ग्लूकोज, C_1 — C_4 तथा C_2 — C_6 बंध

(3) β-D-ग्लूकोज, C_1 — C_4 तथा C_1 — C_6 बंध

(4) α-D-ग्लूकोज, C_1 — C_4 तथा C_1 — C_6 बंध

A. 4

sol. Starch is a polymer of α-D-glucose. It has two components, namely

(i) Amylose and

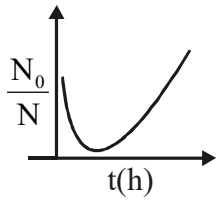
(ii) Amylopectin

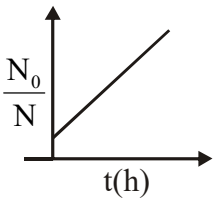
Amylose has only α-1,4-glycosidic linkage and is a linear polymer

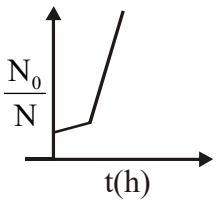
Amylopectin has α-1, 6-glycosidic linkage in addition to α-1,4-glycosidic linkage and is a cross-linked polymer.

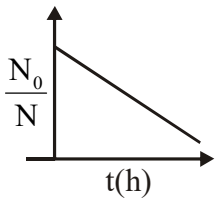
10. A bacterial infection in an internal wound grows as $N'(t) = N_0\exp(t)$, where the time t is in hours. A dose of antibiotic, taken orally, needs 1 hour to reach the wound. Once it reaches there, the bacterial population goes down as $\frac{dN}{dt} = -5N^2$. What will be the plot of $\frac{N_0}{N}$ vs. t after 1 hour ?

एक आंतरिक घाव में बैक्टीरिया संक्रमण इस प्रकार बढ़ता है $N'(t) = N_0\exp(t)$, जहाँ समय t घंटे में है। मुख से एन्टीबायटिक की एक खुराक लेने पर एंटीबायटिक घाव तक पहुँचने में एक घंटे लेती है। एक बार वह वहाँ पहुँच जाती है तो बैक्टीरिया की संख्या नीचे इस प्रकार, $\frac{dN}{dt} = -5N^2$ चली जाती है। $\frac{N_0}{N}$ सापेक्ष t ग्राफ एक घंटे बाद होगा :

(1) 

(2) 

(3) 

(4) 

A. 2

sol. When drug is administered bacterial growth is given by $\frac{dN}{dt} = -5N^2$

$$\Rightarrow \quad \frac{1}{N} = \frac{1}{N_0} + 5t$$

$$\Rightarrow \quad \frac{N_0}{N} = 1 + 5t\,N_0$$

11. The major product of the following reaction is :

निम्नलिखित अभिक्रिया का मुख्य उत्पाद है :

$$CH_3\underset{\displaystyle OH}{\underset{|}{C}}HCH_2CH_2NH_2 \xrightarrow[\text{triethylamine}]{\text{ethyl formate (1 equiv.)}}$$

(1) $CH_3CH{=}CH{-}CH_2NH_2$

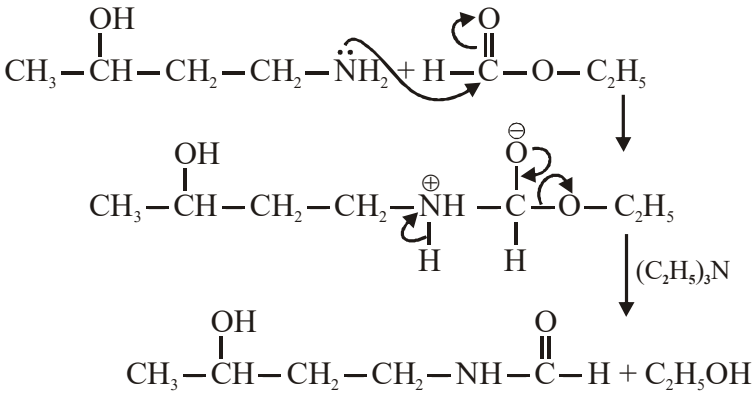
(2) $CH_3{-}\underset{\displaystyle OH}{\underset{|}{C}}H{-}CH{=}CH_2$

(3) $CH_3\underset{\displaystyle O\quad H}{\underset{|}{C}}HCH_2CH_2NH_2$

(4) $CH_3\underset{\displaystyle OH}{\underset{|}{C}}HCH_2CH_2NHCHO$

A. 4

sol.



The acylation of NH_2 group takes place and not of OH group due to lower electronegativity of N-atom.

12. Consider the hydrated ions of Ti^{2+}, V^{2+}, Ti^{3+}, and Sc^{3+}. The correct order of their spin-only magnetic moments is :

Ti^{2+}, V^{2+}, Ti^{3+} तथा Sc^{3+} के जलयोजित आयनों पर विचार कीजिये। उनके स्पिन–मात्र चुम्बकीय आघूर्णों का सही क्रम है :

(1) $Sc^{3+} < Ti^{3+} < Ti^{2+} < V^{2+}$ (2) $Ti^{3+} < Ti^{2+} < Sc^{3+} < V^{2+}$

(3) $Sc^{3+} < Ti^{3+} < V^{2+} < Ti^{2+}$ (4) $V^{2+} < Ti^{2+} < Ti^{3+} < Sc^{3+}$

A. 4

sol. Electronic configuration of the given transition metal ions are

Sc^{3+} (Z = 21) $1s^2 2s^2 2p^6 3s^2 3p^6$

Ti^{2+} (Z = 22) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^2$

Ti^{3+} (Z = 22) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^1$

V^{2+} (Z = 23) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^3$

Magnetic moment is directly proportional to the number of unpaired electrons. So the correct increasing order of magnetic moment is

Sc^{3+} < Ti^{3+} < Ti^{2+} < V^{2+}

0 1 2 3 unpaired electrons

13. The isoelectronic set of ions is :

आयनों का समइलेक्ट्रॉनिकी सेट है :

(1) N^{3-}, Li^+, Mg^{2+} and O^{2-} (2) Li^+, Na^+, O^{2-} and F^-

(3) N^{3-}, O^{2-}, F^- and Na^+ (4) F^-, Li^+, Na^+ and Mg^{2+}

A. 3

sol. Atomic numbers of N, O, F and Na are 7, 8, 9 and 11 respectively. Therefore, total number of electrons in each of N^{3-}, O^{2-}, F^- and Na^+ is 10 and hence they are isoelectronic.

14. The alloy used in the construction of aircrafts is :

एयरक्राफ्टों (विमानों) के निर्माण में प्रयुक्त होने वाला ऐलॉय (मिश्र धातु) है :

(1) Mg - Zn (2) Mg - Sn (3) Mg - Mn (4) Mg - Al

A. 4

sol. An alloy of Mg and Al called magnalium is used in manufacturing of aircraft due to its light weight and high strength.

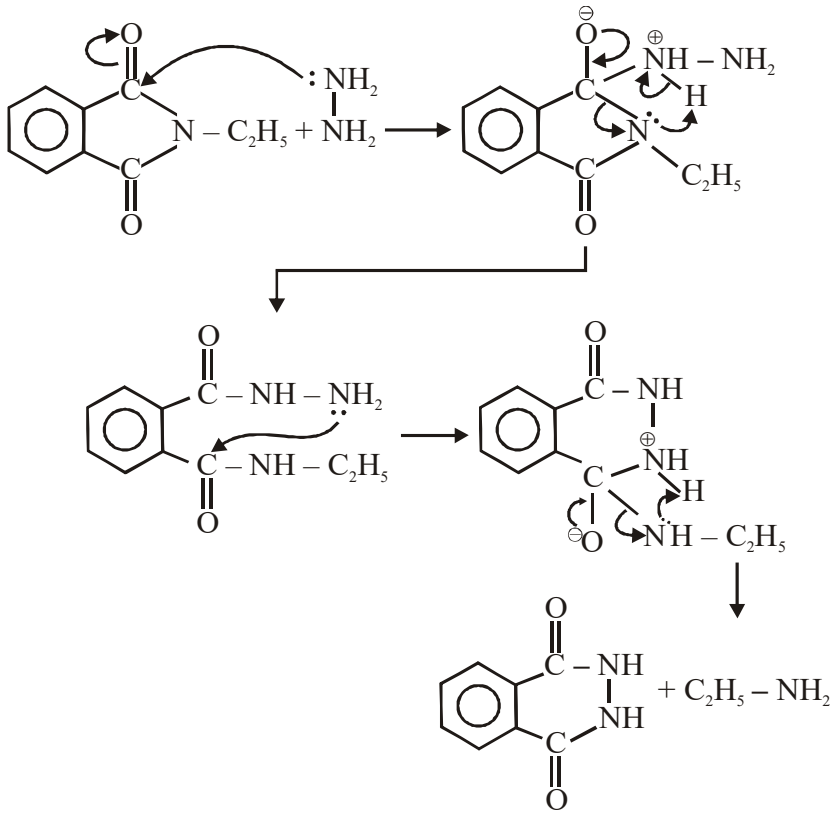
15. Ethylamine ($C_2H_5NH_2$) can be obtained from N-ethylphthalimide on treatment with :

निम्न में से किसके साथ अभिकृत किये जाने पर N–एथिलथैलीमाइड से एथिलऐमीन ($C_2H_5NH_2$) प्राप्त किया जा सकता है?

(1) NH_2NH_2 (2) $NaBH_4$ (3) H_2O (4) CaH_2

A. 1

sol. N-ethyl phthalimide on treatment with NH_2—NH_2 gives ethylamine.



Note: In place of NH_2NH_2, H_2O can also be used in presence of H^+ or OH^- as a catalyst.

16. A process will be spontaneous at all temperatures if :

एक प्रक्रम सभी तापों पर स्वतः होगा यदि :

(1) $\Delta H < 0$ and $\Delta S > 0$ (2) $\Delta H > 0$ and $\Delta S < 0$

(3) $\Delta H > 0$ and $\Delta S > 0$ (4) $\Delta H < 0$ and $\Delta S < 0$

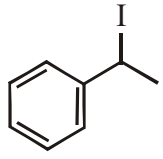
A. 1

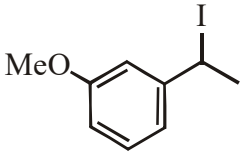
sol. A reaction is spontaneous if ΔG_{sys} is negative. $\Delta G_{sys} = \Delta H_{sys} - T\Delta S_{sys}$

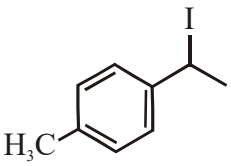
A reaction will be spontaneous at all temperatures if ΔH_{sys} is negative and ΔS_{sys} = +ve

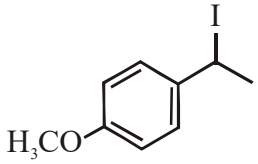
17. Increasing rate of S_N1 reaction in the following compounds is :

निम्न यौगिकों में S_N1 अभिक्रिया की बढ़ती दर होगी :

(A) 

(B) 

(C) 

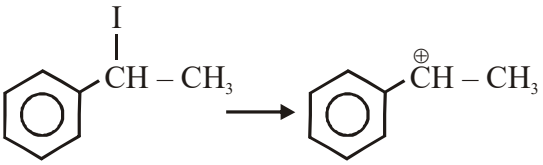
(D) 

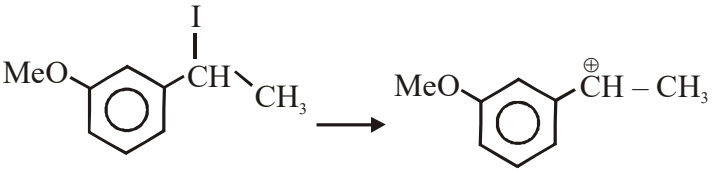
(1) (B) < (A) < (C) < (D) (2) (A) < (B) < (D) < (C)

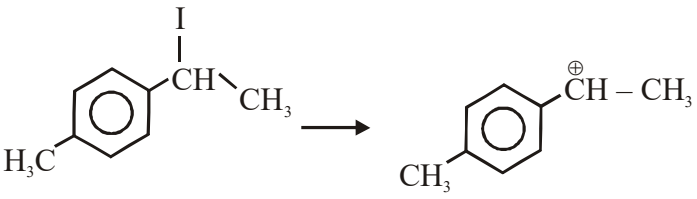
(3) (B) < (A) < (D) < (C) (4) (A) < (B) < (C) < (D)

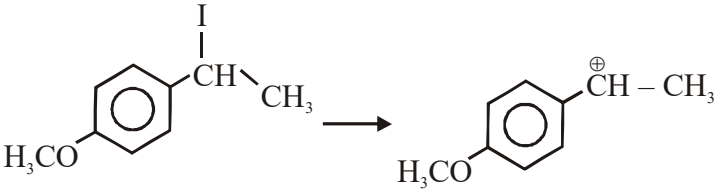
A. 1

sol. The rate of S_{N^1} is decided by the stability of carbocation formed in the rate determining step.

(1) 

(2) 

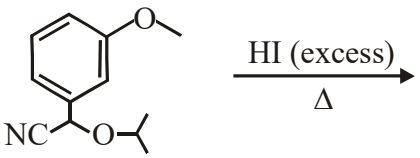
(3) 

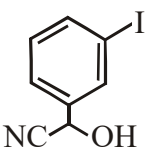
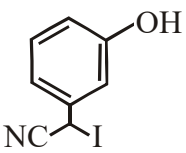
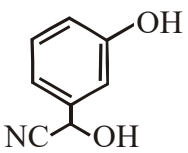
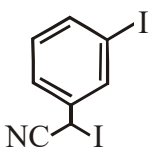
(4) 

Carbocation (D) is most stable due to +R effect of CH_3O group, (C) is stabilised by +I and +H effect of CH_3 group; (B) is least stable due to –I effect of MeO group. So increasing order of rate of S_{N^1} is (B) < (A) < (C) < (D)

18. The major product of the following reaction is :

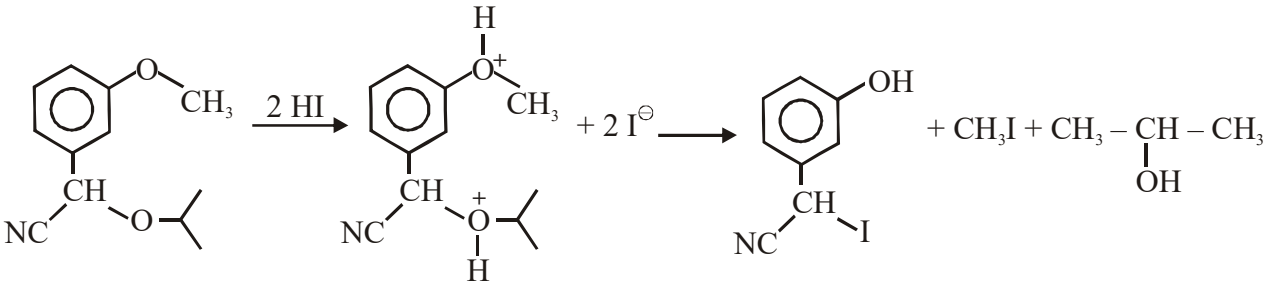
निम्नलिखित अभिक्रिया का मुख्य उत्पाद होगा :



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

A. 2

sol.



19. The species that can have a *trans*-isomer is :

(en = ethane-1, 2-diamine, ox = oxalate)

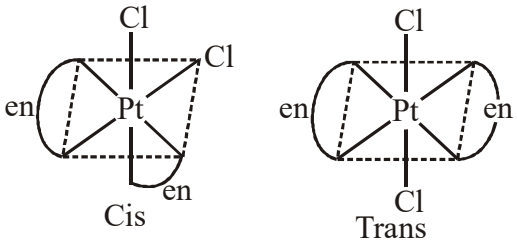
वह स्पीशीज़ जिसका एक *ट्रांस*–आइसोमर हो सकता है, है :

(en = इथेन-1, 2-डाइएमीन, ox = आक्जेलेट)

(1) $[Zn(en)Cl_2]$ (2) $[Pt(en)Cl_2]$ (3) $[Cr(en)_2(ox)]^+$ (4) $[Pt(en)_2Cl_2]^{2+}$

A. 4

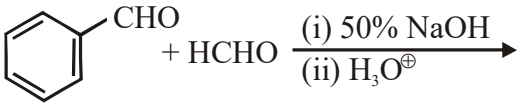
sol.

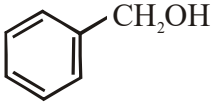


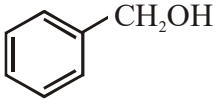
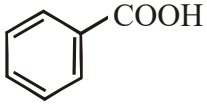
Cis-trans isomerism is possible with $[Pt(en)_2Cl_2]^{2+}$. $[Cr(en)_2Ox]^+$ shows optical isomerism but not geometrical isomerism. The other two complexes, i.e. $[Pt(en)Cl_2]$ and $[Zn(en)Cl_2]$ do not show stereoisomerism.

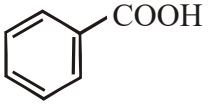
20. Major products of the following reaction are :

निम्नलिखित अभिक्रिया के मुख्य उत्पाद हैं :



(1) HCOOH and 

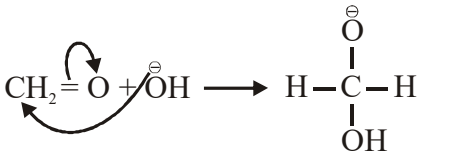
(2)  and 

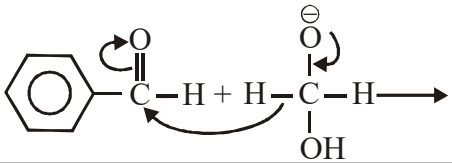
(3) CH_3OH and 

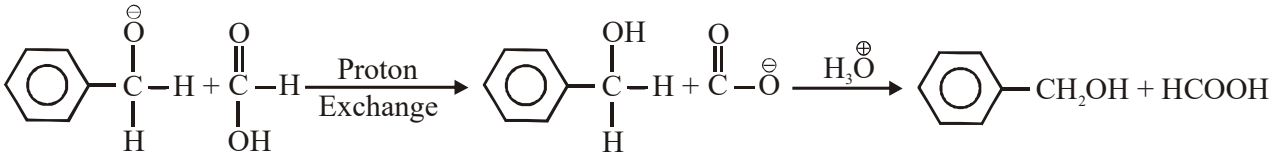
(4) CH_3OH and HCO_2H

A. 1

sol.







21. The correct order of catenation is :

श्रृंखलन का सही क्रम है :

(1) C > Si > Ge ≈ Sn (2) C > Sn > Si ≈ Ge (3) Si > Sn > C > Ge (4) Ge > Sn > Si > C

A. 1

sol. The order of catenation property amongst 14th group elements is based on bond enthalpy values of identical atoms of the same element. The decreasing order of bond enthalpy values is

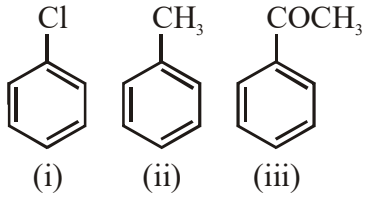
Bond enthalpy $\underset{348\ kJ/mol}{C-C} > \underset{297}{Si-Si} > \underset{260}{Ge-Ge} \approx \underset{240\ kJ/mol}{Sn-Sn}$

∴ Decreasing order of catenation is

C > Si > Ge ≈ Sn

22. The increasing order of the reactivity of the following compounds towards electrophilic aromatic substitution reactions is :

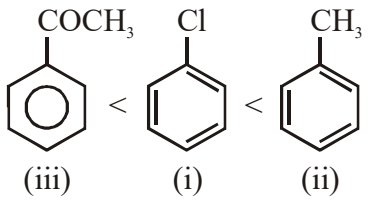
एरोमैटिक इलेक्ट्रॉन स्नेही प्रतिस्थापन अभिक्रियाओं में निम्नलिखित यौगिकों की बढ़ती अभिक्रियात्मकता का सही क्रम है :



(1) I < III < II (2) III < II < I (3) II < I < III (4) III < I < II

A. 4

sol. CH_3 group when bonded to benzene increases the electron density of benzene by +I and hyper conjugation effects and hence makes the compound more reactive towards EAS. Cl group decreases the electron density of benzene by –I effect, and CH_3CO group strongly decreases the electron density of benzene by –I and –R effects. Therefore, correct increasing order the given compounds towards EAS is



23. During the change of O_2 to O_2^-, the incoming electron goes to the orbital :

O_2 को O_2^- में परिवर्तन के समय आने वाला इलेक्ट्रॉन जिस कक्षक में जायेगा वह है :

(1) $\pi 2p_x$ (2) $\pi^* 2p_x$ (3) $\pi 2p_y$ (4) $\sigma^* 2p_z$

A. 2

sol. Electronic configuration of O_2 is

$\sigma_{1s}^2\sigma_{1s}^{*2}\sigma_{2s}^2\sigma_{2s}^{*2}\sigma_{2p_z}^2\pi_{2p_x}^2 = \pi_{2p_y}^2\pi_{2p_x}^{*1} = \pi_{2p_y}^{*1}$

When O_2 gains an electron to form O_2^-, the incoming electron goes to $\pi_{2p_x}^*$ or $\pi_{2p_y}^*$

24. The regions of the atmosphere, where clouds form and where we live, respectively, are :

(1) Troposphere and Troposphere (2) Stratosphere and Troposphere

(3) Troposphere and Stratosphere (4) Stratosphere and Stratosphere

वायुमंडल का वह भाग जहाँ बादल बनते हैं तथा जिसमें हम रहते हैं, उसे क्रमशः कहते हैं :

(1) ट्रोपोस्फीयर (क्षोभमंडल) तथा ट्रोपोस्फीयर (क्षोभमंडल)

(2) स्ट्रेटोस्फीयर (समतापमंडल) तथा ट्रोपोस्फीयर (क्षोभमंडल)

(3) ट्रोपोस्फीयर (क्षोभमंडल) तथा स्ट्रेटोस्फीयर (समतापमंडल)

(4) स्ट्रेटोस्फीयर (समतापमंडल) तथा स्ट्रेटोस्फीयर (समतापमंडल)

A. 1

sol. The lowest region of atmosphere in which human beings live is troposphere. It extends up to a height of 10 km from sea level. Clouds are also formed in this layer.

25. At room temperature, a dilute solution of urea is prepared by dissolving 0.60 g of urea in 360 g of water. If the vapour pressure of pure water at this temperature is 35 mmHg, lowering of vapour pressure will be : (molar mass of urea = 60 g mol^{-1})

कक्षताप पर, यूरिया का एक तनु विलयन 0.60 g यूरिया को 360 g जल में घोलकर बनाया जाता है। इस ताप पर यदि शुद्ध जल का वाष दाब 35 mmHg हो, तो वाष्प दाब का अवनमन होगा : (यूरिया का मोलर द्रव्यमान = 60 g mol^{-1})

(1) 0.031 mmHg (2) 0.017 mmHg (3) 0.028 mmHg (4) 0.027 mmHg

A. 2

sol. Relative lowering of VP is given by

$$\frac{P_B^\circ - P_B}{P_B^\circ} = x_A = \frac{n_A}{n_A + n_B} \simeq \frac{n_A}{n_B}$$

$$\frac{P_B^\circ - P_B}{35} = \frac{0.6\times 18}{60+360} = \frac{1}{2000}$$

On solving, $\Delta P_B = P_B^\circ - P_B = 0.017$

26. A gas undergoes physical adsorption on a surface and follows the given Freundlich adsorption isotherm equation

$$\frac{x}{m} = kp^{0.5}$$

Adsorption of the gas increases with :

(1) Increase in p and decrease in T (2) Decrease in p and decrease in T

(3) Increase in p and increase in T (4) Decrease in p and increase in T

एक गैस का एक पृष्ठ पर भौतिक अधिशोषण होता है और वह दिये गये फ्रायन्डलिक अधिशोषण समतापी समीकरण का अनुसरण करती है

$$\frac{x}{m} = kp^{0.5}$$

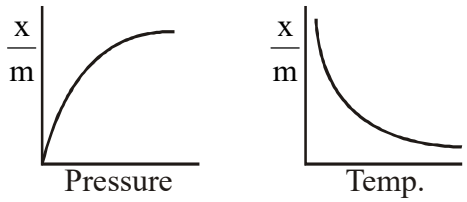
गैस का अधिशोषण बढ़ेगा यदि :

(1) p बढ़ायें तथा T घटायें (2) p घटायें तथा T घटायें

(3) p बढ़ायें तथा T बढ़ायें (4) p घटायें तथा T बढ़ायें

A. 1

sol. Freundlich adsorption is applicable for physical adsorption. The variation of extent of adsorption with (i) Pressure and (ii) Temp is given by the following curves.



So, extent of adsorption increases with increase of pressure and decrease of temperature.

27. The synonym for water gas when used in the production of methanol is :

(1) fuel gas (2) syn gas (3) laughing gas (4) natural gas

वाटर गैस के लिये समानार्थक शब्द जब मेथेनॉल के उत्पादन में प्रयुक्त किया जाता है, होता है :

(1) फ्यूअल गैस (2) सिन गैस (3) लाफिंग गैस (4) नेचुरल गैस

A. 2

sol. When steam is passed over red hot coke, an equimolar mixture of CO and H_2 is obtained

$$\underset{\text{Steam}}{H_2O(g)} + \underset{\text{Red hot Coke}}{C} \longrightarrow CO + H_2$$

The gaseous mixture thus obtained is called water gas or syn. gas.

28. At 300 K and 1 atmospheric pressure, 10 mL of a hydrocarbon required 55 mL of O_2 for complete combustion, and 40 mL of CO_2 is formed. The formula of the hydrocarbon is :

300 K तथा 1 वायुमंडलीय दाब पर, एक हाइड्रोकार्बन के 10 mL के पूर्ण दहन के लिए 55 mL O_2 की आवश्यकता होती है तथा 40 mL CO_2 उत्पन्न होती है। हाइड्रोकार्बन का सूत्र है :

(1) C_4H_{10} (2) C_4H_8 (3) C_4H_6 (4) C_4H_7Cl

A. 3

sol. $CxHy + \left(x + \frac{y}{4}\right)O_2 \longrightarrow xCO_2 + \frac{y}{2}H_2O$

10 ml 55 ml

0 $55 - 10\left(x + \frac{y}{4}\right)$ 10 x

Vol. of CO_2, $10x = 40$; $x = 4$

$55 - 10\left(x + \frac{y}{4}\right) = 0$; $y = 6$

$\therefore$ Hydrocarbon is C_4H_6

29. Three complexes, $[CoCl(NH_3)_5]^{2+}$(I), $[Co(NH_3)_5H_2O]^{3+}$(II) and $[Co(NH_3)_6]^{3+}$(III) absorb light in the visible region. The correct order of the wavelength of light absorbed by them is :

तीन संकर, $[CoCl(NH_3)_5]^{2+}$(I), $[Co(NH_3)_5H_2O]^{3+}$(II) तथा $[Co(NH_3)_6]^{3+}$(III) दृश्य क्षेत्र में प्रकाश अवशोषित करते हैं। इनके द्वारा अवशोषित प्रकाश के तरंगदैर्ध्य का सही क्रम होगा :

(1) (I) > (II) > (III) (2) (II) > (I) > (III) (3) (III) > (I) > (II) (4) (III) > (II) > (I)

A. 1

sol. In a co-ordination compound, the strong field ligand causes higher splitting of the d-orbitals. Wavelength of the energy absorbed by the coordination compound is inversely proportional to ligand field strength of the given coordination compound. The decreasing order of ligand field strength is $NH_3 > H_2O > Cl$. Therefore decreasing order of wavelength absorbed is (I) > (II) > (III).

30. Match the refining methods (Column I) with metals (Column II).

Column I	**Column II**
(Refining methods)	**(Metals)**
(I) Liquation	(a) Zr
(II) Zone Refining	(b) Ni
(III) Mond Process	(c) Sn
(IV) Van Arkel Method	(d) Ga

परिष्करण विधियों (कॉलम I) का धातुओं (कॉलम II) के साथ सुमेल कीजिए।

कॉलम I	**कॉलम II**
(परिष्करण विधि)	**(धातुयें)**
(I) गलनिक पृथक्करण	(a) Zr
(II) जोन रिफाइनिंग	(b) Ni
(III) मान्ड प्रक्रम	(c) Sn
(IV) वान आर्कल विधि	(d) Ga

(1) (I)-(c); (II)-(a); (III)-(b); (IV)-(d)
(2) (I)-(b); (II)-(d); (III)-(a); (IV)-(c)
(3) (I)-(c); (II)-(d); (III)-(b); (IV)-(a)
(4) (I)-(b); (II)-(c); (III)-(d); (IV)-(a)

A. 3

sol. Mond's process is used for refining of Ni, Van Arkel method is used for Zr, Liquation is used for Sn and zone refining is used for Ga.

So, correct match is

(I)-(c); (II)-(d); (III)-(b); (IV)-(a)