

CHEMISTRY

BOOKS - IIT-JEE PREVIOUS YEAR (CHEMISTRY)

D & F BLOCK ELEMENTS

Jee Main And Advanced

1. In the following reaction, ZnO is respectively as a/an



A. base and acid

B. base and base

C. acid and acid

D. acid and base

Answer: D



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2. Sodium salt of an organic acid 'X' produces effervescence with conc. H_2SO_4 . 'X' reacts with the acidified aqueous $CaCl_2$ solution to give a white precipitate which decolourises acidic solution of $KMnO_4$. 'X' is

A. C_6H_5COONa

B. HCOONa

C. CH_3COONa

D. $\text{Na}_2\text{C}_2\text{O}_4$

Answer: D

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3. Which of the following combination will produce H_2 gas ?

A. Fe metal and conc. HNO_3

B. Cu metal and conc. HNO_3

C. Au metal and NaCN (aq) in the presence of air

D. Zn metal and NaOH (aq)

Answer: D



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4. Which of the following compounds is metallic and ferromagnetic ?

A. CrO_2

B. VO_2

C. MnO_2

D. TiO_2

Answer: A



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5. The reaction of zinc with dilute and concentrated nitric acid, respectively, produce

- A. NO_2 and NO
- B. NO and N_2O
- C. NO_2 and N_2O
- D. N_2O and NO_2

Answer: D



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6. The geometries of the ammonia complexes of Ni^{2+} , Pt^{2+} and Zn^{2+} , respectively, are

A. octahedral, square planar and tetrahedral

B. square planar, octahedral and tetrahedral

C. tetrahedral, square planar and octahedral

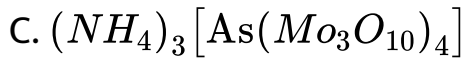
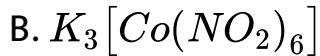
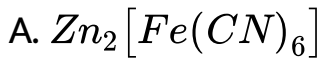
D. octahedral, tetrahedral and square planar

Answer: A



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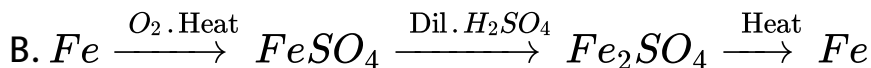
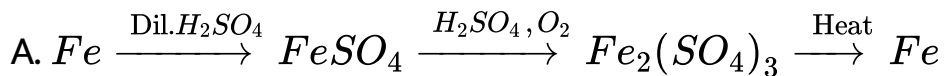
7. Which of the following compounds is not yellow coloured ?

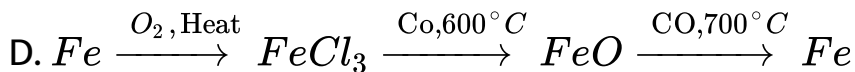
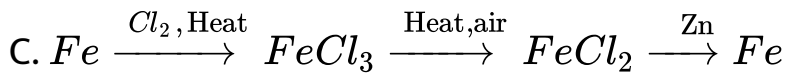


Answer: A

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8. Which series of reactions correctly represents chemical reactions related to iron and its compounds ?

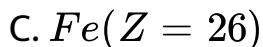
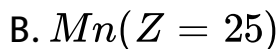
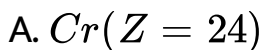




Answer: D

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9. Four successive members of first row transition element are listed below. Which one of them is expected to have highest $E_{\frac{M^{3+}}{(M^{2+})^{\ominus}}}$ value?



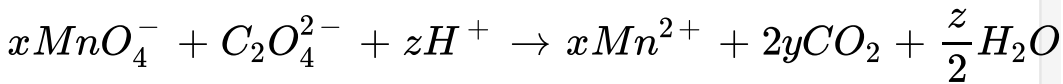
D. $Co(Z = 27)$

Answer: D



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10. Consider the following reaction



The value of x, y and z in the reaction are respectively

A. 5,2 and 16

B. 2,5 and 8

C. 2,5 and 16

D. 5,2 and 8

Answer: C

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11. Which one of the following arrangements does not represent the correct order of the property stated against it?

A. $V^{2+} < Cr^{2+} < Mn^{2+} < Fe^{2+}$: paramagnetic

behaviour

B. $Ni^{2+} < Co^{2+} < Fe^{2+} < Mn^{2+}$: ionic size

C. $Co^{3+} < Fe^{3+} < Cr^{3+} < Sc^{3+}$: stability in

aqueous solution

D. $Sc < Ti < Cr < Mn$: number of oxidation states.

Answer: A



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12. The colour of light absorbed by an aqueous solution of $CuSO_4$ is

- A. orange-red
- B. blue-green
- C. yellow
- D. violet

Answer: A



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13. Which of the following will not be oxidised by O_3 ?

A. KI

B. $FeSO_4$

C. $KMnO_4$

D. K_2MnO_4

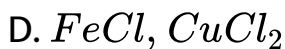
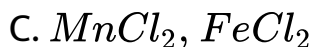
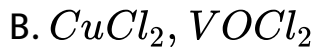
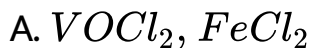
Answer: C



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14. In any transition series, from left to right, the d-orbitals are progressively filled and their properties vary accordingly.

Q. Which of the following pair of compounds is expected to exhibit same colour in aqueous solution?

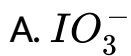


Answer: B



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15. When I^\ominus is oxidised by MnO_4^\ominus in an alkaline medium, I^\ominus converts into

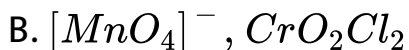
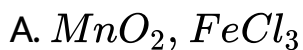


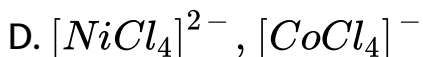
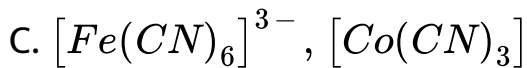
Answer: A



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16. The pair of compounds having metals in their highest oxidation state is .

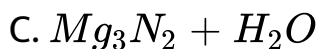
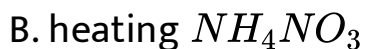
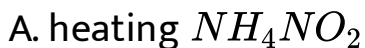




Answer: B

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17. $(NH_4)_2Cr_2O_7$ on heating gives a gas which is also given by



Answer: A



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18. When MnO_2 is fused with KOH , a coloured compound is formed, the product and its colour are

A. K_2MnO_4 , purple green

B. $KMnO_4$, purple

C. Mn_2O_3 , brown

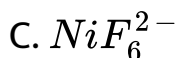
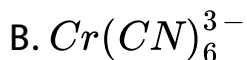
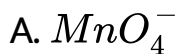
D. Mn_3O_4 , black

Answer: A



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19. Among the following, identify the species with an atom in +6 oxidation state.



Answer: D



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20. On heating ammonium dichromate, the gas evolved is

A. oxygen

B. ammonia

C. nitrous oxide

D. nitrogen

Answer: D



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21. In the dichromate dianion,

A. $4Cr - O$ bonds are equivalent

B. $6Cr - O$ bonds are equivalent

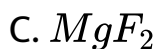
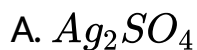
C. all $Cr - O$ bonds are equivalent

D. all $Cr - O$ bonds are non-equivalent

Answer: B

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22. Which of the following compounds is expected to be coloured?



Answer: B



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23. Ammonium dichromate is used in some fireworks. The green-coloured powder blown in the air is

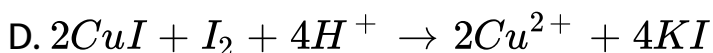
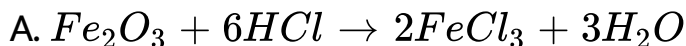


Answer: B



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24. The reaction which proceeds in the forward direction is



Answer: A



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25. Zinc-copper couple that can be used as a reducing agent is obtained by

- A. mixing of zinc dust and copper gauge
- B. zinc coated with copper
- C. copper coated with zinc
- D. zinc and copper wires welded together

Answer: B



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26. How many unpaired electrons are there in Ni^{2+} ?

- A. 0
- B. 2
- C. 4

D. 8

Answer: B

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27. One of the constituents of German silver is

A. Ag

B. Cu

C. Mg

D. Al

Answer: B

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28. Which of the following dissolves in hot concentrated NaOH solution?

A. Fe

B. Zn

C. Cu

D. Ag

Answer: B



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29. Which of the following statements are correct about

Cr^{2+} ($Z = 24$) and Mn^{3+} ($Z = 25$) ?

(i) Cr^{2+} is a reducing agent

(ii) Mn^{3+} is an oxidizing agent

(iii) Both Cr^{2+} and Mn^{3+} exhibit d^4 configuration

(iv) When Cr^{2+} is used as a reducing agent, the chromium ion attains d^5 electronic configuration

A. Cr^{2+} is a reducing agent

B. Mn^{3+} is an oxidising agent

C. both Cr^{2+} and Mn^{3+} exhibit d^4 electronic configuration

D. when Cr^{2+} is used as a reducing agent, the chromium ion attains d^5 electronic configuration.

Answer: A::B::C

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30. Which of the following halides react(s) with $AgNO_{3(aq)}$ to give a precipitate that dissolves in $Na_2S_2O_{3(aq)}$

A. HCl

B. HF

C. HBr

D. HI

Answer: A::C::D



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31. Reduction of the metal centre in aqueous permanganate ion involves

- A. three electrons in neutral medium
- B. five electrons in neutral medium
- C. three electrons in alkaline medium
- D. five electrons in acidic medium

Answer: A::C::D

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32. Which of the following statement(s) is/are correct ?

A. The electronic configuration of Cr is $[Ar]3d^24s^1$

(Atomic number of Cr = 24)

B. The magnetic quantum number may have a negative value

C. In silver atom, 23 electrons have a spin of one type and 24 of the opposite type (Atomic number of Ag = 47)

D. The oxidation state of nitrogen in HN_3 is -3

Answer: B::C



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33. Which of the following statement(s) is/are correct when a mixture of NaCl and $\text{K}_2\text{Cr}_2\text{O}_7$ is gently warmed with conc. H_2SO_4 ?

A. A deep red vapours is formed

B. Vapours when passed into NaOH solution gives a yellow solution of Na_2CrO_4

C. Chlorine gas is evolved

D. Chromyl chloride is formed

Answer: A::B::D



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34. Which of the following alloys contain (s) Cu and Zn?

A. Bronze

B. Brass

C. Gun metal

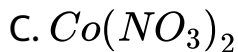
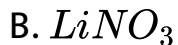
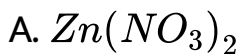
D. Type metal

Answer: B::C



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35. The aqueous solution of the following salts will be coloured in the case of



Answer: C::D



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36. Potassium manganate (K_2MnO_4) is formed when

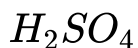
A. chlorine is passed into aqueous $KMnO_4$ solution

B. manganese dioxide is fused with KOH in air

C. formaldehyde reacts with potassium permanganate

in the presence of strong alkali

D. potassium permanganate reaction with conc.



Answer: B::C



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37. Statement I : Zn^{2+} is diamagnetic

Statement II : The electrons are lost from 4s orbital to

from Zn^{2+}

- A. Statement I is true , Statement II is true , Statement II is the correct explanation of Statement I
- B. Statement I is true , Statement II is true , Statement II is not the correct explanation of Statement I
- C. Statement I is true , Statement II is false
- D. Statement I is false , Statement II is false

Answer: B



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38. Assertion: If a strong acid is added to a solution of potassium chromate it changes its colour from yellow to orange.

Reason: The colour change is due to the oxidation of potassium chromate.

A. Statement I is true , Statement II is true , Statement

II is the correct explanation of Statement I

B. Statement I is true , Statement II is true , Statement

II is not the correct explanation of Statement I

C. Statement I is true , Statement II is false

D. Statement I is false , Statement II is false

Answer: C



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39. The compound $Yb_2Cu_3O_7$ which shows super conductivity has copper in oxidation state _____. Assume that the rare earth element yttrium is in its usual +3 oxidation state.

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40. The outermost electronic configuration of Cr is _____

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41. Fehling's solution 'A' consists of an aqueous solution of copper sulphate, while Fehling's solution 'B' consists of an alkaline solution



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42. Among (i) $FeSO_4 \cdot 7H_2O$, (ii) $CuSO_4 \cdot 5H_2O$, (iii) $ZnSO_4 \cdot 7H_2O$ and (iv) $MnSO_4 \cdot 4H_2O$, isomorphous salts are



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43. Mn^{2+} can be oxidised to MnO_4^- by $\underline{\quad} \underline{\quad} \underline{\quad}$ (SnO_2, PbO_2, BaO_2).



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44. Deposition of zinc exhibits paramagnetism due to loss of two electrons from 3d-orbitals of neutral atom.

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45. Copper metal reduces Fe^{2+} in an acid medium.

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46. In neutral or faintly alkaline solution, 8 moles of permanganate anions to produce X moles of a sulphur containing product. The magnitude of X is

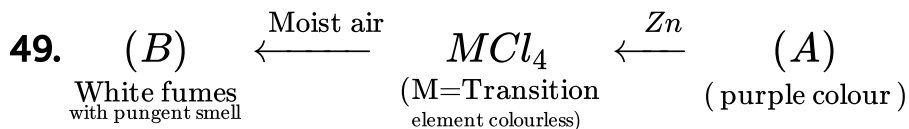
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47. In dilute aqueous H_2SO_4 the complete diaquadioxalatoferate (II) is oxidised by MnO_4^- . For this reaction, the ratio of the rate of change of $[H^+]$ to the rate of change of $[MnO_4^-]$ is

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48. Consider the following list of reagents: Acidified $K_2Cr_2O_7$, alkaline $KMnO_4$, $CuSO_4$, H_2O_2 , Cl_2 , O_3 , HNO_3 , and $Na_2S_2O_3$. The total number of reagents that can oxidise aqueous I^- ion to I_2 is

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Identify the metal M and hence MCl_4 . Explain the difference in colours of MCl_4 and A.

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50. Give reason : CrO_3 is an acid anhydride.

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51. A compound of vanadium has a magnetic moment of $1.73BM$. Work out the electronic configuration of vanadium in the compound

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52. Write balanced equations for the following

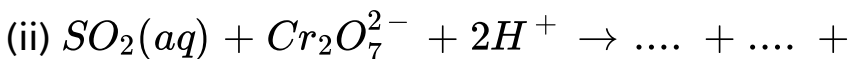
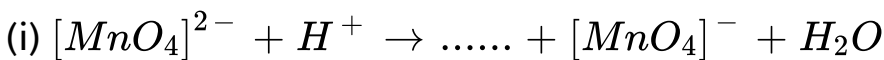
(i) Oxidation of hydrogen peroxide with potassium permanganate in acidic medium

(ii) Reaction of zinc with dilute nitric acid.



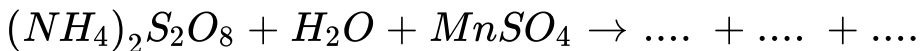
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53. Complete and balance the following reactions



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54. Complete and balance the following reaction



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55. Write the balanced chemical equations for the following reactions

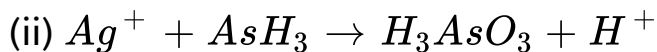
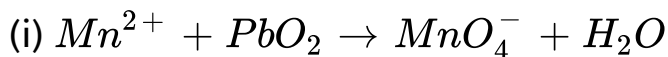
(i) A mixture of potassium dichromate and sodium chloride is heated with concentrated H_2SO_4

(ii) Potassium permanganate is added to a hot solution of manganous sulphate.



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56. Complete and balance the following reactions.



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57. Give reason in one or two sentences

"Most transition metal compound are coloured".

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58. Write the balanced equations for the reactions when

(i). Potassium permanganate interacts with manganese dioxide in the presence of potassium hydroxide.

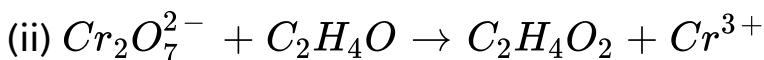
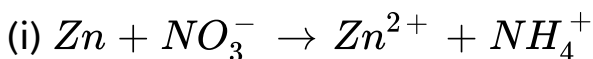
(ii). Potassium ferrocyanide is heated with concentrated sulphuric acid.

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59. State the conditions under which the following preparations are carried out. Give the necessary equations which need not be balanced. Potassium permanganate from manganese dioxide.

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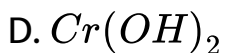
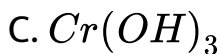
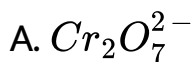
60. Complete and balance the following reactions





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61. CrO_3 dissolves in aqueous NaOH to give



Answer: B



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62. Pick out the incorrect statement

- A. MnO_2 dissolves in dilute HCl. But does not form Mn^{4+}
- B. MnO_2 oxidises hot concentrated H_2SO_4 liberating oxygen
- C. K_2MnO_4 is formed when MnO_2 is fused with KOH in presence of KNO_3
- D. Decomposition of $KMnO_4$ is not catalysed by sunlight

Answer: D



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63. When $KMnO_4$ is added to oxalic acid, the decolourisation is slow in the beginning but becomes instantaneous after sometime because

- A. Mn^{2+} acts as autocatalyst
- B. CO_2 is formed as product
- C. Reaction is exothermic
- D. MnO_4^- catalyses the reaction

Answer: A



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64. K_2MnO_4 can be converted into $KMnO_4$ using all of the following except

A. dil. H_2SO_4

B. Cl_2

C. O_3

D. HCl

Answer: D



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65. Addition of non-metals like B and C to the interstitial sites of a transition metal results the metal

A. of more ductility

B. of less ductility

C. less malleable

D. of more hardness

Answer: B::C::D



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66. Which of the following statement concening $KMnO_4$ is incorrect ?

A. In dilute alkaline medium, it is reduced to MnO_2

- B. When added in small quantity to concentrated H_2SO_4 a green solution containing MnO_3^+ ion is formed
- C. With larger amount of $KMnO_4$ added to concentrated H_2SO_4 , an explosive oil Mn_2O_7 is formed
- D. $KMnO_4$ is stable to heat and sunlight

Answer: D

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67. To an acidified dichromate solution, a pinch of Na_2O_2 is added and shaken. What is observed ?

- A. Blue colouration
- B. Red colouration finally changing to green
- C. Oxygen gas is evolved
- D. Bluish-green precipitate is formed

Answer: A:C

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68. Assertion : $KMnO_4$ in aqueous solution is purple coloured due to charge transfer

Reason : In MnO_4^- there is no electron present in the d-orbital of Mn

- A. Both assertion and reason are correct and reason is the correct explanation of the assertion
- B. Both assertion and reason are correct but reason is not the correct explanation of assertion
- C. Assertion is correct but reason is wrong
- D. Assertion is incorrect but reason is correct

Answer: B



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69. Assertion : CrO_3 reacts with HCl to form chromyl chloride gas

Reason : Chromyl chloride (CrO_2Cl_2) has tetrahedral shape.

- A. Both assertion and reason are correct and reason is the correct explanation of the assertion
- B. Both assertion and reason are correct but reason is not the correct explanation of assertion
- C. Assertion is correct but reason is wrong
- D. Assertion is incorrect but reason is correct

Answer: B



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1. Fe^{3+} is reduced of Fe^{2+} by using

A. H_2O_2 is presence of NaOH

B. Na_2O_2 in water

C. H_2O_2 in presence of H_2SO_4

D. Na_2O_2 in presence of H_2SO_4

Answer: A::B



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