



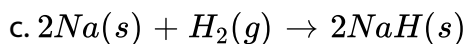
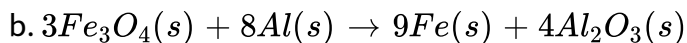
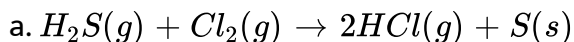
CHEMISTRY

BOOKS - S DINESH & CO CHEMISTRY (HINGLISH)

REDOX REACTIONS

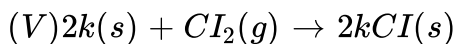
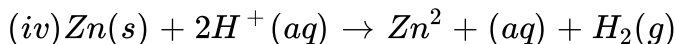
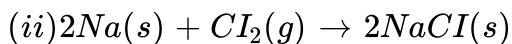
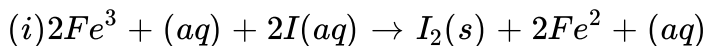
Example

1. Identify the species undergoing oxidation and reduction.



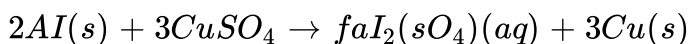
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2. Write the half equations for each of the following redox reactions:



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3. For the following redox reaction:



(i) Write the oxidation and reduction half reactions,

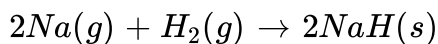
(ii) Which species acts as reducing agent and which as an oxidising agent?

(iii) What is the role of SO_4^{2-} ions in the reaction?



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4. On the basis of electronic concept, justify that the following reaction is a redox reaction



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5. Calculate the oxidation number of

(i) C in CH_4 , (ii) Mn in $KMnO_4$, (iii) Cr in $K_2Cr_2O_7$, (iv) P in H_3P



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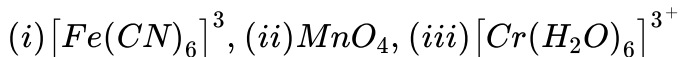
6. Calculate the oxidation number of sulfur in the following molecules and ions:

(i) H_2SO_4 , (ii) Na_2SO_4 , (iii) SO_4^{2-} , (iv) $S_2O_4^{2-}$



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7. What is the oxidation number of the metal atom in the following ions?



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8. Write the formula of the following compounds:

(i) Tin (IV) oxide, (ii) Copper (I) iodide

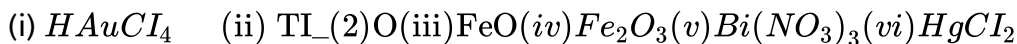
, (iii) chromium (III) oxide, (IV) Thallium (I) sulphate

, (V) Bismuth (III) nitrate, Mercury (II) chloride



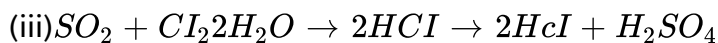
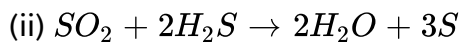
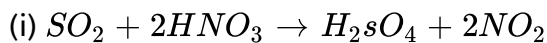
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9. Using stock notation, represent the following compounds:



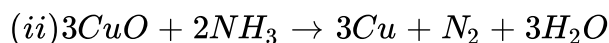
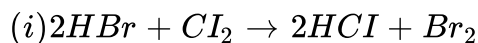
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10. Point out the oxidising and reducing agents in the following reactions:



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11. In the following chemical reactions, indicate the substances undergoing oxidation and reduction and also mention the oxidising and reducing agents.



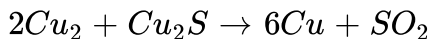
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12. Is the reaction $BaO_2 + H_2SO_4 \rightarrow BaSO_4 + H_2O_2$ a redox reaction?



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13. Justify that the reaction :



is a redox reaction. Identify the species oxidised// reduced , acts as oxidant and as reductant.



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14. How do the following ions undergo disproportionation

(i) ClO^- , (ii) ClO_2^- , (iii) ClO_3^- ?



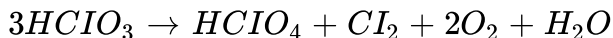
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15. Does ClO_4^- (perchlorate ion) undergo disproportionation in solution?



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16. In the disproportionation reaction,

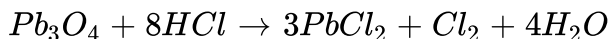


What is the equivalent mass of the oxidising agent ?

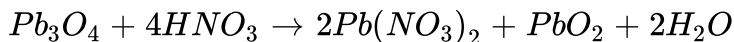


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17. Why following two reactions proceed differently?

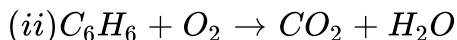
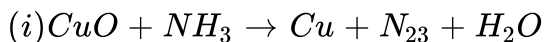


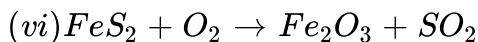
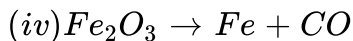
and



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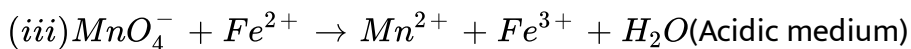
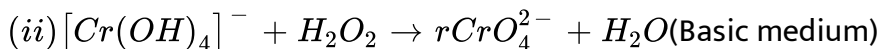
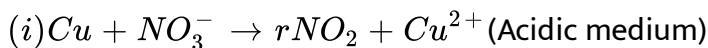
18. Balance the following chemical equations by the oxidation number method





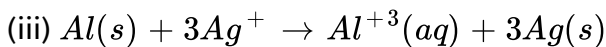
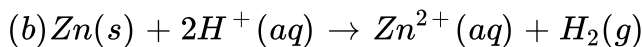
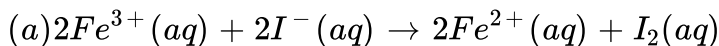
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19. Balance the following redox equation:



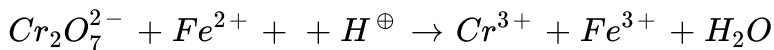
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20. Write the half reaction for the following redox reaction



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21. Balance the following equation stepwise:



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22. Balance the equation in acidic medium :

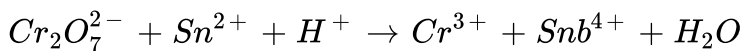
(a) "When chloride ion" Cl^- is oxidised to Cl_2 by MnO_4^-

(b) "Chlorate ion" ClO_3^- oxidises $Mn^{2+} \rightarrow MnO_2(s)$



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23. The reaction involves the oxidation of $Sn^{2+} \rightarrow Sn^{4+}$ ion the skeleton equation for the reaction is :

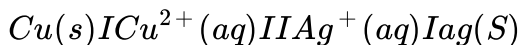


Balance the equation by ion electron method.



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24. A cell is set up between copper and silver electrodes as follows:



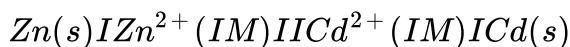
If the two half cells work under standard conditions, calculate the EMF of the cell

$$(Given E^{\circ} - (Cu^{2+} / Cu) = + 0.34V, E^{\circ} - (Ag^{+} / Ag) = + 0.80V)$$



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25. Calculate the standard reduction electrode potential of Cd^{2+} / Cd electrode for the cell:



$$(Given that " " E^{\circ}_{cell} = 0.36V \text{ and } E^{\circ}_{Zn^{2+} / Zn} = - 0.76V)$$



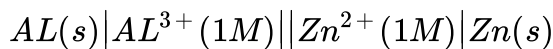
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26. Can a nickel spoon be used to stir a solution of copper sulphate ?
Support your answer with reason.

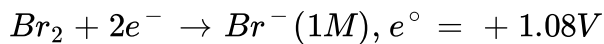
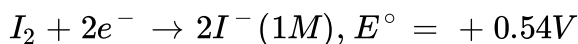
$$(Given : E^{\circ}_{Ni^{2+} / Ni} = - 0.25 \text{ V}, E^{\circ}_{Cu^{2+} / Cu} = 0.34 \text{ V})$$

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27. Write each half cell reaction as well as redox reaction for the following electrochemical cell

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28. Write the cell reaction that occurs when the following half cells are combined.

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29. A cell is prepared by dipping a copper rod in $1M CuSO_4$ solution and a nickel rod in $1M NiSO_4$. The standard reduction potentials of copper and nickel electrodes are $+0.34V$ and $-0.25V$ respectively.

(i) Which electrode will work as anode and which as cathode?

(ii) What will be the cell reaction?

(iii) How is the cell represented ?

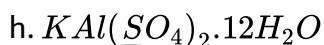
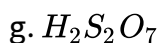
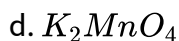
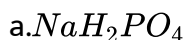
(iv) Calculate the EMF of the cell.



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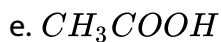
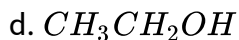
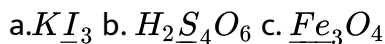
Board Examination N C E R T

1. Assign oxidation number to the underlined elements in each of the following species:

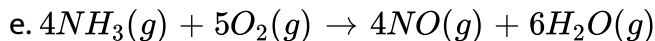
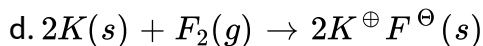
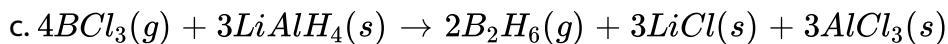
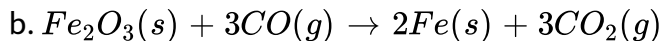
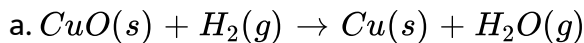


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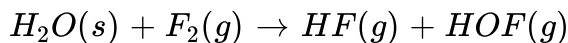
2. What are the oxidation number of the underlined elements in each of the following and how do you rationalise your results?

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3. Justify that the following reaction are redox reactions:

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4. Fluorine reacts with ice and results in the change:



Justify that this reaction is a redox reaction.



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5. Calculate the O.N of sulphur, chromium and nitrogen in H_2SO_5 , CrO_5 and NO_3^- ion. Suggest structure of these compounds. Account for the fallacy if any.



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6. Write formulas for the following compounds:

- a. Mercury (II) chloride
- b. Nickel (II) sulphate
- c. Tin (IV) oxide
- d. Thallium (I) sulphate
- e. Iron (III) sulphate
- f. Chromium (III) oxide



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7. Suggest a list of the substances where carbon can exhibit oxidation states from -4 to $+4$ and nitrogen from -3 to $+5$.



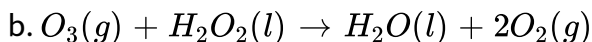
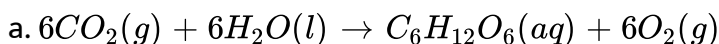
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8. While sulphate dioxide and hydrogen peroxide can act as oxidising as well as reducing agents in their reactions, ozone and nitric acid act only as oxidants. Why?

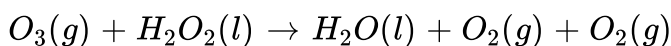
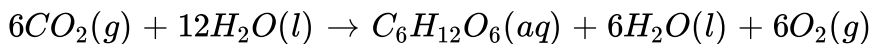


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9. Consider the reaction:



Why it is more appropriate to write these reaction as: a.



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 an unstable compound. However, if formed, the compound acts as a strong oxidising agent. Why?



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11. Whenever a reaction between an oxidising 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 count for the following observations ?

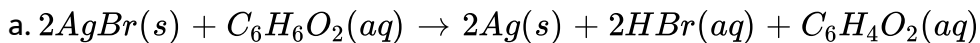
(a) Though alkaline potassium permanganate and acidic potassium permanganate both are used as oxidants, yet in the manufacture of benzoic acid from toluene we use alcoholic potassium permanganate as an oxidant. Why ? Write a balanced redox equation for the reaction.

(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 vapour of bromine. Why ?

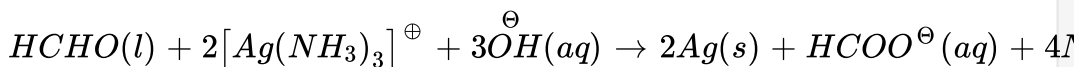


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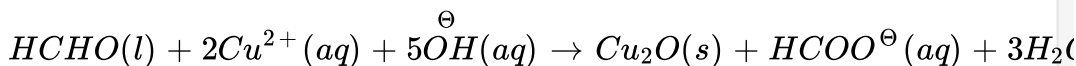
13. Identify the substance oxidised substance reduced, oxidising agent, and reducing agent for each of the following reactions:

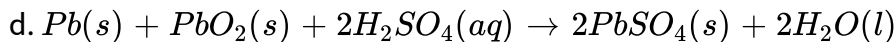
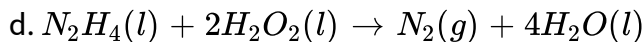


b.



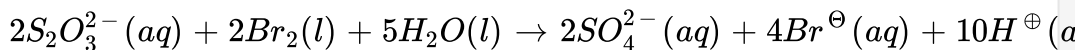
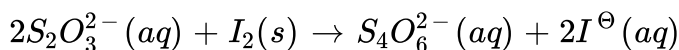
c.





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14. Consider the reaction:



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



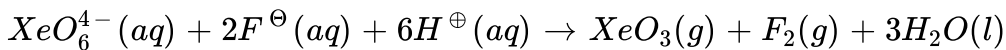
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15. Justify giving reaction that among halogens, fluorine is the best oxidant and among hydrohalic compounds, hydroiodic acid is the best reductant.



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16. Why does the following reaction occur?



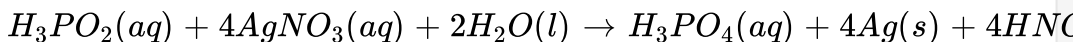
What conclusion about the compound Na_4XeO_6 (of which XeO_6^{4-} is a part) can be drawn from the reaction?



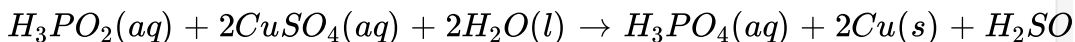
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17. Consider the reactions:

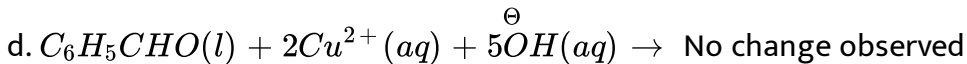
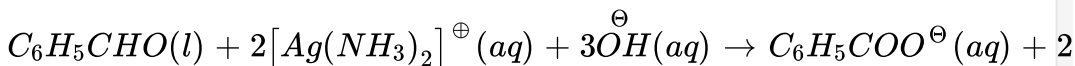
a.



b.



c.

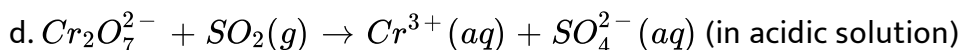
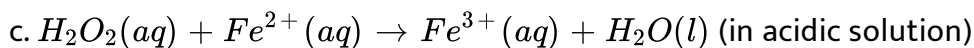
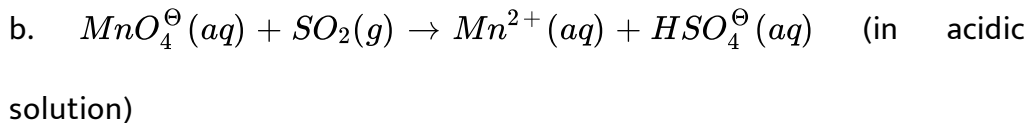
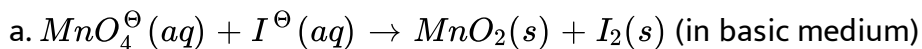


What inference do you draw about the behaviour of $\text{Ag}^{\oplus}$ and Cu^{2+} from these reaction?



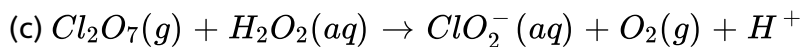
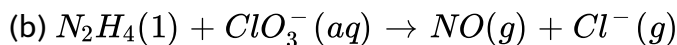
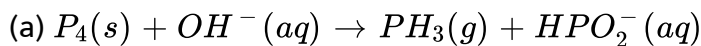
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18. Balance the following redox reactions by ion electron method:



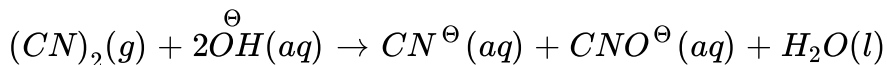
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19. Balance the following equations in basic medium by ion-electron method and oxidation number methods and identify the oxidising agent and the reducing agent.



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20. What sort of informations can you draw from the following reaction?



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



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22. Consider the elements:

Cs , Ne , I and F

- 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. From the periodic table select three non metals and three metals which can show disproportionation reactions.



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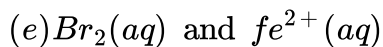
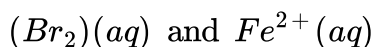
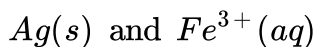
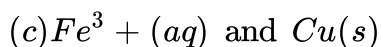
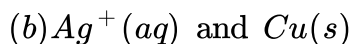
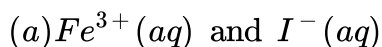
25. In Ostwald's process for the manufacture of nitric acid, the first step involves the oxidation of ammonia gas by oxygen gas to give nitric oxide

gas and steam. What is the maximum weight of nitric oxide that can be obtained starting only with 10.00g of ammonia and 20.00g of oxygen?



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26. Using the standard electrode potentials given in the table predict if the reaction between the following is feasible.



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27. Predict the products of electrolysis in each of the following :

a. An aqueous solution of $AgNO_3$ with silver electrodes.

- b. An aqueous solution of $AgNO_3$ with platinum electrodes,
- c. A dilute solution of H_2SSO_4 with platinum electrodes.
- d. 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 , Cu , Fe , Mg , and Zn .



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29. Given standard electrode potentials

$$K^{\oplus} | K = -2.93V, Ag^{\oplus} | Ag = 0.80V,$$

$$Hg^{2+} | Hg = 0.79V$$

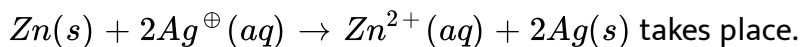
$$Mg^{2+} | Mg = -2.37V, Cr^{3+} | Cr = -0.74V$$

Arrange these metals in their increasing order of reducing power.



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30. Depict the galvanic cell in which the reaction :



Further show :

- Which electrode is negatively charged ?
- The carriers of the current in the cell.
- Individual reaction at each electrode.



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Problems For Practice

1. What is the O.N in (a) H_2S (b) SO_2 (c) SO_3 ?



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2. Calculate the O.N of Mn in (a) Mn_4^{+} (b) K_2MnO_4 (c) MnO_2



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3. What is the oxidation number of the underlined atoms in the following ?

(a) CO_2 , (b) SOO_2 , (c) $Cr_2O_7^{2-}$, (d) CrO_4^{2-} , (e) $H_4P_2O_7$, (f) NaH_2PO , (h) l



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4. Are the O.N of oxygen in OF_2 and Na_2O_2 same or different?



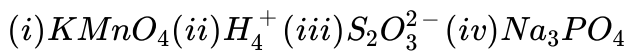
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5. Calculate the oxidation number of (i) Cr in CrO_4^{2-} (ii) C in HCO_3^- (iii) Cl in ClO_4^- (iv) Cr in $Cr_2O_7^{2-}$



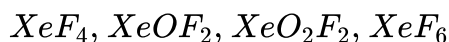
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6. Write the oxidation number of the underlined atoms in each of the following:



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7. Classify the following compounds on the basis of the oxidation number of xenon.



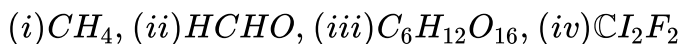
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8. What is the oxidation number of nitrogen in (i) nitric acid (HNO_3) (ii) nitrous acid (HNO_2) (iii) nitric oxide (NO) (iv) nitrous oxide (N_2O) (v) nitrogen (N_2)?



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9. In which of the following compounds O.N of carbon is Zero:



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10. Answer the following :

(i) What is the O.N Of iodine in HIO_4 ?

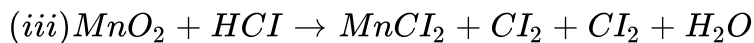
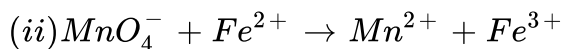
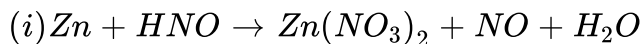
(ii) What is the O.N of Mg in Mg_3N_2

(iii) What is the sum of the O.N of various elements in an anion ?

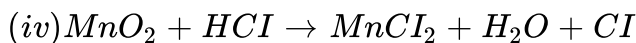
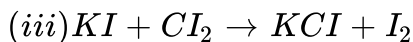
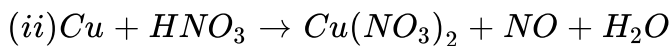
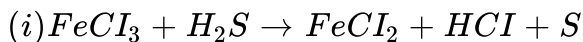
(iv) What is the O.N of oxygen in Na_2O_2

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11. Balance the following equation by oxidation number method .

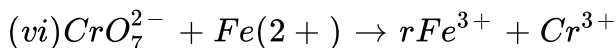
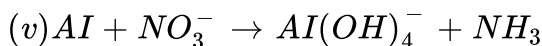
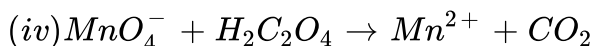
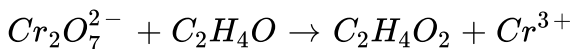
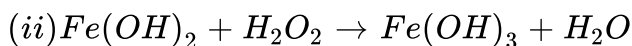
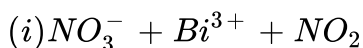
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12. Balance the following equation by ion electron method



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13. Write correctly the balanced half reactions and the overall equations for the following skeletal equations



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14. Which reaction occurs at cathode in a galvanic cell ?



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15. Can a half cell work independently ?



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16. What is the direction of flow of electrons in the following cell ?



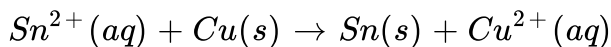
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17. Can 1M FeSO_4 solution be stored in nickel vessel ?



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18. Predict whether the following redox reaction is feasible under the standard conditions or not.



Given : $E_{\text{Sn}^{2+}/\text{Sn}}^{\circ} = -0.136 \text{ V}$ and $E_{\text{Cu}^{2+}/\text{Cu}}^{\circ} = +0.34 \text{ V}$



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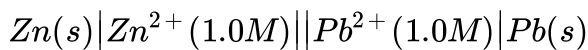
19. Can 1 M ZnSO_4 be stored in a vessel made up of copper ?

Given : $E_{\text{Zn}^{2+}/\text{Zn}}^{\circ} = -0.76$ and $E_{\text{Cu}^{2+}/\text{Cu}}^{\circ} = +0.34 \text{ V}$



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20. What is the cell potential of the following cell ?



Given : $E_{\text{Pb}^{2+}/\text{Pb}}^{\circ} = -0.12 \text{ V}$ and $E_{\text{Zn}^{2+}/\text{Zn}}^{\circ} = -0.76 \text{ V}$



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Short Answer Type Questions

1. The reaction $Cl_2(g) + 20H^-(aq) \rightarrow ClO^-(aq) + Cl^-(aq) + H_2O(l)$ represents the process of bleaching. Identify and name the species that bleaches the substances due to its oxidising action.



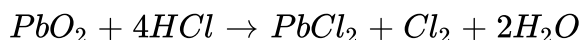
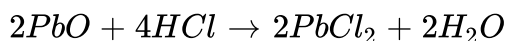
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2. MnO_4^{2-} undergoes disproportionation reaction in acidic medium but MnO_4^- does not. Given reason.



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3. PbO and PbO_2 react with HCl according to following chemical equations



Why do these compounds differ in their reactivity?



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4. Nitric acid is an oxidising agent and reacts with PbO but it does not react with PbO_2 . Explain why?



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5. write balanced chemical equation for the following reaction

(i) Permanganate ion (MnO_4^-) reacts with sulphur dioxide gas in acidic medium to produce Mn^{2+} and hydrogen sulphate ion.

(Balance by oxidation number method)

(ii) Reaction of liquid hydrazine (N_2H_4) with chlorate ion ClO_3^- in basic medium produces nitric oxide gas and chloride ion in gaseous state.

(Balance by oxidation number method)

(iii) Dichlorine heptaoxide (Cl_2O_7) in gaseous state combines with an aqueous solution of hydrogen peroxide in acidic medium to give chlorite ion (ClO_2^-) and oxygen gas.

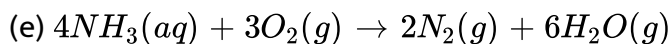
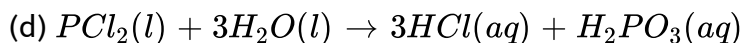
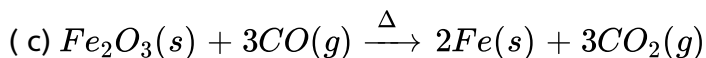
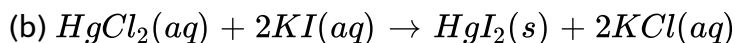
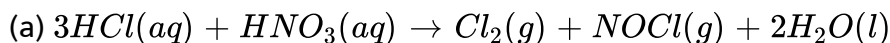
(Balance by ion electron method)

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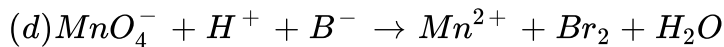
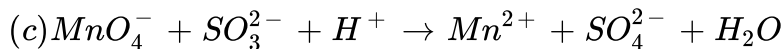
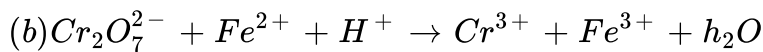
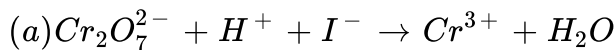
6. Calculate the oxidation number of phosphorus in the following species.

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7. Identify the redox reaction out of the following reactions and identify the oxidising and reducing agents in them.

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8. Balance the following ionic equations



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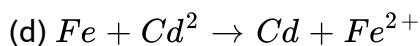
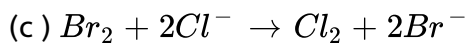
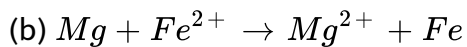
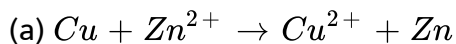
Long Answer Type Questions

1. Explain redox reaction on the basis of electron transfer, Given suitable examples.



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2. On the basis of standard electrode potential values, suggest which of the following reactions would take place? (Consult the book for E^θ value)



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3. Why does fluorine not shown disproportionation reaction?



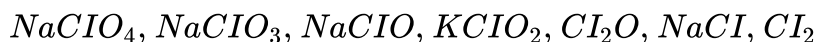
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4. Write redox couples involved in the reactions (i) to (iv) given in question 31 .



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5. Find out the oxidation number of chlorine in the following compounds





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6. Which method can be used to find out strength of reductant/oxidant in a solution? Explain with an example.



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Additional Important Question

1. The blue colour of copper sulphate solution is discharged when a rod of zinc is dipped in it. Explain.



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2. Why cannot oxidation occur without reduction?



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3. Articles of iron are generally coated with zinc. Explain.



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4. Why is anode negatively charged in an electrochemical cell?



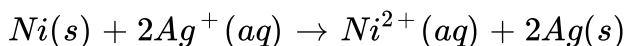
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5. Why is standard hydrogen electrode called reversible electrode?



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6. Check the feasibility of the following redox reaction with the help of electrochemical series



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7. What will happen when chloride is passed through an aqueous solution of potassium bromide ?



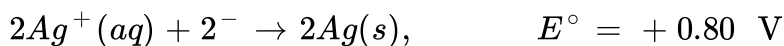
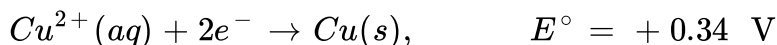
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8. What is the source of electrical energy in a galvanic cell ?



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9. Knowing that :

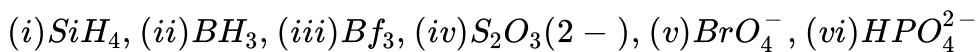


reason out whether, 1M silver nitrate solution can be stored in copper vessel or 1M copper sulphate solution in silver vessel.



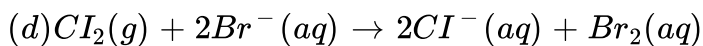
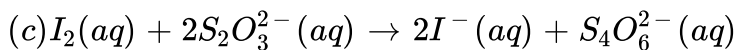
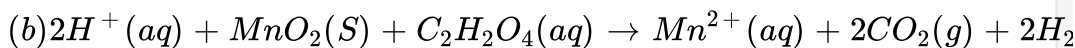
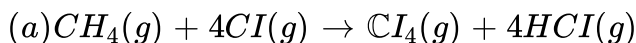
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10. Determine the oxidation number of the element in the bold in the following species



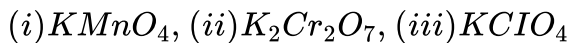
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11. Identify the oxidants and redutants in the folowing reactions



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12. write the O.N of all the atoms in the folowing well known oxidants:



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13. The difference in the oxidation numbers of two types of sulphur atoms in $Na_2S_4O_6$ is.....



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14. Define reducing agent.



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15. Arrange the following in order of increasing O.N of iodine:



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16. What is the oxidation number of hydrogen in $LiAlH_4$? Name a compound in which hydrogen has the same oxidation state.



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17. H_2O_2 changes to O_2 What is the change in oxidation number of oxygen per atom?



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18. What is O.N of carbon in $(CN)^- ion$?



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19. Which is the anhydride of HNO_3 out of N_2O , NO and N_2O_5 ?



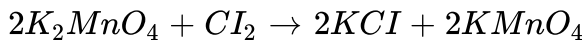
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20. Out of $(HSO_4)^-$ which is a stronger base?



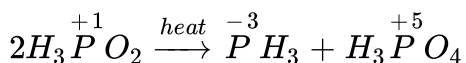
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21. Identify the oxidant and reductant in the following redox reaction:



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22. Given one example of disproportionation reaction



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23. What is the oxidation state of sodium in sodium amalgam (Na/Hg)?



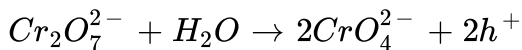
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24. What is the oxidation number of chlorine in bleaching powder?



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25. Is the following reaction a redox reaction in nature? Justify your answer.



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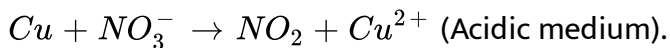
26. Is it safe to stir 1M AgNO_3 solution with copper spoon? Given:

$$E^\circ \text{Ag}^+ / \text{Ag} = 0.80\text{V}, E^\circ \text{Cu}^{2+} / \text{Cu} = 0.34\text{V}$$



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27. Balance the following redox reaction :



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28. (a) Define oxidation.

(b) Which is the O.N of sulphur in H_2S and of carbon in $C_6H_{12}O_6$?



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29. Define reducing agent.



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30. What is O.N of Na in Na_2O_2 ?



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31. A number of phenomenon both physical, chemical and biological are concerned with redox reactions. These reactions find extensive use in pharmaceutical industrial and agriculture fields. Answer the following question on the basis of above paragraph.

(a) What is a redox reaction?

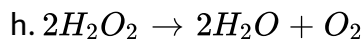
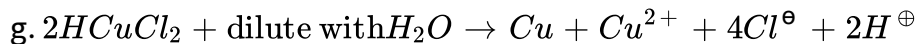
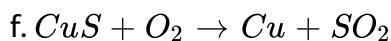
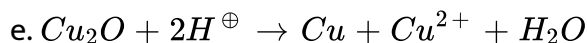
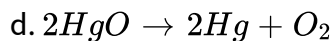
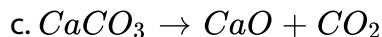
(b) Give applications of redox reaction in photosynthesis.



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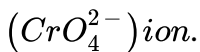
H O T S Conceptual Question

1. Which of the following are examples of disproportionation reactions?



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2. Calculate the formal charge and the oxidation state of Cr in chromate



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3. Phosphorus acid can act both as oxidising agent as well as reducing agent while phosphoric acid is only an oxidising agent. Explain.

" " Or

Phosphorus acid undergoes disproportionation reaction but phosphoric acid does not. Explain.



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4. H_2S acts only as reducing agent while SO_2 can act both as a reducing agent and as an oxidising agent. How will you account for it ?



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5. The number of mole of oxalate ions oxidised by one mole of MnO_4^- ion is:



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Value Based Question

1. A student working in the laboratory kept an aqueous solution of ferrous sulphate in a vessel made up of zinc.

After a few days, he found that the vessel had developed holes and cracks

(i) why did the vessel develop holes in it ?

(ii) What is the chemical reaction that takes place?

(iii) what is the value associated with this?



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2. An electrochemical cell is a device in which the oxidation and reduction half reactions are taking place separately and the electrical energy is

evolved as a result of the reaction. In fact all redox reactions are of spontaneous nature and the free energy change (ΔG) is negative. This is converted into the electrical energy.

(i) Which electrode acts as negative pole?

(ii) Which electrode acts as positive pole?

(iii) How does current flow in the electrochemical cell?

(iv) What is the value associated with the working of electrochemical cells?



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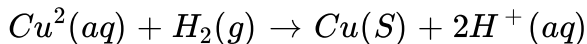
Oxidation Reduction Very Short Answer Questions Assignment

1. Define oxidation according to electronic concept.



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2. Which reactant is reducing agent in the following reaction ?



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3. What is the electrode potential of a standard hydrogen electrode?



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4. Can we store copper sulphate solution in zinc vessel ?



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5. What will happen if $CuSO_4$ solution is stirred by a nickel spatula?



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6. What changes take place when a zinc plate is immersed in copper sulphate solution ? Explain in the light of electronic concept of oxidation and reduction.



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7. In the reaction $MnO_2 + 4HCl \rightarrow MnCl_2 + 2H_2O + Cl_2$, identify which one is reduced and which one is oxidized ?



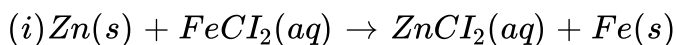
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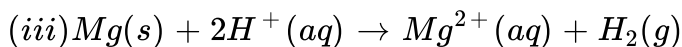
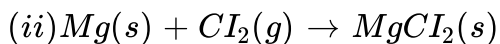
8. Oxidation and reduction always proceed side by side Explain.



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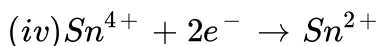
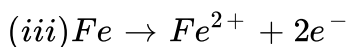
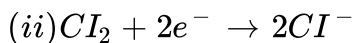
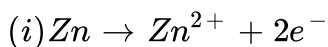
9. Write the following redox reactions using half cell reactions





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



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11. Explain oxidation and reduction according to electronic concept .Give two examples.



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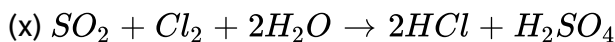
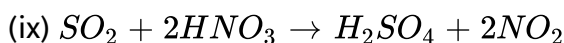
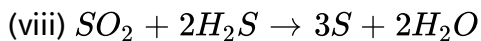
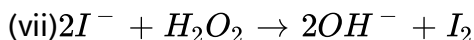
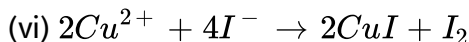
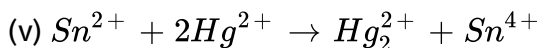
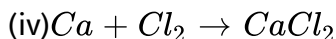
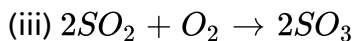
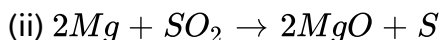
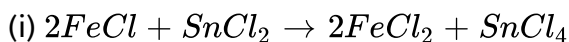
12. Oxidation cannot occur without reduction. Justify.



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Oxidation Number Balancing Of Redox Equations Very Short Answer Questions Assignment

1. Indicate which of the substance/ion in the following reactions is an oxidising agent and which is a reducing agent?





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2. What is O.N of H in NaH?



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3. What happens to oxidation number of a substance in oxidation ?



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4. What is the O.N of C in $C_6H_{12}O_6$?



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5. A species undergoes decrease in O.N What is its nature?



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6. What is the O.N of oxygen in peroxide linkage?



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7. What is the O.N of Fe in iron (III) sulphate?



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8. The oxidation state of Cr in $Cr_2O_7^{2-}$ is



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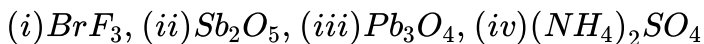
Oxidation Number Balancing Of Redox Equations Short Answer Questions Assignment

1. Define oxidation and reduction according to the oxidation number.



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2. What is the O.N of all the atoms in the following:



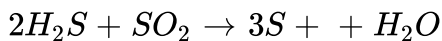
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3. What is the O.N of



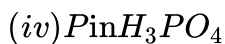
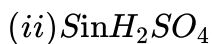
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4. Determine the change in OgtN of S in H_2S and SO_2 in the following reaction



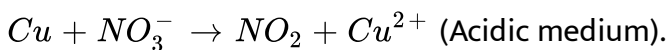
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5. Calculate the O.N of



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6. Balance the following redox reaction :



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Electrochemical Cells Galvanic Cells

1. Why it not possible to determine the absolute reduction potential of an electrode?



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2. DIFFERENCE BETWEEN POTENTIAL DIFFERENCE AND EMF



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3. An electrochemical cell stops working after sometime. Explain.



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4. (a) What do you mean by Electrolytic cell?

(b) An electrochemical cell is made of nickel and copper electrodes with their standard reduction potentials -0.25 V and $+0.34\text{ V}$ respectively. Select the anode and cathode. Represent the cell and find e.m.f. of the cell.



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5. For a standard cell



Write the electrode reaction and cell reaction. Also find the e.m.f. of cell if ?

$$E_{\text{Zn}^{2+} | \text{Zn}}^{\circ} = -0.76 \text{ V},$$

$$E_{\text{Cu}^{2+} | \text{Cu}}^{\circ} = +0.34 \text{ V}.$$



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6. (a) Standard reduction potentials of zinc and copper electrodes are -0.76 V and 0.34 V respectively. Which electrode will undergo oxidation and which will undergo reduction?

(b) Can we store copper sulphate in zinc vessel? Give explanation support of your answer.



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7. Is it safe to stir 1M AgNO_3 solution with copper spoon?



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Assertion Reason Type Question

1. Assertion [A]: Among halogens fluorine is the best oxidant.

Reason (R): Fluorine is the most electronegative atom.

- 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. Both A and R are false

Answer:



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2. Assertion (A) In the reaction between potassium permanganate and potassium iodide, permanganate ions act as oxidising agent.

Reason (R) Oxidation state of manganese changes from +2 and +7 during the reaction.

- 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. Both A and R are false

Answer:



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3. Assertion (A) The decomposition of hydrogen peroxide to form water and oxygen is an example of disproportionation reaction

Reason (R) The oxygen of peroxide is in -1 oxidation state and it is converted to zero oxidation state in O_2 and -2 oxidation state in H_2O .

- 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. Both A and R are false

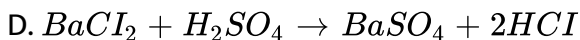
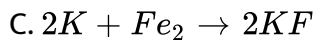
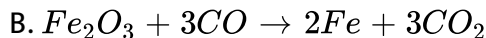
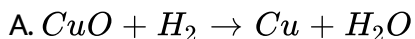
Answer:



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Multiple Choice Question Type I

1. Which of the following is not an example of redox reaction?



Answer:



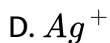
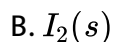
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2. The more positive the value of E^θ , the greater is the tendency of the species to get reduced. Using the standard electrode potential of redox couples given below find out which of the following is the strongest oxidising agent.

$$E^\theta \text{ values: } Fe^{3+} / Fe^{2+} = +0.77$$

$$I_2(s) / I^- = +0.54,$$

$$Cu^{2+} / Cu = +0.34, Ag^+ / A = 0.80V$$



Answer:



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3. E^θ values of some redox couples are given below. On the basis of these values choose the correct option.

$$E^\theta \text{ values: } Br_2 / Br^- = +1.90$$

$$Ag^+ / Ag(s) = +0.80$$

$$Cu^{2+} / Cu(s) = +0.34, I_2(s) / I^- = +0.54$$

A. Cu will reduce Br^-

B. Cu will reduce Ag

C. Cu will reduce I^-

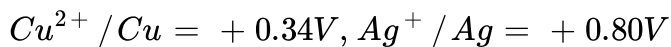
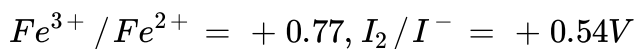
D. Cu will reduce Br_2

Answer:



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4. Using the standard electrode potential, find out the pair between which redox reaction is not feasible. E° values :



A. Fe^{3+} and I^-

B. Ag^+ and Cu

C. Fe^{3+} and Cu

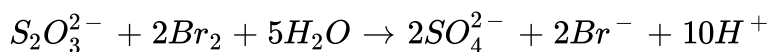
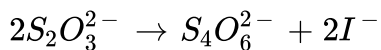
D. Ag and Fe^{3+}

Answer:



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5. Thiosulphate reacts differently with iodine and bromine in the reaction given below



Which of the following statements justifies the above dual behaviour of thiosulphate?

- A. Bromine is a stronger oxidant than iodine
- B. Bromine is a weaker oxidant than iodine
- C. Thioussuphate undergoes oxidation by bromine and reductuon vby iodine in these rections
- D. Bromine undergoes oxidaion and iodine undergoes reduction these reactions

Answer:



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6. The oxidation number of an element in a compound is evaluated on the basis of certain rules. Which of the following rules is not correct in this respect ?

- A. The oxidation number of hydrogen is always +1
- B. The algebraic sum of all the oxidation numbers in a compound zero

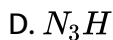
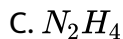
- C. An element in the free or the uncombined state bears oxidation number zero
- D. In all its compounds the oxidation number of fluorine is -1

Answer:



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7. In which of the following compounds, an element exhibits two different oxidation states?

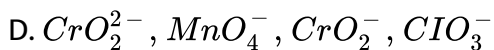
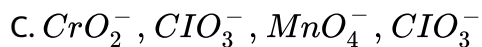
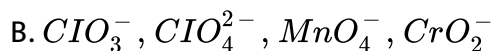
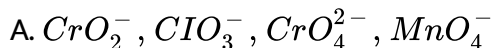


Answer:



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8. Which of the following arrangements represent increasing aoxidation number of the central atom?

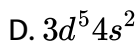
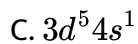
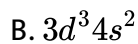
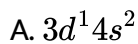


Answer:



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9. The largest oxidation number exhibited by an element depends on its outer eletronic configuration. With which of the following outer electronic configurations the element will exhibit largest oxidation number ?

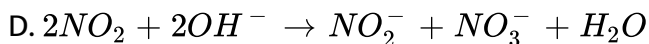
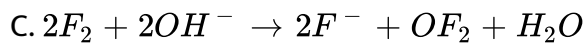
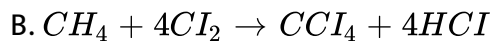
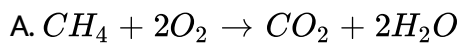


Answer:



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10. Identify disproportionation reaction



Answer: D



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11. Which of the following elements does not show disproportionation tendency?

A. Cl

B. Br

C. Fe

D. I

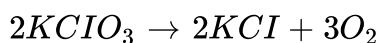
Answer:



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Multiple Choice Question Type II

1. Which of the following statement (s) *is/are* not true about the following decomposition reaction



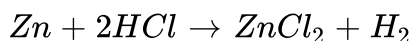
- A. Potassium is undergoing oxidation
- B. Chlorine is undergoing oxidation
- C. Oxygen is reduced
- D. None of the species are undergoing oxidation or reduction

Answer:



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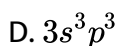
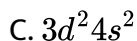
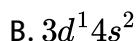
2. Identify the correct statement(s) in relation to the following reaction.



- A. Zinc is acting as an oxidant
- B. Chlorine is acting as a reductant
- C. Hydrogen ion is acting as an oxidant
- D. Zinc is acting as a reductant

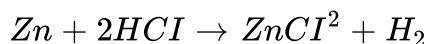
Answer:

3. The exhibition of various oxidation states by an element is also related to the outer orbital electronic configuration of its atom. Atom(s) having which of the following outermost electronic configurations will exhibit more than one oxidation state in its compounds



Answer:

4. Identify the correct statement (s) in relation to the following reaction :



- A. Phosphorus is undergoing reduction only
- B. Phosphorus is undergoing oxidation only
- C. Phosphorus is undergoing oxidation as well as reduction
- D. Hydrogen is undergoing neither oxidation nor reduction

Answer:



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5. Which of the following electrodes will act as anodes, which connected to Standard Hydrogen Electrode?

A. $Al / Al^{3+} E^{\text{minus}} = -1.66$

B. $Fe / Fe^{2+} E^{\text{minus}} = -0.44$

C. $Cu / Cu^{2+} E^{\text{minus}} = +0.34$

D. $F_2(g) / 2F^-(aq) E^{\text{minus}} = +2.87$

Answer:

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Multiple Choice Question Mcqs

1. Oxidation is defined as:

- A. loss of electrons
- B. gain of electrons
- C. gain of protons
- D. loss of protons

Answer: A

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2. A reducing agent is a substance Which can:

- A. accept electrons

- B. donate electrons
- C. accept protons
- D. donate protons

Answer: B



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3. A redox reaction is:

- A. proton transfer reaction
- B. ion combination reaction
- C. a reaction in solution
- D. electron transfer reaction

Answer: D



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4. Which of the following is not a redox reaction?

- A. Burning of candle
- B. Rusting of iron
- C. dissolving a salt in water
- D. dissolving Zn in dil H_2SO_4

Answer: C



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5. The reaction of $H_2S + H_2O_2 \rightarrow S + 2H_2O$ manifests

- A. alkaline of H_2O_2
- B. reducing nature of H_2O_2
- C. oxidising nature of H_2O_2
- D. reducing nature of H_2O_2

Answer: C



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6. The oxidation number of iron in the compound $K_4[Fe(CN)_6]$ is

A. +6

B. +4

C. +3

D. +2

Answer: D



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7. Pick the group which does not on an a neutral oxide:

A. NO_2 , P_4O_{10} , Al_2O_3 , NO

B. MgO , N_2O_5 , SO_3N_2O

C. CO_2 , SO_3 , CaO , XeO_3

D. CO , SiO_2 , SnO_2 , Na_2O_3

Answer: C



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8. Magnesium reacts with acids producing hydrogen and corresponding magnesium salts. In such reactions Mg undergoes

A. reduction

B. oxidation

C. neither oxidation nor reduction

D. simple dissolution

Answer: B



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9. When P reacts with caustic soda the products are PH_3 and NaH_2PO_2

.the reaction is an example of:

- A. Oxidation
- B. reduction
- C. both oxidation and reduction
- D. neutralisation

Answer: C



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10. In a reaction the oxidation number of an element becomes zero from -1

It is a case of:

- A. oxidation
- B. reduction

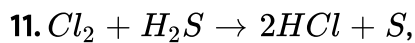
C. neither oxidation nor reduction

D. both oxidation and reduction

Answer: A



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In that above reaction oxidation state of chlorine changes from

A. zero to -1

B. 1 to zero

C. zero to 1

D. remains unchanged.

Answer: A



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12. During electrolysis, the reaction at anode is :

- A. oxidation
- B. reduction
- C. decomposition
- D. None of these

Answer: A



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13. In a reaction



- A. H_2O is the reducing agent
- B. H_2O is the oxidising agent
- C. carbon is the oxidising agent
- D. oxidation reduction does not occur

Answer: B



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14. The oxidation number of C in CH_4 , CH_3Cl , CH_2Cl_2 , $CHCl_3$ and CCl_4 are respectively:

A. +4, +2, 0, -2, -4

B. +2, +4, 0, -4, -2

C. -4, -2, 0, +4, +4

D. -2, -4, 0, +4, +2

Answer: C



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15. Reduction never involves:

- A. gain of electrons
- B. decrease in oxidation number
- C. loss of electrons
- D. decrease in valency of electropositive component

Answer: C



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Very Short Answer Questions Assignment

1. The oxidation number of Cl in $HClO_5$ is:

- A. +3
- B. +5
- C. -1
- D. +7

Answer: D



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Multiple Choice Question Bank Mcqb

1. The oxidation number of Cr in $Cr(CO_6)$ is :

A. 0

B. 2

C. -2

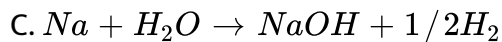
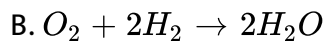
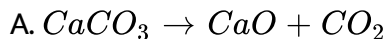
D. $+6$

Answer:



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2. Which of the following is not a redox reaction?

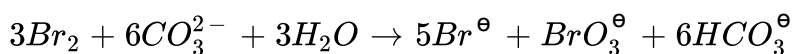


Answer:



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3. In the reaction



A. Bromine is oxidised and carbonate is reduced

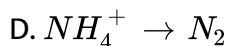
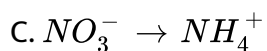
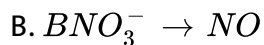
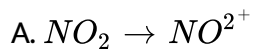
B. Bromine is reduced and water is oxidised

C. Bromine is neither reduced nor oxidised

D. Bromine is both reduced and oxidised

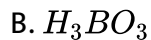
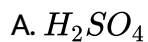
Answer:

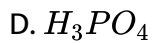
4. In which of the following reaction nitrogen is not reduced ?



Answer:

5. The most powerful oxidising agent among the following is:





Answer:



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6. The oxidation state of iodine in $H_4IO_6^-$ is:

A. +7

B. -1

C. +5

D. +1

Answer:



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7. The standard electrode potentials of elements A, B and C are +0.68, -2.50 and -0.50 V respectively. The correct order of their reducing powers is:

A. $A > B > C$

B. $A > B > C > B$

C. $C > B > A$

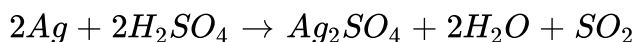
D. $NC > C > A$

Answer:



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8. In the reaction:



Sulphuric acid acts as:

A. Oxidising agent

B. Reducing agent

C. Catalyst

D. Acid as well as oxidant

Answer:



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9. Which of the following is a redox reaction?

A. H_2SO_4 with NaOH

B. In atmosphere O_3 form O_2 by lightening

C. Nitrogen oxide formed from nitrogen and oxygen by lightening

D. Evaporation of water.

Answer:



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10. Without losing its concentration, $ZnCl_2$ solution can't be kept in contact with

A. Al

B. Au

C. Pb

D. Ag

Answer: A



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11. The oxidation number of Cr in $K_2Cr_2O_7$ is

A. -6

B. $+6$

C. $+2$

D. -2

Answer:



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12. The oxidation state of nitrogen in N_3H is

A. $+1/2$

B. $+3$

C. -1

D. $-1/3$

Answer: D



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13. A metal ion M^{3+} loses three electrons , its oxidation number will be

A. $+3$

B. $+6$

C. 0

D. -3

Answer:



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14. Oxidation state of Fe in FeO_4 is:

A. $3/2$

B. $4/5$

C. $5/4$

D. $8/3$

Answer:



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15. In an acidic medium dichromate ion oxidises ferrous ion to ferric ion. If the gram molecular mass of potassium dichromate is 294 g, its gram equivalent mass is..... Grams.

A. 294

B. 127

C. 49

D. 24.5

Answer:



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16. Which of the following statement is true for the electrochemical Daniell cell ?

A. Current flows from zinc electrode to copper electrode

B. Electrons flow from copper electrode to zinc electrode

C. Cations move towards copper electrode

D. Cations move towards zinc electrode

Answer:



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17. Number of moles of MnO_4^- required to oxidise one mole of ferrous oxalate completely in acidic medium will be

A. 2.5 mol

B. 0.2 mol

C. 0.6 mol

D. 0.4 mol

Answer:



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18. Oxidation number of P in PO_4^{3-} , of S in SO_4^{2-} and that of $Cr_2O_7^{2-}$ are respectively

A. +3, +6 and +5

B. +5, +3 and +6

C. +3, +6 and +6

D. +5, +6 and +6

Answer:



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19. Oxidation states of P in $H_4P_2O_5$, $H_4P_2O_6$, $H_4P_2O_7$ are:

A. +3, +5, +4

B. +5, +3, +4

C. +5, +4, +3

D. +3, +4, +5

Answer:



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20. When Cl_2 gas reacts with hot and concentrated solution of sodium hydroxide the oxidation number of chlorine changes from:

A. $Zero \rightarrow +1$ and $zero \rightarrow -5$

B. $Zero \rightarrow -1$ and $zero \rightarrow +5$

C. $Zero \rightarrow -1$ and $zero \rightarrow +3$

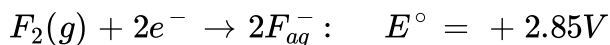
D. $Zero \rightarrow +1$ and $zero \rightarrow -3$

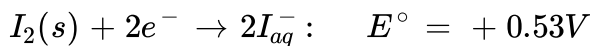
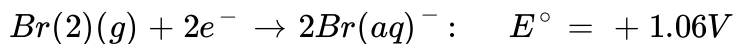
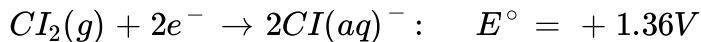
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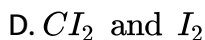
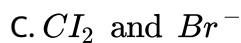
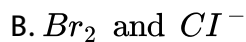
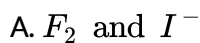
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21. Standard reduction potentials of the half reactions are given below:





The strongest oxidising and reducing agents respectively are

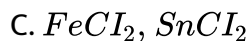
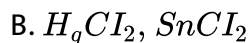
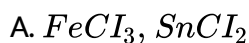


Answer:



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22. The pair of compounds that can exist together is



D. $FeCl_3$, KI

Answer:



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23. In acidic medium, H_2O_2 changes $Cr_2O_7^{2-}$ to CrO_5 Which has two (-O-O-) bonds. Oxidation state of Cr in CrO_5 is

A. +5

B. +3

C. +6

D. -10

Answer:



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24. Which of the following does not involve oxidation of iron?

- A. Formation of $Fe(CO)_5$ from Fe
- B. Liberation of H_2 from steam by iron at high temperature
- C. Rusting of iron sheets
- D. Decomposition of blue copper sulphate solution by iron

Answer:



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Jee Main Other Engineering Entrance Examination

1. Out of Cu, Ag, Fe and Zn, the metal which can displace all other atoms from their salt solutions is:

- A. Ag
- B. Cu

C. Zn

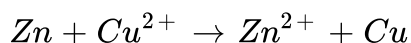
D. Fe

Answer: C



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2. Consider the following reaction:



with reference to the above which one of the following is the correct statement ?

A. Zn is reduced to Zn^{2+} ions

B. Zn is reduced to Zn^{2+} ions

C. Zn^{2+} ions are oxidised to Zn

D. Cu^{2+} ions are oxidised to Cu

Answer: B



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3. A half cell reaction $A^+ + e^- \rightarrow A$ has a large negative reduction potential. It follows that

- A. A is easily reduced
- B. A is easily oxidised
- C. A^+ is readily reduced
- D. A^+ is readily oxidised

Answer: D

4. Four metals A, B, C, D have standard electrode potentials of -3.05, -1.66, -0.40 and +0.8V respectively. The metal which is most easily reduced is :

- A. A

B. B

C. C

D. D

Answer: D



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5. The oxidation number of Fe in $Fe(CO)_5$ is

A. 4

B. 2

C. 10

D. None of these

Answer: D



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6. When $KMnO_4$ reacts with acidified $FeSO_4$

- A. only $FeSO_4$ is oxidised
- B. only $KMnO_4$ is oxidised
- C. $FeSO_4$ is oxidised and $KMnO_4$ is reduced
- D. None of these

Answer: C



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7. The O.N of N in $(NH_4 - (2)SO_4)$ is :

- A. +3
- B. +2
- C. +5
- D. -3

Answer: D



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8. The oxidation potential of A and B are + 2.37 and + 1.66 V respectively. In a chemical reaction

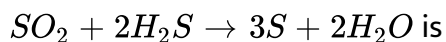
- A. A will be replaced by B
- B. A will replace B
- C. A will not replace B
- D. A and B will not replace each other

Answer: B



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9. Equivalent mass of oxidising agent in the reaction



A. 321

B. 64

C. 16

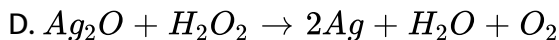
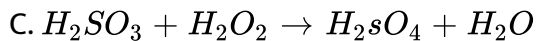
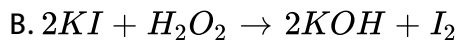
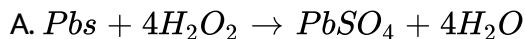
D. 8

Answer: C



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10. The reaction in which hydrogen poeroxide is a reducing agent is:

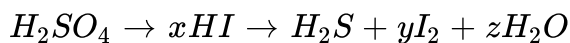


Answer: D



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11. In a balanced equation



The values of x,y,z are

A. $x=3, y=5, z=2$

B. $x=4, y=8, z=5$

C. $x=8, y=4, z=4$

D. $x=5, y=3, z=4$

Answer: C



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12. The oxidation state of chromium in the final product formed by the reaction between KI and acidified potassium dichromate solution is :

A. $+4$

B. +6

C. +2

D. +3

Answer: D



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13. What is the oxidation number of Xe in $XeOF_2$?

A. zero

B. +2

C. +4

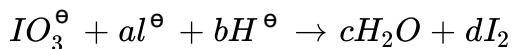
D. +3

Answer: C



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14. In the balanced chemical reaction



a , b , c , and d , respectively, correspond to

A. 5,6,3,3

B. 5,3,6,3

C. 3,5,3,6

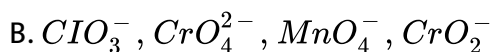
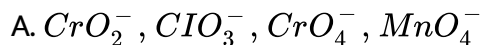
D. 5,6,5,5

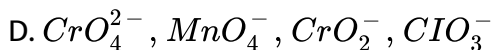
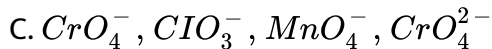
Answer: A



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15. Which of the following arrangements represent increasing oxidation number of the central atom?



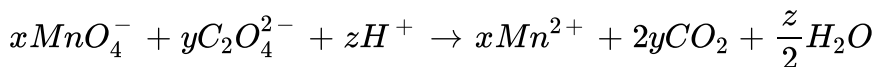


Answer: A



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16. Consider the following reaction :



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

A. 2,5 and 16

B. 5,2 and 16

C. 2,5 and 8

D. 2,5 and 8

Answer: A



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17. In which of the following reactions H_2O_2 acts as a reducing agent?

- A. I and II
- B. III and IV
- C. I and III
- D. II and IV

Answer: D



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18. In Br_3O_8 compound, oxidation number of bromine is:

- A. $\frac{16}{13}$
- B. $\frac{26}{3}$
- C. $\frac{24}{3}$
- D. $\frac{16}{3}$

Answer: D



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19. How many grams of potassium dichromate are required to oxidise 20.0 g of Fe^{2+} in $FeSO_4$ to Fe^{3+} if the reaction is carried out in acidic medium? Molar masses of $K_2Cr_2O_7$ and $FeSO_7$ are 294 and 152 respectively

A. 6.45 g

B. 7.45 g

C. 8.45 g

D. 9.45 g

Answer: A



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1. Oxidation number is the charge assigned to an atom of a molecule or ion according to some arbitrary rules. In neutral molecules, the sum of the oxidation numbers of all the atoms present is zero while in a simple or complex ion it is equal to the net charge on ion. In some cases the oxidation number may be even fractional. Although sometimes a particular element may have same valency and oxidation state but these are based upon different concepts. The number of oxidation states available for a particular element are normally more than the valencies.

A brown complex has the formula:

$[Fe(H_2O)_5NO]SO_4$ the oxidation number of iron is:

A. +1

B. +2

C. +3

D. 0

Answer: A



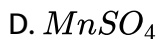
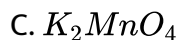
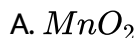
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2. oxidation states available for a particular elements are normally more than the valencies

A brown complex has the formula:

$[Fe(H_2O)_5NO]SO_4$ the oxidation number of iron is:

In which compound, Mn exhibits highest oxidation state?



Answer: C



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3. oxidation states available for a particular elements are normally more than the valencies

A brown complex has the formula:

$[Fe(H_2)(O)_5NO]SO_4$ the oxidation number of iron is:

In which of the following pairs there is the maximum difference in the oxidation state of the elements other than oxygen?

A. NO_2 and N_2O_4

B. P_2O_5 and P_4O_{10}

C. K_2MnO_4 and NO

D. SO_2 and SO_3

Answer: D



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4. oxidation states available for a particular elements are normally more than the valencies

A brown complex has the formula:

$[Fe(H_2O)_5NO]SO_4$ the oxidation number of iron is:

Phosphorus has the oxidation state of +3 in

- A. Phosphorus acid
- B. Orthophosphoric acid
- C. Hypophosphorus acid
- D. Metaphosphoric acid

Answer: A

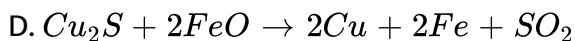
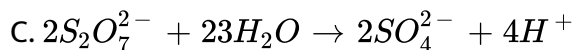
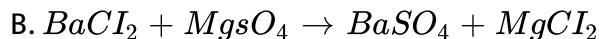


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5. A redox reaction consists of oxidation and reduction half reactions. There is a loss of electrons in oxidation and the species which loses electrons is a reducing agent. Its oxidation number increases during oxidation. Similarly there is a gain of electrons during reduction and the species which gains electrons is an oxidising agent. The species which gains electrons is an oxidising agent its oxidation number decreases

during reduction. The number of electrons released during oxidation is equal to number of electrons gained during reduction.

Out of the following only one is redox reaction. Identify it.



Answer: D

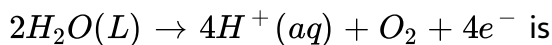


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6. A redox reaction consists of oxidation and reduction half reactions. There is a loss of electrons in oxidation and the species which loses electrons is a reducing agent. Its oxidation number increases during oxidation. Similarly there is a gain of electrons during reduction and the species which gains electrons is an oxidising agent. The species which gains electrons is an oxidising agent its oxidation number decreases

during reduction. The number of electrons released during oxidation is equal to number of electrons gained during reduction.

The reaction:



- A. an oxidation reaction
- B. a reduction reaction
- C. a redox reaction
- D. a hydrolysis reaction

Answer: A

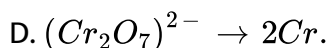
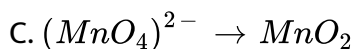
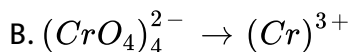
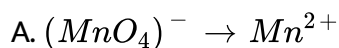


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7. A redox reaction consists of oxidation and reduction half reactions. There is a loss of electrons in oxidation and the species which loses electrons is the reducing agent. Its oxidation number increases during oxidation. Similarly there is a gain of electrons during reduction and the species which gains electrons is an oxidising agent. The species which

gains electrons is an oxidising agent its oxidation number decreases during reduction. The number of electrons released during oxidation is equal to number of electrons gained during reduction.

Which of the following involves transfer of five electrons?



Answer: A



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8. A redox reaction consists of oxidation and reduction half reactions. There is a loss of electrons in oxidation and the species which loses electrons is the reducing agent. Its oxidation number increases during oxidation. Similarly there is a gain of electrons during reduction and the species which gains electrons is an oxidising agent. The species which

gains electrons is an oxidising agent its oxidation number decreases during reduction. The number of electrons released during oxidation is equal to number of electrons gained during reduction.

When SO_2 is passed through KIO_3 the O.N of iodine changes from

A. $+5 \rightarrow 0$

B. $5 \rightarrow -1$

C. $-5 \rightarrow 0$

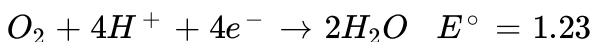
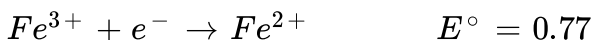
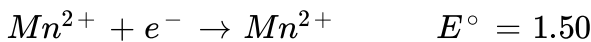
D. $-7 \rightarrow -1$

Answer: B



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9. Given below are a set of half-cell reactions (acidic medium) along with their E° with respect to normal hydrogen electrode values. Using the data obtain the correct explanation to question given below.



Among the following, identify the correct statement:

- A. Chloride ion is oxidised by O_2
- B. Fe^{2+} is oxidised by iodide
- C. Iodide ion is oxidised by chlorine
- D. Mn^{2+} is oxidised by chlorine

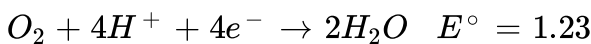
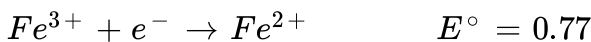
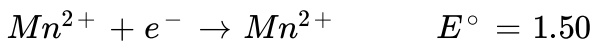
Answer: C



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Jee Joint Entrance Examination Comprehension 2

1. Given below are a set of half-cell reactions (acidic medium) along with their E° with respect to normal hydrogen electrode values. Using the data obtain the correct explanation to question given below.



While Fe^{2+} is stable, Mn^{3+} is not stable in acid solution because:

A. O_2 oxidises Mn^{2+} to Mn^{3+}

B. O_2 oxidises both Mn^{2+} to Mn^{3+} and $Fe^{2+} \rightarrow Fe^{3+}$

C. Fe^{3+} oxidises $H_2O \rightarrow O_2$

D. Mn^{3+} oxidises H_2O to O_2

Answer: D

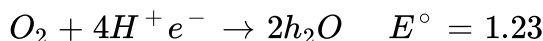
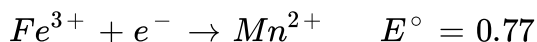
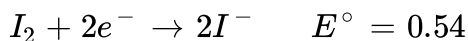


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Jee Joint Entrance Examination Comprehension 3

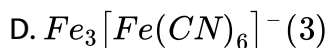
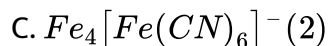
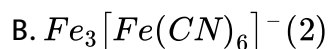
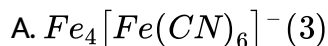
1. Redox reactions play a pivotal role in chemistry and biology. The values of standard reduction potential E° of two half cell reaction decide which way the reaction is expected to proceed. A simple example is Daniell cell in

which zinc goes in to solution and copper gets deposited Given below are set of half cell reaction (acidic medium) along with their E° values.



Using these data , obtain the correct explanation for the following question.

Sodium fusion extract obtained from aniline. On treatment with iron (II) sulphate and H_2SO_4 in presence of air gives a prussian blue precipitate. The blue colour is due to the formation of



Answer: A

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Straight Objective Type Mcqs Single Correct Option

1. The O.N of P in $Ba(H_2PO_2)_2$ is:

A. +3

B. +2

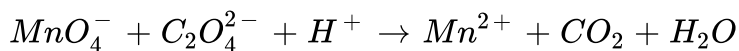
C. +1

D. -1

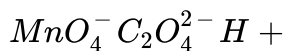
Answer: C

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2. For the redox reaction:



The correct coefficients of the reactants for the balanced reaction are:



A. 2 5 16

B. 16 5 2

C. 5 16 2

D. 2 16 5

Answer: A



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3. A Standard hydrogen electrode has zero electrode potential because

A. hydrogen is easiest to oxidise

B. the electrode potential is assumed to be zero

C. hydrogen atom has only one electron

D. hydrogen is the lightest element

Answer: B



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4. The standard reduction potential of three metallic cations x,y and z are +0.52,-3.03 and -1.18V respectively .The order of reducing power is:

A. $Y > Z > X$

B. $X > Y > X$

C. $Z > Y > X$

D. $Z > X > Y$

Answer: A



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5. The oxidation number of sulphur in S_8 , S_2F_{32} and H_2S respectively are:

- A. 0, + 1 and - 2
- B. +2, + 1 and - 2
- C. 0, + 1 and + 2
- D. - 2, + 1 and - 2

Answer: A



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6. A gas X at 1 atm pressure is bubbled through a solution containing a mixture of $1M Y^-$ and $1M Z^-$ at $25^\circ C$. If the reduction potential of $Z > Y > X$, then

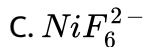
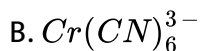
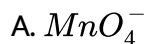
- A. Y will oxidise X and not Z
- B. Y will oxidise Z and not X
- C. Y will Oxidise both Z and X
- D. Y will reduce both X and Z

Answer: A



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7. Among the following , identify the species with an atom in +6 oxidation state of metal



Answer: D



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8. In the standardisation of $Na_2S_2O_3$ using $K_2Cr_2O_7$ by iodometry the equivalent mass of $K_2Cr_2O_7$ is:

- A. Molecular *mass* / 2
- B. Molecular *mass* / 6
- C. Molecular *mass* / 3
- D. Same as the molecular mass.

Answer: B



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9. In an electrolytic cell, the flow of electron mass.

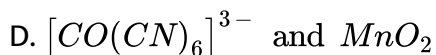
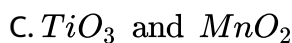
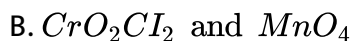
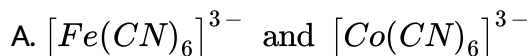
- A. cathode to anode in solution
- B. cathode to anode through external supply
- C. cathode to anode through internal supply
- D. anode to cathode through internal supply

Answer: C



View Text Solution

10. The pair of compounds in which both the metals are in the highest possible oxidation state is:



Answer: B



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11. Oxidation numbers of the metal in the minerals haematite and magneetite respectively are:

A. II,III in haematite and III in magnetite

B. II, III in haematite and II in magnetite

C. II in haematite and II,III in magnetite

D. III in haematite and II, III in magnetite

Answer: D



View Text Solution

12. The reaction of white phosphorus with aqueous NaOH gives phosphine along with another phosphorus containing compound. The oxidation states of phosphorus in phosphine and the other product are respectively

A. redox reaction, -3 and -5

B. redox reaction, +3 and +5

C. disproportionation reactions, -3 and +5

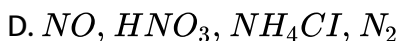
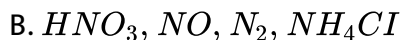
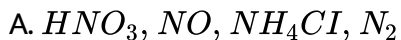
D. disproportionation reaction, -3 and +3

Answer:



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13. Which ordering of compounds is according to the decreasing order of oxidation state of nitrogen ?

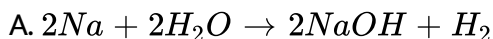


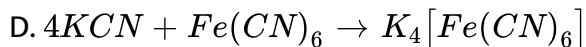
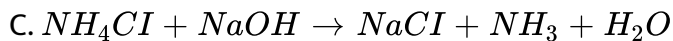
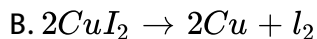
Answer: B

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Multiple Correct Answer Type Mcqs

1. Which of the following involve oxidation and reduction?



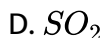
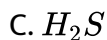
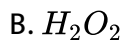


Answer: A::C



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2. Which of the following can act both as oxidising agents and reducing agents?

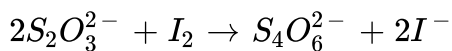


Answer: A::B::D



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3. In the reaction



A. $S_2O_3^{2-}$ gets oxidised to $S_4O_6^{2-}$

B. $S_2O_3^{2-}$ gets oxidised to $S_4O_6^{2-}$

C. I_2 gets reduced to I^-

D. I_2 gets oxidised to I^-

Answer:



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4. Which Cl_2 is passed through hot $NaOH$ solution, oxidation number of Cl changes from

A. $-1 \rightarrow 0$

B. $0 \rightarrow -1$

C. $0 \rightarrow +5$

D. $0 \rightarrow +7$

Answer: B::C



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5. For the reaction,

$I^- + ClO_3^- + H_2SO_4 \rightarrow Cl^- + HSO_4^- + I_2$ the correct statement (s) in the balanced equation *is/are*

A. stoichiometric coefficient of HSO_4^- is 6

B. iodide is oxidised

C. sulphur is reduced

D. H_2O is one of the products

Answer: A::B::D



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6. The oxidation states of the most electronegative element in the products of reaction between BaO^2 and diluent H_2SO_4 are:

A. -1

B. $+1$

C. -2

D. 0

Answer: A::C



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Assertion Reason Type Questions

1. Assertion: In aqueous solution, SO_2 reacts with H_2S liberating sulphur

Reason : SO_2 is an effective reducing agent.

- A. If both assertion and reason are correct and reason is correct explanation for assertion
- B. If both assertion and reason are correct but reason is not correct explanation for assertion
- C. If assertion is correct but reason is incorrect
- D. If both assertion and reason are incorrect

Answer: B



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2. Assertion: An acidified aqueous solution of $KClO_3$ when boiled with iodine produces KIO_3

Reason : $KClO_3$ is an oxidising agent while KIO_3 is not

- A. If both assertion and reason are correct and reason is correct explanation for assertion

- B. If both assertion and reason are correct but reason is not correct explanation for assertion
- C. If assertion is correct but reason is incorrect
- D. If both assertion and reason are incorrect

Answer: A



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3. Assertion: Pb^{4+} ion can easily be reduced to Pb^{2+} ion.

Reason: Pb^{2+} ion is paramagnetic in nature

- A. If both assertion and reason are correct and reason is correct explanation for assertion
- B. If both assertion and reason are correct but reason is not correct explanation for assertion
- C. If assertion is correct but reason is incorrect

D. If both assertion and reason are incorrect

Answer: C



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4. Assertion : Zinc displaces copper from copper sulphate solution

Reason: The E° of Zn is - 0.76 V and that of Cu is +0.34 V.

A. If both assertion and reason are correct and reason is correct

explanation for assertion

B. If both assertion and reason are correct but reason is not correct

explanation for assertion

C. If assertion is correct but reason is incorrect

D. If both assertion and reason are incorrect

Answer: A



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5. Assertion : An electrochemical cell can be set up only if redox reaction is spontaneous.

Reason: A reaction is spontaneous if free energy change (ΔG) is negative

- A. If both assertion and reason are correct and reason is correct explanation for assertion
- B. If both assertion and reason are correct but reason is not correct explanation for assertion
- C. If assertion is correct but reason is incorrect
- D. If both assertion and reason are incorrect

Answer: A



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6. Assertion : Oxidation state of carbon in its compounds is +4

Reason : An element has a fixed oxidation state.

A. If both assertion and reason are correct and reason is correct explanation for assertion

B. If both assertion and reason are correct but reason is not correct explanation for assertion

C. If assertion is correct but reason is incorrect

D. If both assertion and reason are incorrect

Answer: D



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Reasoning Type Questions

1. Statement -1. copper liberates hydrogen from a dilute solution of hydrochloric acid

Statement-2 E° of Cu is higher than that of H_2

A. Statement -1 is true, statement -2 is also true, statement -2 is the correct explanation of statement-1

B. Statement -1 is true, statement -2 is also true, statement-2 is not the correct explanation of statement-1

C. Statement -1 is true, statement -2 false

D. Statement -1 is false, statement -2 is true.

Answer: D



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2. Statement -1. HNO_2 can act both as an oxidising agent as well as reducing agent

Statement-2. In the O.S of $N(+3)$ in HNO_2 can undergo increase as well as decrease in its value

- A. Statement -1 is true, statement -2 is also true, statement -2 is the correct explanation of statement-1
- B. Statement -1 is true, statement -2 is also true, statement-2 is not the correct explanation of statement-1
- C. Statement -1 is true, statement -2 false
- D. Statement -1 is false, statement -2 is true.

Answer: A



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3. Statement-1. Oxidation number of Ni in $Ni(CO)_4$, is zero

Statement-2. Oxidation number of CO has been taken as zero.

- A. Statement -1 is true, statement -2 is also true, statement -2 is the correct explanation of statement-1
- B. Statement -1 is true, statement -2 is also true, statement-2 is not the correct explanation of statement-1
- C. Statement -1 is true, statement -2 false
- D. Statement -1 is false, statement -2 is true.

Answer: A



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4. Statement -1. $HClO_4$ is a stronger oxidising agent than $HClO_3$.

Statement-2. Oxidation state of Cl in $HClO_4$ is +7 and in $HClO_3$, it is +5.



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