

JEE-Main-27-06-2022-Shift-2 (Memory Based)

Chemistry

Question: Assertion: Fluorine forms only one oxo acid

Reason: It is small and electronegative

Options:

- (a) Both assertion and reason are true, reason is correct explanation of assertion.
- (b) Both assertion and reason are true, but reason is not a correct explanation of assertion.
- (c) Assertion is true, but reason is false
- (d) Assertion is false, but reason is true

Answer: (a)

Solution: Due to high electronegativity and small size, fluorine forms only one oxoacid, HOF known as fluoric (I) acid or hypofluorous acid.

Question: The gas produced by treating an aqueous solution of ammonium chloride with sodium nitrite is

Options:

- (a) N_2O
- (b) NH_3
- (c) N_2
- (d) Cl_2

Answer: (c)

Solution: $NH_4Cl(aq) + NaNO_2(aq) \rightarrow N_2(g) + 2H_2O(l) + NaCl(aq)$

Question: Which of the following ions have half & completely filled f-orbital respectively in lanthanides ions?

[Given Atomic No.: Eu-63, Sm-62, Tm-69, Tb-65, Yb-70, Dy-66]

Options:

- (a) Eu^{2+} , Tm^{2+}
- (b) Tb^{4+} , Yb^{2+}

(c) Dy^{3+} , Yb^{3+}

(d) Sm^{2+} , Tm^{3+}

Answer: (b)

Solution: Electronic configuration of $\text{Tb}^{4+} = [\text{Xe}] 4f^7$ and for $\text{Yb}^{2+} = [\text{Xe}] 4f^{14}$

Question: In 3d series, the metal having the highest negative M^{2+}/M standard electrode potential is

Options:

(a) Cu

(b) Fe

(c) Zn

(d) Cr

Answer: (d)

Solution: The element Cr has the highest negative M^{2+}/M standard electrode potential (– 0.90 V).

Question: Correct order of increasing ionic radii of Na^+ , F^- , Mg^{2+} , O^{2-} , N^{3-}

Options:

(a) $\text{O}^{2-} < \text{Na}^+ < \text{F}^- < \text{Mg}^{2+} < \text{N}^{3-}$

(b) $\text{N}^{3-} < \text{Na}^+ < \text{O}^{2-} < \text{Mg}^{2+} < \text{F}^-$

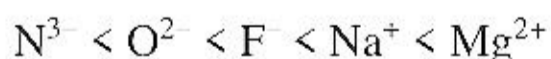
(c) $\text{Mg}^{2+} < \text{Na}^+ < \text{F}^- < \text{O}^{2-} < \text{N}^{3-}$

(d) $\text{Mg}^{2+} < \text{N}^{3-} < \text{O}^{2-} < \text{Na}^+ < \text{F}^-$

Answer: (c)

Solution: The ionic radii of isoelectronic species increases with a decrease in the magnitudes of nuclear charge.

The arrangement of the given species in order of their increasing nuclear charge is as follows:



Therefore, the arrangement of the given species in order of their increasing ionic radii is as follows: $\text{Mg}^{2+} < \text{Na}^+ < \text{F}^- < \text{O}^{2-} < \text{N}^{3-}$

Question: Match the following.

Column-I	Column-II
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A) Antipyretic	i) Reduces pain
B) Analgesic	ii) Reduces stress
C) Tranquilizer	iii) Reduces fever
D) Antacid	iv) Reduces acidity (Smooth)

Options:

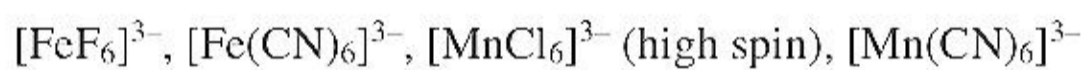
- (a) A → i; B → iv; C → ii; D → iii
 (b) A → iii; B → iv; C → ii; D → i
 (c) A → i; B → ii; C → iii; D → iv
 (d) A → iii; B → i; C → ii; D → iv

Answer: (d)

Solution:

- A) Antipyretic ⇒ Reduces fever
 B) Analgesic ⇒ Reduces pain
 C) Tranquilizer ⇒ Reduces stress
 D) Antacid ⇒ Reduces acidity (Smooth)

Question: Increasing order of magnetic moment

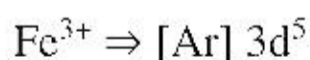
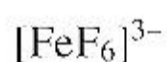


Options:

- (a) $[\text{Fe}(\text{CN})_6]^{3-} < [\text{Mn}(\text{CN})_6]^{3-} < [\text{MnCl}_6]^{3-} < [\text{FeF}_6]^{3-}$
 (b) $[\text{Fe}(\text{CN})_6]^{3-} < [\text{Mn}(\text{CN})_6]^{3-} < [\text{FeF}_6]^{3-} < [\text{MnCl}_6]^{3-}$
 (c) $[\text{MnCl}_6]^{3-} < [\text{Mn}(\text{CN})_6]^{3-} < [\text{FeF}_6]^{3-} < [\text{Fe}(\text{CN})_6]^{3-}$
 (d) $[\text{FeF}_6]^{3-} < [\text{Mn}(\text{CN})_6]^{3-} < [\text{Fe}(\text{CN})_6]^{3-} < [\text{MnCl}_6]^{3-}$

Answer: (a)

Solution:

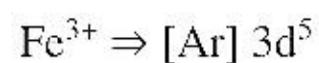


No. of unpaired electrons = 5

As F^- is a weak field ligand

$$\mu = \sqrt{n(n+2)} = \sqrt{5(5+2)} = 5.92 \text{ BM} \dots (1)$$

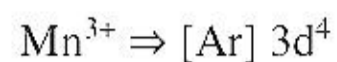




No. of unpaired electrons = 1

As CN^- is a strong field ligand

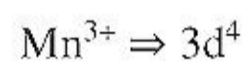
$$\mu = \sqrt{n(n+2)} = \sqrt{1(1+2)} = 1.73 \text{ BM}$$



No. of unpaired electrons = 4

As Cl^- is a weak field ligand

$$\mu = \sqrt{n(n+2)} = \sqrt{4(4+2)} = 4.89 \text{ BM}$$

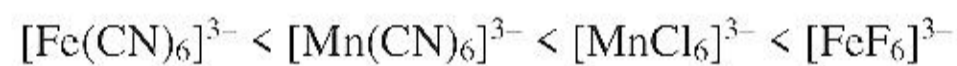


No. of unpaired electrons = 2

As CN^- is a strong field ligand

$$\mu = \sqrt{n(n+2)} = \sqrt{2(2+2)} = 2.87 \text{ BM}$$

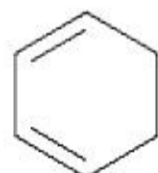
Increasing order of magnetic moment



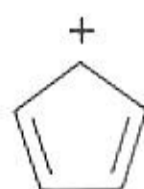
Question: Which of the following species is most stable?

Options:

(a)



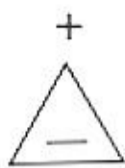
(b)



(c)



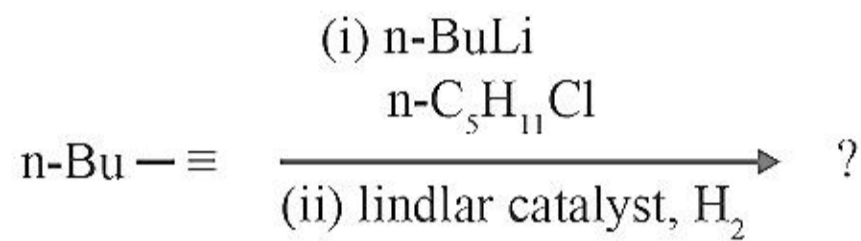
(d)



Answer: (d)

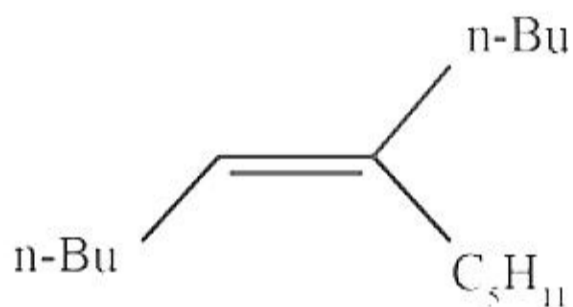
Solution: Due to aromaticity, most stable species is (d).

Question: Major product is

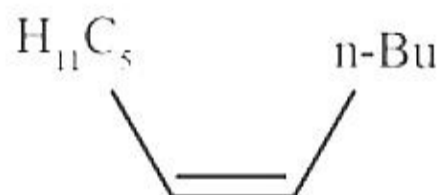


Options:

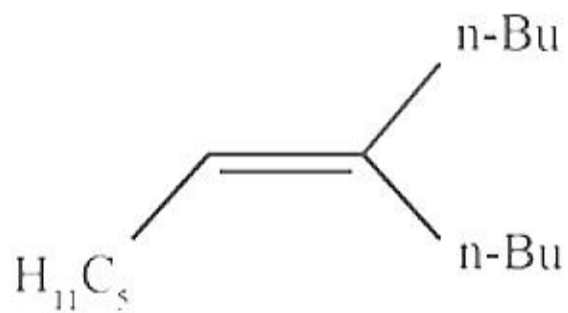
(a)



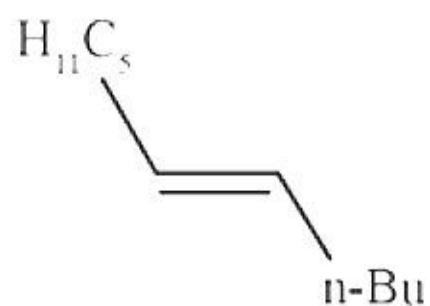
(b)



(c)

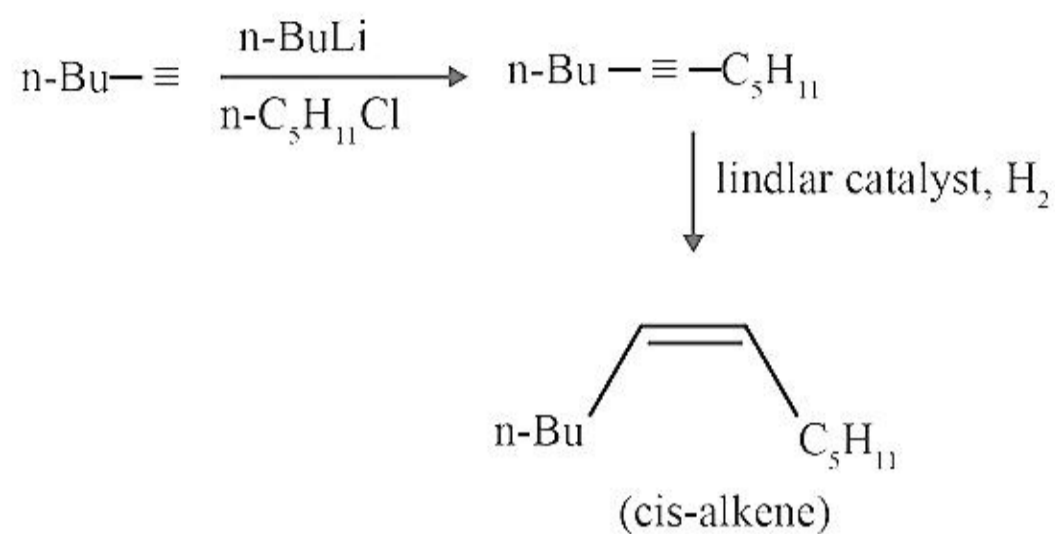


(d)



Answer: (b)

Solution:



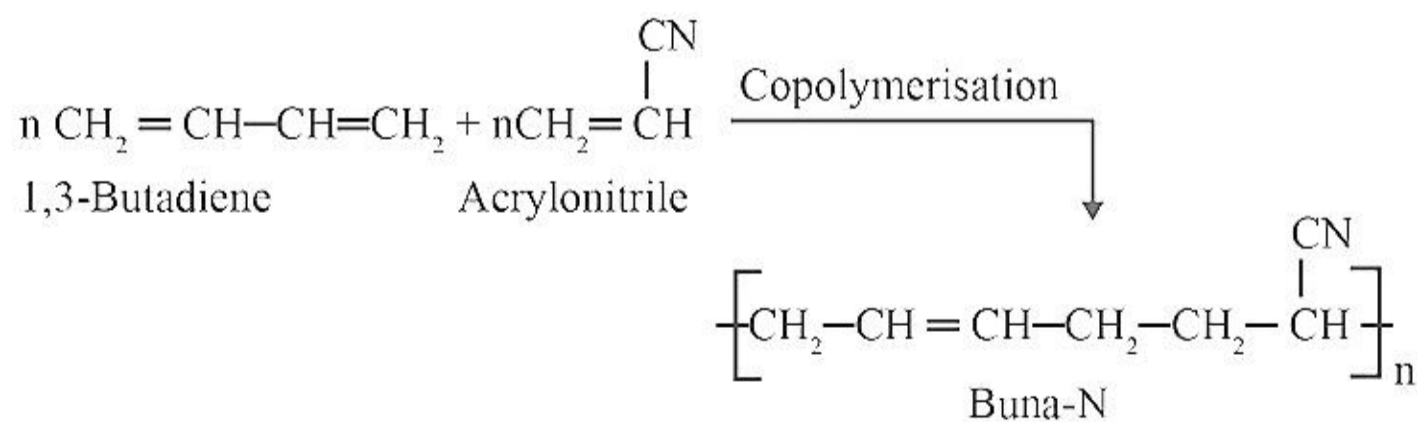
Question: What is the monomer of Buna-N?

Options:

- (a) 1,3-Butadiene and Acrylonitrile
- (b) 2-Chloro-1,3-butadiene
- (c) 1,3-Butadiene and Styrene
- (d) Phenol and formaldehyde

Answer: (a)

Solution:



Question: pH of 10^{-3} M NaOH is

Options:

- (a) 11

(b) 9

(c) 7

(d) 12

Answer: (a)

Solution:

$$[\text{OH}^-] = 10^{-3} \text{ M}$$

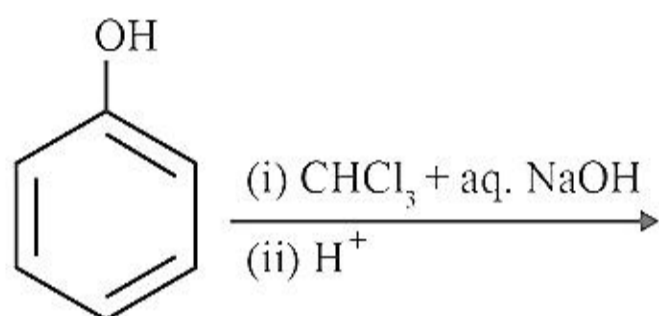
$$\text{pOH} = -\log_{10}[\text{OH}^-]$$

$$\text{pOH} = -\log_{10}10^{-3} = -(-3\log_{10}10) = 3$$

$$\text{pH} + \text{pOH} = 14 \text{ at } 298 \text{ K}$$

$$\text{pH} = 14 - 3 = 11$$

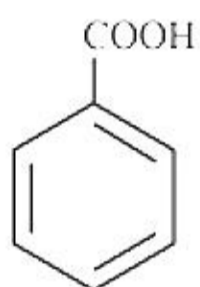
Question: Consider the following reaction,



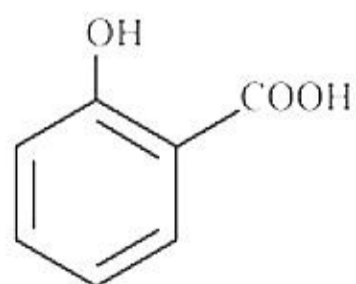
The major product formed in the above reaction is:

Options:

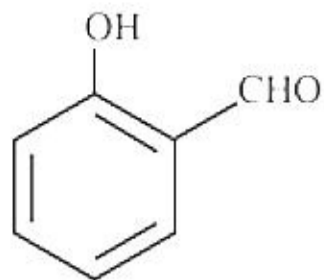
(a)



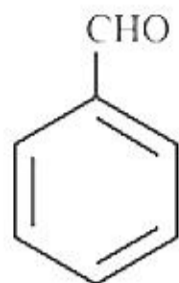
(b)



(c)

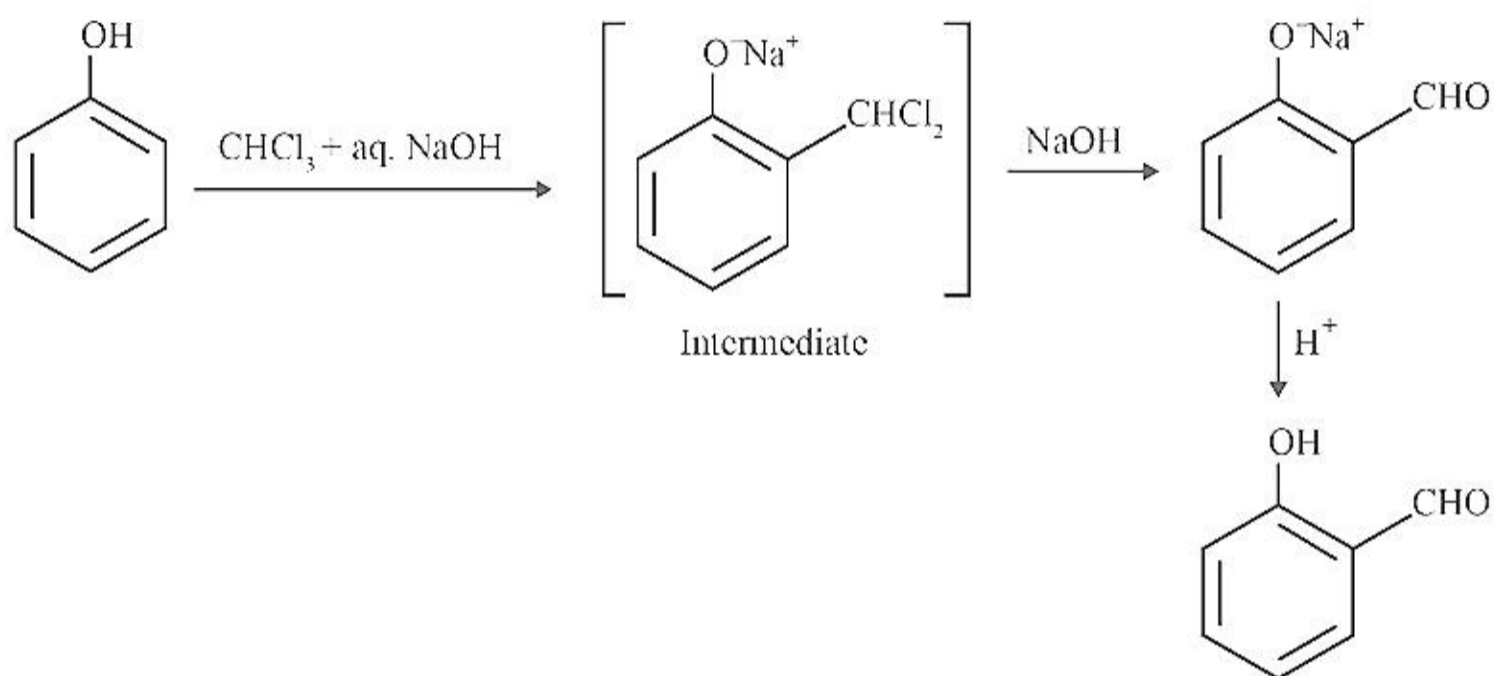


(d)



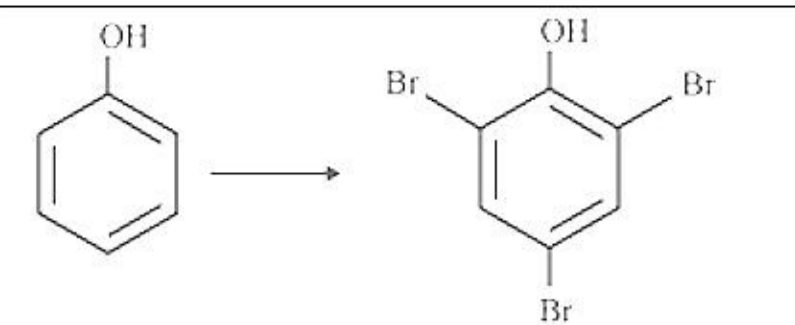
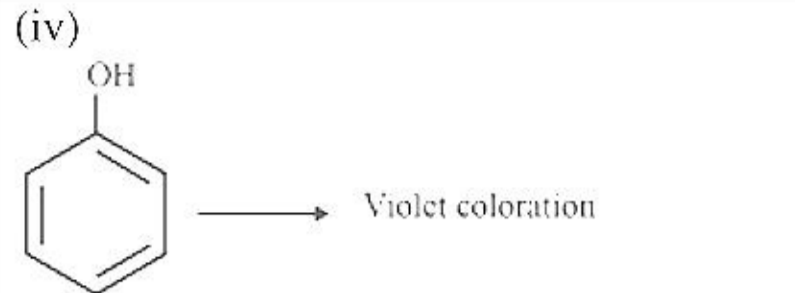
Answer: (c)

Solution:



Question: Match the reagent with organic conversions.

Column-I	Column-II
(i) 	(P) $\text{Na}_2\text{Cr}_2\text{O}_7/\text{H}^+$
(ii) 	(Q) Zn
(iii)	(R) FeCl_3

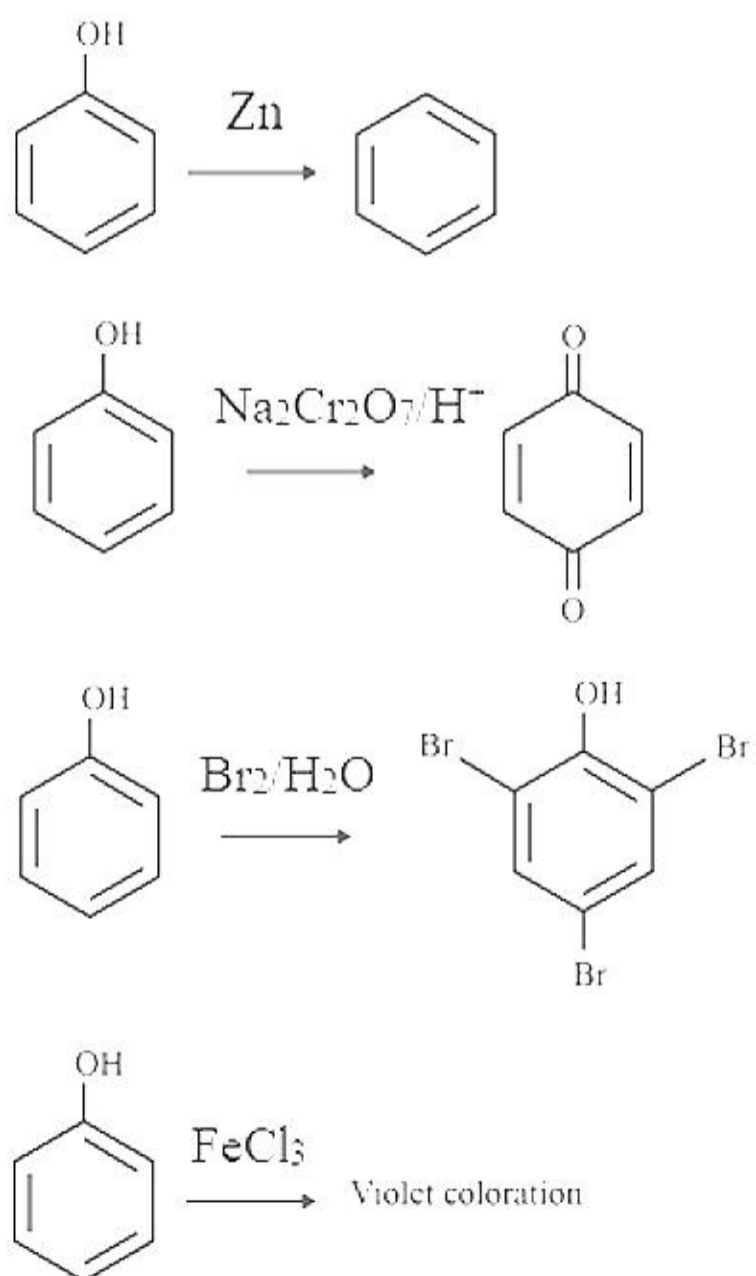
	
(iv) 	(S) Br ₂ /H ₂ O

Options:

- (a) i → Q; ii → P; iii → S; iv → R
 (b) i → P; ii → Q; iii → R; iv → S
 (c) i → S; ii → R; iii → Q; iv → P
 (d) i → R; ii → P; iii → S; iv → Q

Answer: (a)

Solution:



Question: Match the acid radicals present in column I with their characteristic observation in column II

Column-I	Column-II
i) CO_3^{2-}	(P) Brisk Effervescence
ii) NO_3^-	(Q) White precipitate
iii) SO_4^{2-}	(R) Brown ring
iv) S^{2-}	(S) Rotten egg smell

Options:

- (a) i \rightarrow S; ii \rightarrow R; iii \rightarrow Q; iv \rightarrow P
- (b) i \rightarrow P; ii \rightarrow Q; iii \rightarrow R; iv \rightarrow S
- (c) i \rightarrow P; ii \rightarrow R; iii \rightarrow Q; iv \rightarrow S
- (d) i \rightarrow P; ii \rightarrow R; iii \rightarrow S; iv \rightarrow Q

Answer: (c)

Solution:

i) $\text{CO}_3^{2-} \Rightarrow$ Brisk Effervescence

ii) $\text{NO}_3^- \Rightarrow$ Brown ring

iii) $\text{SO}_4^{2-} \Rightarrow$ White precipitate

iv) $\text{S}^{2-} \Rightarrow$ Rotten egg smell

Question: Statement 1: In extraction of gold, the oxidation state of gold in the cyanide complex formed is +3.

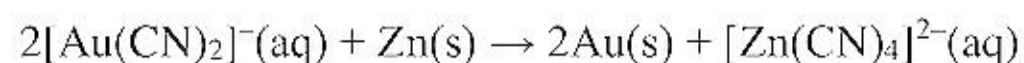
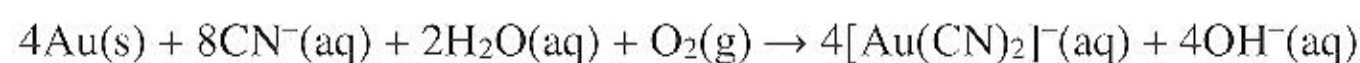
Statement 2: When the cyanide complex is treated with zinc, Zn gets oxidised to +2 state.

Options:

- (a) Statement 1 and statement 2 both are correct.
- (b) Statement 1 is correct but statement 2 is wrong.
- (c) Statement 1 is wrong but statement 2 is correct.
- (d) Statement 1 and statement 2 both are wrong.

Answer: (c)

Solution:

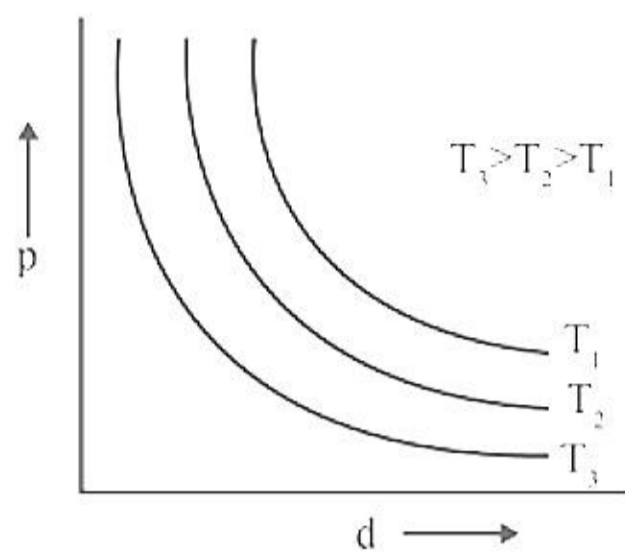


Oxidation state of Gold in complex $[\text{Au}(\text{CN})_2]^-$ is +1 and oxidation state of Zn in Zn complex is +2.

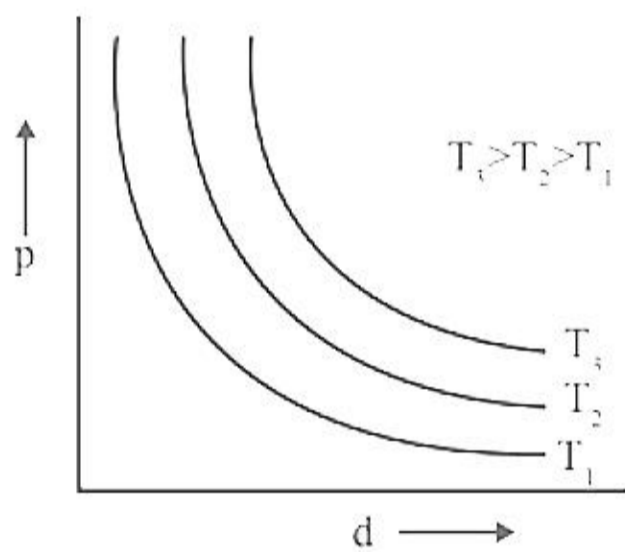
Question: Which of the following curve is correct for an ideal gas?

Options:

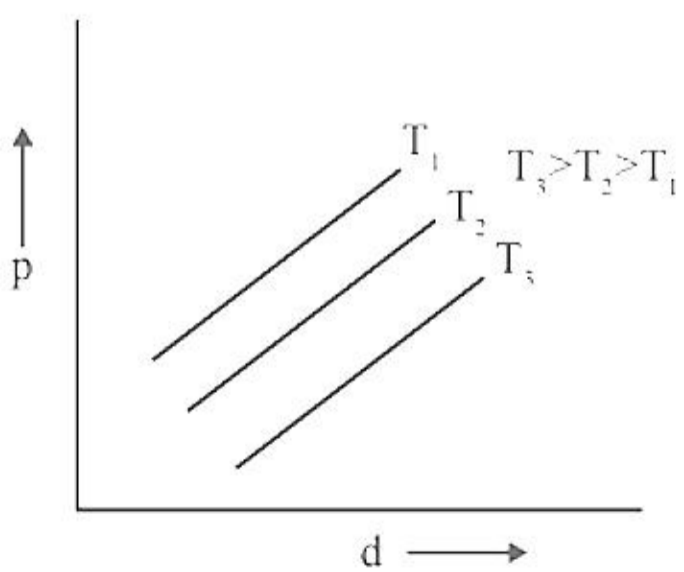
(a)



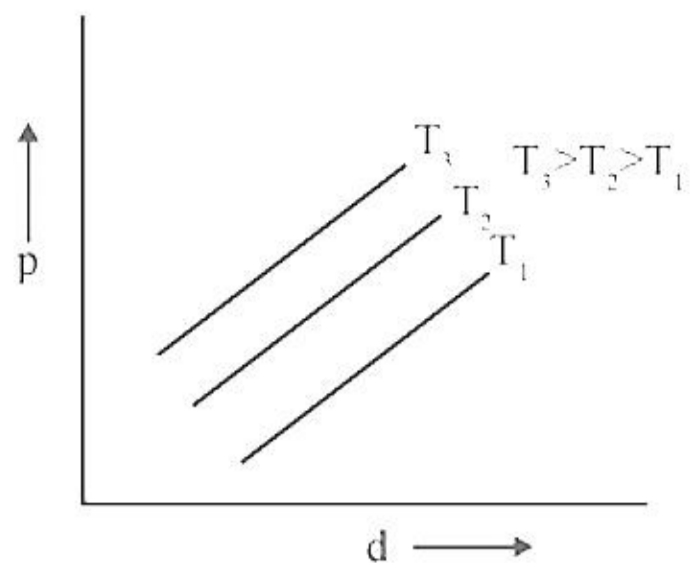
(b)



(c)



(d)



Answer: (d)

Solution:

$$PM = dRT \therefore P \propto d \cdot T$$

So, curve is linear and $T_3 > T_2 > T_1$

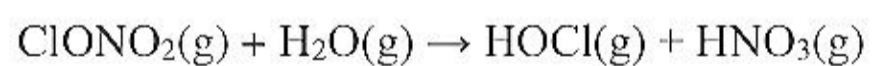
Question: In the stratospheric clouds, the hydrolysis of chlorine nitrate gives product A and B and also when it reacts with HCl it gives product B and C. What is Product A, B and C?

Options:

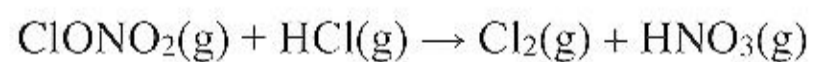
- (a) HOCl, HNO₃, Cl₂
- (b) Cl₂, HNO₃, HOCl
- (c) HClO₂, HNO₂, HOCl
- (d) HOCl, HNO₂, Cl₂O

Answer: (a)

Solution:



(A)



(C) (B)