



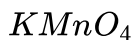
CHEMISTRY

BOOKS - V PUBLICATION

REDOX REACTIONS

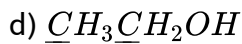
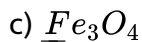
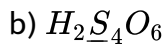
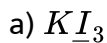
Question Bank

1. Determine the oxidation number of the underlined element in the following:



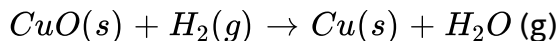
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2. What are the oxidation number of the underlined elements in each of the following and how do you rationalise your results?



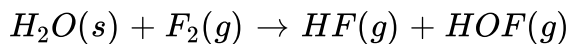
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3. Justify the given reaction is redox reaction



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4. Fluorine reacts with ice as given bellow:

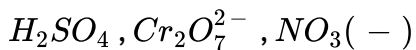


Justify that this is a redox reaction.



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5. Calculate the oxidation number of sulphur, chromium and nitrogen in



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6. Write formulas for the following compounds:

a) Mercury (II) chloride

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7. Suggest a list of the substances where carbon can exhibit oxidation states from '-4' to '(+4)'

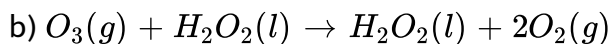
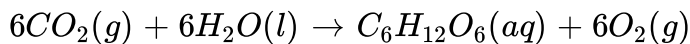
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8. While SO_2 and H_2O_2 act as oxidising as well as reducing agents in reactions, O_3 and HNO_3 act only as oxidants. Why ?

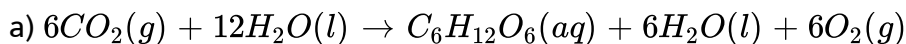


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9. Consider the reactions. a)



Why it is more appropriate to write these reactions as:



Also suggest a technique to investigate the path of the above (a) and (b) redox reactions.



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10. The compound AgF_2 is unstable. However, if formed, the compound acts as a very strong oxidizing agent. Why?



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11. Whenever a reaction between an oxidizing agent and a reducing agent is carried out, a compound of lower oxidation state is formed if the reducing agent is in excess and a compound of higher oxidation state is formed if the oxidising agent is in excess. Justify this statement giving three illustrations.



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12. How do you account for the following observations?

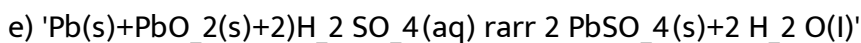
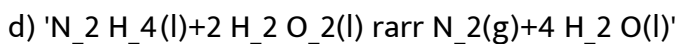
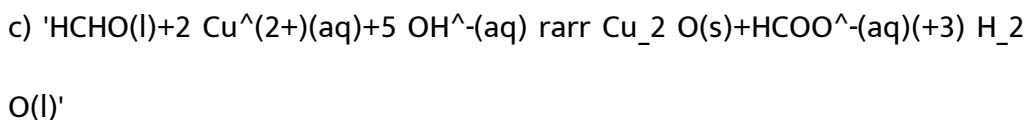
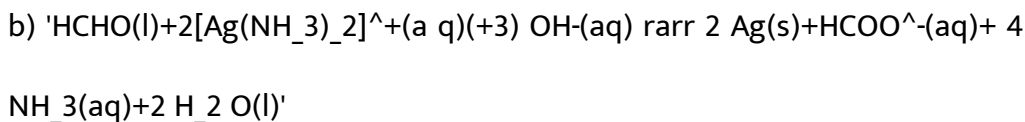
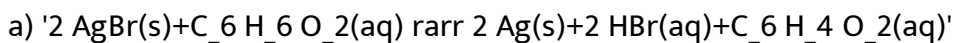
a) Though alkaline potassium permanganate and acidic potassium permanganate both are used as oxidants, yet in the manufacture of benzoic acid from toluene we use alcoholic potassium permanganate as an oxidant. Why? Write a balanced redox equation for the reaction.

b) When concentrated- sulphuric acid is added to an inorganic mixture containing chloride, we get colourless pungent smelling gas 'HCl', but if the mixture contains bromide, then we get red vapours of bromine. Why?



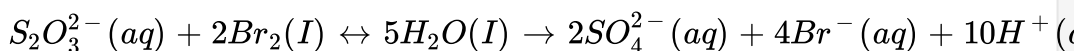
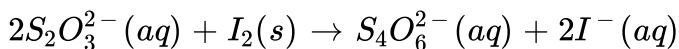
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13. Identify the substance oxidized, reduced, oxidizing agent and reducing agent for each of the following reactions.



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14. Consider the reactions:



Why does the same reductant, thiosulphate react differently with iodine and bromine ?

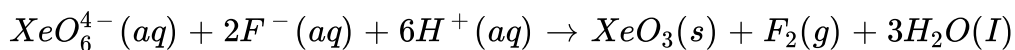


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15. Justify giving reactions that among halogens, fluorine is the best oxidant and among hydrohalic compounds, hydroiodic acid is the best reductant.

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16. Why does the following reaction occur?

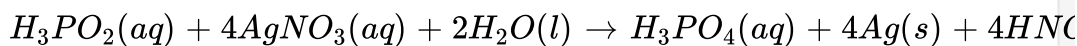


What conclusion about the compound Na_4XeO_6 (of which XeO_6^{4-} is a part) can be drawn from the reaction?

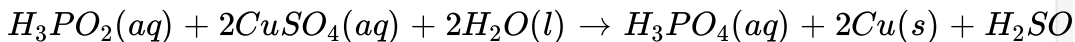
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17. Consider the reactions:

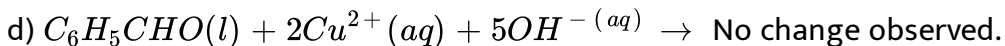
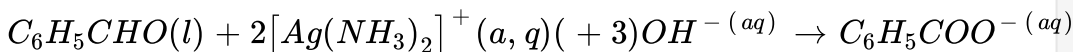
a)



b)



c)

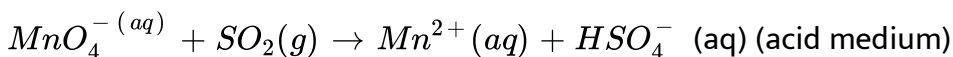


What inference do you draw about the behaviour of Ag^+ and $Cu^{(2+)}$ from these reactions?



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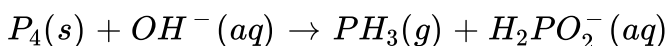
18. Balance the following redox reactions by ion electron method



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19. Balance the equations in the basic medium by ion electron method

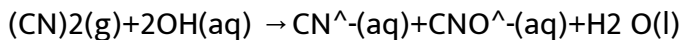
and oxidation number methods. Identify the oxidant and reductant



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20. What sorts of information can you draw from the following reaction:



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21. The Mn^{3+} ion is unstable in solution and undergoes disproportionation to give Mn^{2+} , MnO_2 and H^+ ion. Write a balanced ionic equation for the reaction.



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22. Consider the elements: Cs, Ne, 'F' and 'I'.

- Identify the element that exhibits only negative oxidation state.
- Identify the element that exhibits only positive oxidation state.
- Identify the element that exhibits both positive and negative oxidation states.

d) Identify the element which exhibits neither the negative nor does the positive oxidation state.

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23. Chlorine is used to purify drinking water. Excess of chlorine is harmful. The excess of chlorine is removed by treating with sulphur dioxide. Present a balanced equation for this redox change taking place in water.

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24. Refer to the periodic table given in your book and now answer the following questions.

a) Select the possible non-metals that can show disproportionation reaction.

b) Select three metals that can show disproportionation reaction.

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25. In Ostwalds process for the manufacture of nitric acid, the first step involves the oxidation of ammonia gas by oxygen gas to give nitric oxide gas and steam. What is the maximum weight of nitric oxide that, can be obtained starting only with '10.00 g' of ammonia and '20.0 g' of oxygen?

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26. Using the standard electrode potentials given in the text (Table 8.1), predict if the reaction between the following is feasible?

a) ' $\text{Fe}^{3+}(\text{aq})$ ' and ' $\text{I}^{-}(\text{aq})$ '

b) ' $\text{Ag}^{+}(\text{aq})$ ' and ' $\text{Cu}(\text{s})$ '

c) ' $\text{Fe}^{3+}(\text{aq})$ ' and ' $\text{Cu}(\text{s})$ '

d) ' $\text{Ag}(\text{s})$ ' and ' $\text{Fe}^{3+}(\text{aq})$ '

e) ' $\text{Br}_2(\text{aq})$ ' and ' $\text{Fe}^{2+}(\text{aq})$ '

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27. Predict the products of electrolysis in each of the following: i. An aqueous solution of $AgNO_3$ with silver electrodes. ii. An aqueous solution of $AgNO_3$ with platinum electrodes. iii. A dilute solution of H_2SO_4 with platinum electrodes. iv. An aqueous solution of $CuCl_2$ with platinum electrodes.

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28. Arrange the following metals in the order in which they displace each other from the solution of their salts.

Al, 'C u', F e, M g' and 'Z n'.

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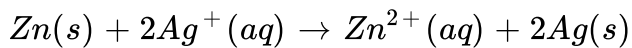
29. Given the standard electrode potentials

$$K^+ / K = - 2.93V, Ag^+ / Ag = + 0.8V, Hg^{2+} / Hg = 0.79V, Mg^{2+} / Mg = - 2.37V$$

Arrange them in increasing order of reducing power.

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30. Depict the galvanic cell in which the reaction



takes place, further show:

- i) Which of the electrode is negatively charged.
- ii) the carriers of the current in the cell, and
- iii) individual reaction at each electrode:

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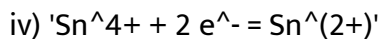
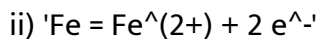
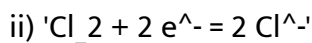
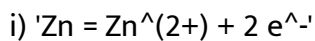
31. Calculate the oxidation number of 'P' in ' PO_4^{3-} ', ' HPO_3^{2-} '

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32. Can the reaction $\text{Cr}_2\text{O}_7^{2-} + \text{H}_2\text{O} \rightarrow 2\text{CrO}_4^{2-} + 2\text{H}^+$ be regarded as a redox reaction?

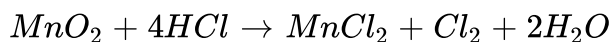
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33. Which of the following redox reaction is oxidation and which is reduction?



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34. Identify the oxidant and reductant and the atoms undergoing oxidation and reduction in the following redox reactions.

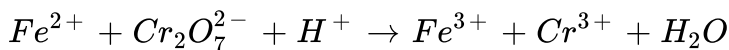


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35. a) Identify redox reaction from the following reactions.

i) Evaporation of water.

- ii) Conversion of oxygen to ozone in the upper atmosphere.
 - iii) Formation of nitric oxide from nitrogen and oxygen during lightning.
 - iv) Reaction of $NaOH$ with H_2SO_4
- b) Balance the following equation by oxidation number method.



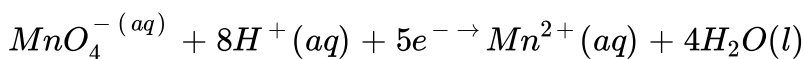
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36. Write half equations for each of the following redox reactions:

- i) 'Zn(s)+PbCl₂(aq) rarr Pb(s)+ZnCl₂(aq)'
- ii) '2 Fe⁽³⁺⁾(aq)+2 I^(aq) rarr I₂(aq)+2 Fe⁽²⁺⁾(aq)'
- iii) '2 Na(s)+Cl₂(g) rarr 2 NaCl(s)'

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37. Consider a voltaic cell constructed with the following substances:



- a) Which substances are oxidized and reduced in this cell?
- b) Write the overall cell equation and calculate the cell potential.
- c) Which are the negative and positive electrodes?
- d) Write the cell notation for this voltaic cell.

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38. Calculate the Oxidation No. of carbon in glucose 'C₆H₁₂O₆'

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39. Decide which atom or atoms have been oxidised and reduced, when the following compounds are formed from their elements.

SO_2 , H_2O , H_2S , NH_3 , HF , BF_3

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40. Fill in the blanks and classify the following reactions into oxidation and reduction:

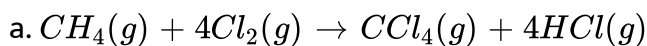


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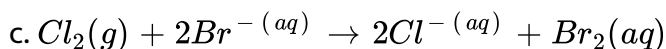
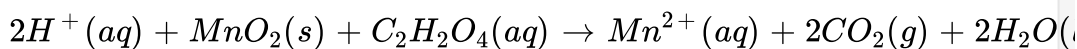
41. Determine the oxidation number of the element underlined in the following species. 'S in H_4 , B in F_3 , B in O_4^{4-} '

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42. Identify the oxidants and reductants in the following reactions.

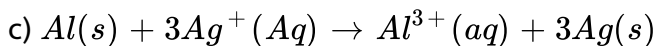
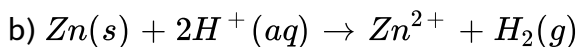
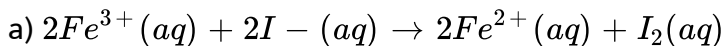


b.



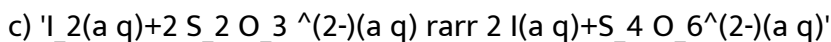
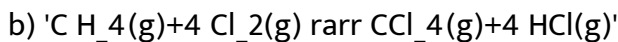
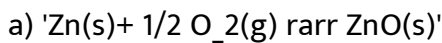
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43. Write the half-reactions for the following redox reactions:



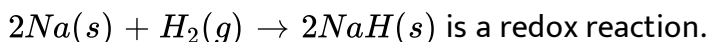
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44. Identify the oxidant and reductant in the following reactions.



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45. Justify that the reaction:



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46. Calculate the oxidation number of all the atoms in the following compounds and ions.

'CO₂, SiO₂, PbSO₄, ClO₄⁻'

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47. Determine the change in the oxidation number of 'S' in 'H₂S' and 'SO₂' in the following industrial reaction: '2 H₂S(g)+SO₂(g) → 3 S(s)+2 H₂O(g)'

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48. Which of the two 'ClO₂⁻' or 'ClO₄⁻' show disproportionation reaction and why? Write reaction for the species that disproportionates.

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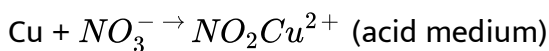
49. Write the disproportionation reactions of the following species:

i) ClO^-



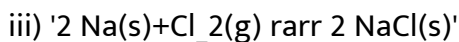
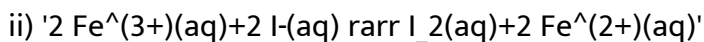
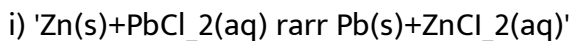
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50. Balance the following equation using oxidation number method :



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51. Write half equations for each of the following redox reactions:



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52. Arrange the following molecules in the decreasing order of oxidation state (+ve to -ve) of nitrogen.

'NO₂, NH₃, HN₃, NO₂⁻, N₂H₄'



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53. Can the reaction ' $\text{Cr}_2\text{O}_7^{(2-)} + \text{H}_2\text{O} \rightleftharpoons 2\text{CrO}_4^{(2-)} + 2\text{H}^+$ ' be regarded as a redox reaction?



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54. Split the following redox reactions in the oxidation and reduction half reaction: i) $2\text{K(s)} + \text{Cl}_2(\text{g}) \rightarrow 2\text{KCl(s)}$ ii) $2\text{Al} + 3\text{Cu}^{2+}(\text{aq}) \rightarrow 2\text{Al}^{3+}(\text{aq}) + 3\text{Cu(s)}$

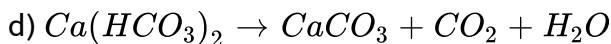
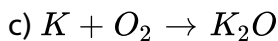
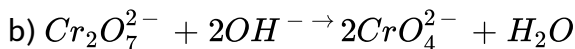
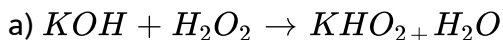


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55. Nitric acid acts only as an oxidising agent while nitrous acid acts both as an oxidising as well as reducing agent. Explain.

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56. Which of the following equation represent oxidation, reduction reaction? Identify each oxidising agent and each reducing agent.



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57. While SO_2 and H_2O_2 act as oxidising as well as reducing agents in reactions, O_3 and HNO_3 act only as oxidants. Why ?

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58. Reduction involves:

- A. gain of electrons
- B. addition of oxygen
- C. increase in oxidation number
- D. loss of electrons

Answer: A



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59. Calculate the oxidation number of 'P' in ' $\text{PO}_4^{(-3)}$, $\text{HPO}_3^{(2-)}$ '

- A. (-3)
- B. 7
- C. 5
- D. 3

Answer: C



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60. Oxidation number of 'Mn' in ' MnO_4^- ' is: '

A. 1

B. -7

C. -1

D. 7

Answer: D



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61. The element with atomic number 9 can exhibit oxidation state of:

A. 1

B. 3

C. -1

D. 5

Answer: C



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62. In ' MgCl_2 ', the oxidation number of chlorine is:

A. 1

B. 3

C. -1

D. Zero

Answer: C



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63. Oxidation number of 'C' in ' CH_3OH , CH_2O , HCOOH ' and ' C_2H_2 ' is respectively:

- A. $(-2), 0, +2, -1$
- B. $+2, 0, +2, (-2)$
- C. $(-2), 0, +2, 0$
- D. $(-2), -4, +2, (-2)$

Answer: A



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64. The highest and lowest oxidation states possible for Te (group 16) are

$+6, -2, +6, 0, +4, -4, +6, -6$

- A. $+6, (-2)$
- B. $+6, 0$
- C. $+4, -4$

D. '+6,-6'

Answer: A



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65. oxidation state of 'S' in ' Na_2S_2 ' ?

A. 1

B. -1

C. 1

D. 0

Answer: C



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66. The oxidation state of 'S' in (permonosulphuric acid) ' H_2SO_3 ' is

A. 8

B. 6

C. 5

D. 4

Answer: B



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67. Oxidation number of sodium in sodium amalgam (Na/Hg) is

A. 0

B. 1

C. -1

D. 2

Answer: A



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68. In the reaction: $Cl_2 + 2OH^- \rightarrow OCl^- + Cl^- + H_2O$: (1) OH^- is oxidising and Cl^- is reducing agent, (2) Cl_2 is oxidising and OH^- is reducing agent, (3) OH^- is both oxidising and reducing agent, (4) Cl_2 is both oxidising and reducing agent

A. OH^- is oxidising and Cl^- is reducing agent

B. Cl_2 is oxidising and OH^- is reducing agent

C. OH^- is both oxidising and reducing agent

D. Cl_2 is both oxidising and reducing agent

Answer: D

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69. The oxidation state of 'S' in ' $S_2O_8^{2-}$ ' is

A. 2

B. 4

C. 6

D. 7

Answer: C



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70. In which of the following compounds, the oxidation number of carbon is not zero? $C_{12}H_{22}O_{11}$, $HCHO$, CH_3CHO , CH_3COOH

A. $C_{12}H_{22}O_{11}$

B. $HCHO$

C. CH_3CHO

D. CH_3COOH

Answer: C



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71. The oxidation states of V and Br in $V(BrO_2)_2$ are respectively : 2 and 2 , 2 and 1, 4 and 2, 2 and 3

A. 2 and 2

B. 2 and 1

C. 4 and 2

D. 2 and 3

Answer: D



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72. The oxidation state of 'N' in ' $H N_3$ ' is

A. 3

B. (-3)

C. -1/3

D. $-1/3$

Answer: C

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73. In which of the following S has highest oxidation state? $Na_2S_2O_6$, S_2Cl_2 , S_8 , H_2SO_4

A. $Na_2S_2O_6$

B. S_2Cl_2

C. S_8

D. H_2SO_4

Answer: D

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74. The coefficients x , y and z in the following balanced equation:



A. 4,1,4

B. 2,2,2

C. 4,2,4

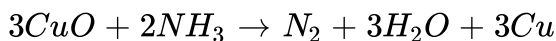
D. 4,4,4

Answer: A



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75. In the reaction:



the change of NH_3 to N_2 involve : Loss of 6 electrons per mol of N_2 , Loss of 3 electrons per mol, of N_2 , Gain of 6 electrons per mol of N_2 , Gain of 3 electrons per mol.of N_2

A. Loss of 6 electrons per mol of 'N₂'

B. Loss of 3 electrons per mol, of 'N₂'

C. Gain of 6 electrons per mol of 'N_{text} , '

D. Gain of 3 electrons per mol.of 'N₂'

Answer: A



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76. Which of the following statement is not, correct?: Oxidant is a substance which increases the oxidation number of other substance, Reductant is a substance which decreases the oxidation number of other substance., The oxidation number of oxidant decreases, In oxidation there is decrease in oxidation number.

A. Oxidant is a substance which increases the oxidation number of other substance

B. Reductant is a substance which decreases the oxidation number of other substance.

C. The oxidation number of oxidant decreases

D. In oxidation there is decrease in oxidation number.

Answer: D

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77. When phosphorus reacts with caustic soda, the products are PH_3 and NaH_2PO_2 . The reaction is an example of : oxidation, reduction, disproportionation, non of these

A. oxidation

B. reduction

C. disproportionation

D. non of these

Answer: C

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78. The increasing electron releasing tendencies of Cu, Ag, Fe and Zn are in the order: (1)Ag, Cu, Fe, Zn (2)Cu, Ag, Fe, Zn (3)Zn, Cu, Fe, Ag (4)Fe, Zn, Cu, Ag

A. Ag, Cu, Fe, Zn'

B. Cu, Ag, Fe, Zn'

C. Zn, Cu, Fe, Ag'

D. Fe, Zn, Cu, Ag'.

Answer: A

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79. The following four colourless salt solutions are placed in separate test tubes and a strip of a copper is placed in each. Which of the following solution will finally turn blue? (1)NaCl (2)AgNO₃ (3)ZnSO₄ (4)Cd(NO₃)₂

A. NaCl'

B. AgNO₃'

C. ZnSO₄'

D. Cd(NO₃)₂'

Answer: B



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80. When Zn is added to 'CuSO₄' solution, copper is precipitated because of:

A. reduction of 'Zn'

B. hydrolysis of 'CuSO₄'

C. oxidation of 'Zn'

D. reduction of ' SO_4^{2-} ' ions.

Answer: C

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81. In a standard hydrogen electrode, the concentration of ' H^+ ' is :

(a) 0.1M (b) 1M (3) 10M (4) Not fixed

A. 0.1M

B. 1M

C. 10M

D. Not fixed

Answer: B

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82. In a galvanic cell, which of the following statement is correct? : anode is negatively charged, cathode is positively charged, reduction occurs at anode, standard e.m.f. of the cells is always zero.

- A. anode is negatively charged
- B. cathode is positively charged
- C. reduction occurs at anode
- D. standard e.m.f. of the cells is always zero.

Answer: C



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