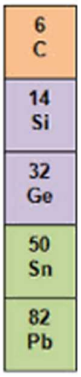
JEE-Main-31-01-2024 (Memory Based)
[MORNING SHIFT]

Chemistry

Question: Which of the following is amphoteric?
Options:
(a) GeO & GeO_2
(b) SnO_2 & PbO_2
(c) SiO_2 & GeO_2
(d) CO & SiO
Answer: (b)
Solution: The dioxides –CO_2, SiO_2 and GeO_2 are acidic, whereas SnO_2 and PbO_2 are amphoteric in nature. Among monoxides, CO is neutral, GeO is distinctly acidic whereas SnO and PbO are amphoteric.

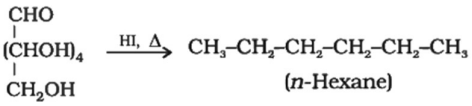


Question: Match the following.

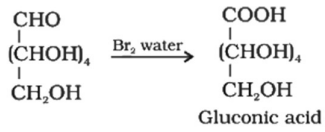
List - I (Reactants)	**List - II** (Products)
A) Glucose + HI	i) Gluconic acid
B) Glucose + $NaBH_4$	ii) n-Hexane
C) Glucose + Br_2 - H_2O	iii)Sorbitol
D) Glucose + HNO_3	iv) Saccharic acid

Options:
(a) A - iii, B - ii; C - i; D - iv
(b) A - ii, B - iii; C - i; D - iv
(c) A - i, B - iii; C - ii; D - iv
(d) A - ii, B - iii; C - iv; D - i
Answer: (b)
Solution:

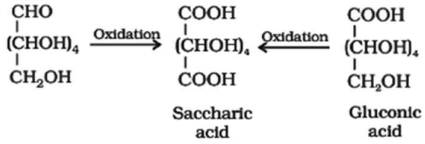
On prolonged heating with HI, it forms n-hexane, suggesting that all the six carbon atoms are linked in a straight chain.

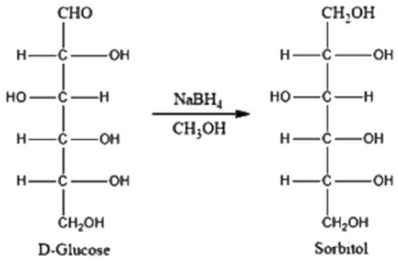


Glucose gets oxidised to six carbon carboxylic acid (gluconic acid) on reaction with a mild oxidising agent like bromine water. This indicates that the carbonyl group is present as an aldehydic group.

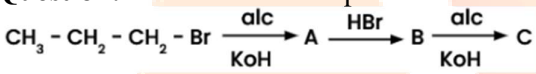


On oxidation with nitric acid, glucose as well as gluconic acid both yield a dicarboxylic acid, saccharic acid. This indicates the presence of a primary alcoholic (–OH) group in glucose.





Question: Find out the final product C.



Options:

(a) Propan - 1 - ol

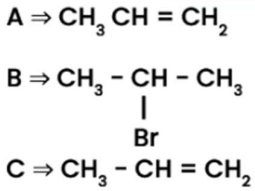
(b) Propan - 2 - ol

(c) Propene

(d) Propane

Answer: (c)

Solution:



Question: Which Compound is white in colour in aqueous medium?

Options:

(a) $ZnSO_4$

(b) $CuSO_4$

(c) $FeSO_4$

(d) $FeCl_3$

Answer: (a)

Solution: Zn salts are colourless due to completely filled d orbital.

Question: On which factor electrical conductivity of electrolytic cell does not depend

Options:

(a) Concentration of electrolyte

(b) Amount of electrolyte added
(c) Temperature
(d) Nature of electrode
Answer: (d)
Solution: It depends on the nature of the electrolyte and concentration of the electrolyte.

Question: Decreasing order of electron gain enthalpy of the following elements (magnitude only)
Sulphur - A, Bromine - B, Fluorine - C, Argon - D
Options:
(a) A > B > C > D
(b) D > C > B > A
(c) C > B > A > D
(d) A > B > D > C
Answer: (c)

Question: If one faraday of electricity is used in the discharging of Cu^{2+} , then find the mass (in g) of Cu deposited
Options:
(a) 31.75 g
(b) 45.9 g
(c) 65.3 g
(d) 27.5 g
Answer: (a)
Solution:
$Cu^{+2} + 2e^{-} \rightarrow Cu$
Two moles of electrons are required to deposit one mole Cu. Therefore, the weight of copper that will get deposited on passing 2 faradays of electricity is 63.5g.
1F = 63.5/2 g
31.75g

Question: Statement I: Dichromates are generally made from cromates
Statement II: Manganate ions are diamagnetic
Options:
(a) Both statement I and statement II are false
(b) Statement I is true but statement II is false
(c) Statement I is false but statement II is true
(d) Both statement I and statement II are true
Answer: (b)
Solution: Potassium dichromate is a very important chemical used in leather industry and as an oxidant for preparation of many azo compounds. Dichromates are generally prepared from chromate, which in turn are obtained by the fusion of chromite ore ($FeCr_2O_4$) with sodium or potassium carbonate in free access of air. The reaction with sodium carbonate occurs as follows:
$4\ FeCr_2O_4 + 8\ Na_2CO_3 + 7\ O_2 \rightarrow 8\ Na_2CrO_4 + 2\ Fe_2O_3 + 8\ CO_2$
The yellow solution of sodium chromate is filtered and acidified with sulphuric acid to give a solution from which orange sodium dichromate, $Na_2Cr_2O_7 . 2H_2O$ can be crystallised.
$2Na_2CrO_4 + 2\ H^{+} \rightarrow Na_2Cr_2O_7 + 2\ Na^{+} + H_2O$

Question: Which have highest electron gain enthalpy?
Options:
(a) F
(b) Cl
(c) Br
(d) I
Answer: (b)
Solution: Electron-electron repulsion is very high in fluorine which resists the addition of an electron. Thus, electron gain enthalpy follows the order: Cl > F > Br > I.

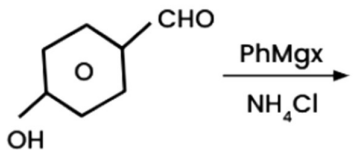
Question: Which of the following give positive deviation from Raoult's Law ?
Options:
(a) Ethanol + acetone
(b) Benzene + toluene
(c) Acetone + chloroform
(d) Chloroethane + bromoethane
Answer: (b)

Question: Assertion: Noble gas have very high boiling point.
Reason: Noble gas have weak dispersion forces
Options:
(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.
Answer: (d)
Solution: Noble gases have weak Vander waals forces present in them both in the liquid and solid state. and have very low melting and boiling point due to this reason.

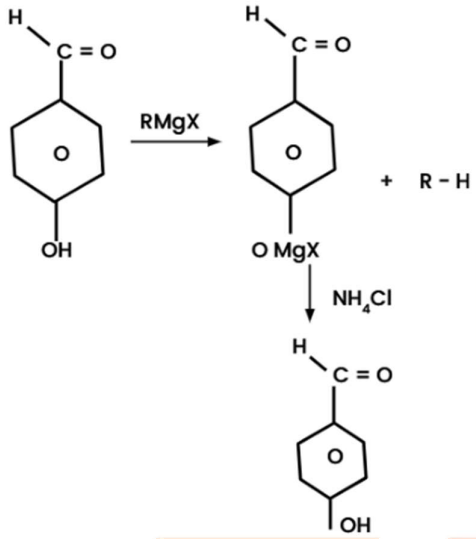
Question: Statement-I: Pka value of Phenol and ethanol is 10.0 and 15.9 respectively.
Statement-II: Ethanol is more Acidic than phenol.
Options:
(a) Both statement I and statement II are false
(b) Statement I is true but statement II is false
(c) Statement I is false but statement II is true
(d) Both statement I and statement II are true
Answer: (b)
Solution: Greater the pK_a value. Weaker is the acid Hence, phenol is more acidic than ethanol.

Question: Which of the following does not give colour with conc. H_2SO_4 ?
Options:
(a) NaBr
(b) CaF_2
(c) $NaNO_3$
(d) I^-
Answer: (a)

Question:



Solution:



Question: Which of the following have six electron in carbon?

Options:

(a) Carbocation

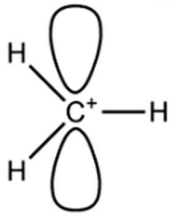
(b) Carbanion

(c) Carbon free radical

(d) None of the above

Answer: (a)

Solution:



Question: Adsorption method is used in.

Options:

(a) Chromatography

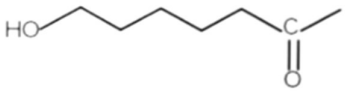
(b) Extracational method

(c) Distillation method

(d) Sublimation

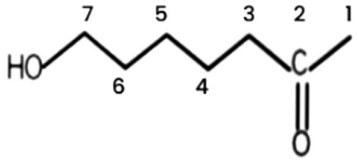
Answer: (a)

Question: Correct IUPAC name of



Options:

(a) 7 - Hydroxyheptan - 2 - one
(b) 6 - Hydroxyheptan - 2 - one
(c) 2 - Oxoheptan - 7 - ol
(d) 1 - Hydrogen - 6 - oxoheptane
Answer: (a)
Solution:



Question: White colour compound is
Options:
(a) Ammonium molybdate
(b) Ammonium sulphide
(c) Lead sulphate
(d) Lead iodide
Answer: (c)

Question: Statement I: Alcohols can act as nucleophile as well as electrophile
Statement II: Alcohols react with metals to form alkoxide and liberate H_2.
Options:
(a) Both statement I and statement II are false
(b) Statement I is true but statement II is false
(c) Statement I is false but statement II is true
(d) Both statement I and statement II are true
Answer: (c)
Solution:
Statement 2 true
Statement 1 alcohol act as nucleophile and protonated alcohol act as electrophile

Question: How many of the following compounds have sp^3 hybridized central atom?
H_2O, NH_3, SiO_2, SO_2, CO and BF_3
Answer: 3
Solution:

sp^3 hybrid orbitals

Question: Moles of CH_4 required for formation of 22 g of CO_2 is m ✕ 10^{-2}
The value of m is :
Answer: 50
Solution:

$CH_4 + 2O_2 \longrightarrow Co_2 + 2H_2O$

22 g

Number of moles of $Co_2 = \frac{22}{44} = \frac{1}{2}$ 0.5 mol

Number of moles of CH_4 = Number of moles Co_2

= 0.3 moles

Question: The total number of different alkanes formed when the following mixture is subjected to electrolysis :

CH_3COONa (aq) and C_2H_5COONa (aq) is ____
(do not consider disproportionation reaction)
Answer: 3
Solution: Ethane, Butane & propane

Question: Which of the following are generally used in batteries?
Zn, Cd, Hg, Mn, Fe
Answer: 4

Question: Number of Geometrical Isomers of $[Pt(en)_2\ Cl_2]$
Answer: 2