



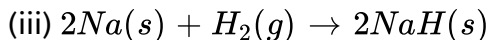
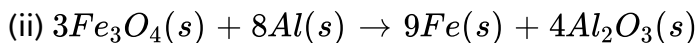
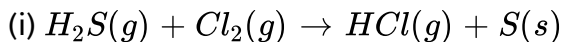
CHEMISTRY

NCERT - NCERT CHEMISTRY(TELUGU)

REDOX REACTIONS

Problem

1. In the reactions given below, identify the species undergoing oxidation and reduction :



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2. Justify that the reaction : $2Na(s) + H_2(g) \rightarrow 2NaH(s)$ is a redox change.

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3. Using Stock notation, represent the following compounds : $HAuCl_4$, Tl_2O , FeO , Fe_2O_3 , CuI , CuO , MnO and MnO_2 .

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4. Justify that the reaction : $2Cu_2O(s) + Cu_2S(s) \rightarrow 6Cu(s) + SO_2(g)$ is a redox reaction. Identify the species oxidised/reduced, which acts as an oxidant and which acts as a reductant.

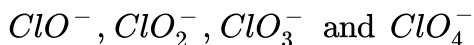
- A.
- B.
- C.

D.

Answer:

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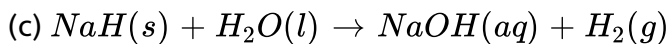
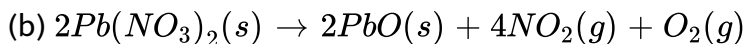
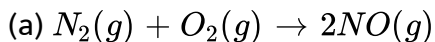
5. Which of the following species, do not show disproportionation reaction and why ?



Also write reaction for each of the species that disproportionates.

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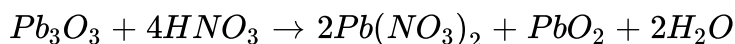
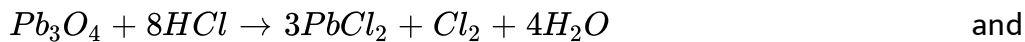
6. Suggest a scheme of classification of the following redox reactions



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7. Why do the following reactions proceed differently?



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8. Write the net ionic equation for the reaction of potassium dichromate (VI), $K_2Cr_2O_7$ with sodium sulphite, Na_2SO_3 , in an acid solution to give chromium (III) ion and the sulphate ion.

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9. Permanganate ion reacts with bromide ion in basic medium to give manganese dioxide and bromate ion. Write the balanced ionic equation for the reaction.

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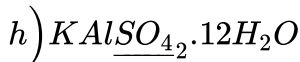
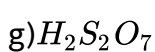
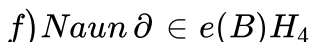
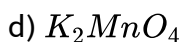
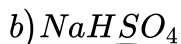
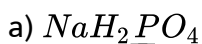
10. Permanganate (VII) ion, MnO_4^- in basic solution oxidises iodide ion, I^- to produce molecular iodine (I_2) and manganese (IV) oxide (MnO_2).

Write a balanced ionic equation to represent this redox reaction.

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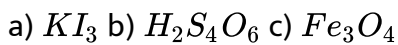
Exercises

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



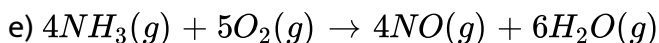
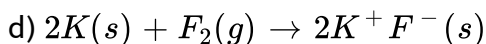
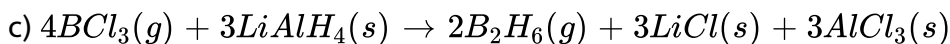
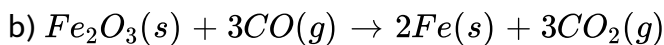
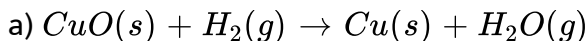
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2. What are the oxidation number to the underlined elements in each of the following and how do you rationalise your results?



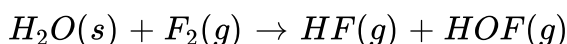
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3. Justify that the following reactions are redox reactions.



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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 oxidation number of sulphur, chromium and nitrogen ion

H_2SO_5 , $Cr_2O_7^{2-}$ and NO_3^- . Suggest structure of those compounds.



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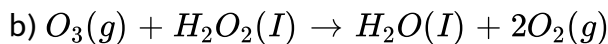
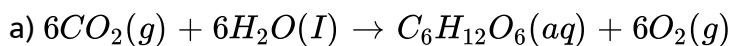
7. Suggest a list of the substances where carbon exhibit oxidation states from -4 to +4 and nitrogen from -3 to +5.

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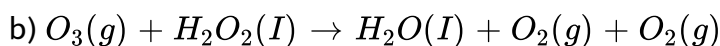
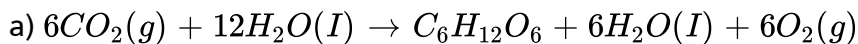
8. While sulphur dioxide and hydrogen peroxide act as oxidising as well as reducing agents in their reactions, ozone and nitric acid act only as oxidants. Why?

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9. Consider the reactions



Why it is more appropriate to write these reaction as



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

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10. The compound AgF_2 is unstable compound. However, if formed, the compound acts as a very 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 the following observations?

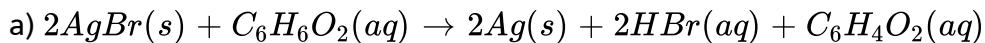
a) Though alkaline potassium permanganate and acidic potassium permanganate both are used as oxidants, yet in the manufacture of benzoic acid from toluene we use alcoholic potassium permanganate as an oxidant. Why? Write balanced redox equation for the reaction.

b) When concentrated sulphuric acid is added to 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?

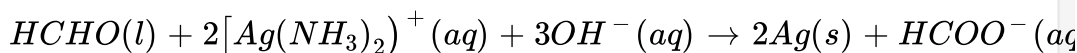


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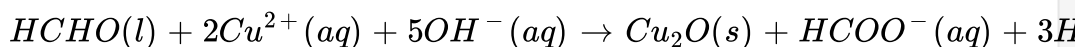
13. Identify the substance oxidised, reduced, oxidising agent and reducing agent for each of the following reactions :

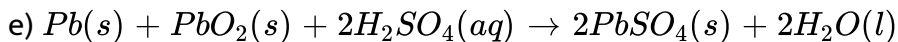
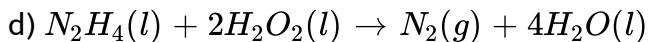


b)



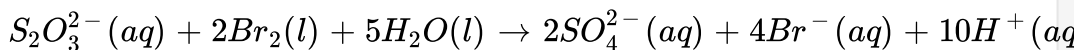
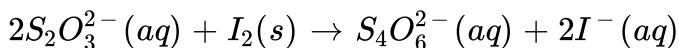
c)





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14. Consider the reactions



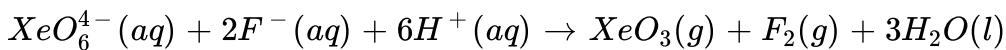
Why does the same reductant, thiosulphate react differently with iodine and bromine ?

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

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16. Why does the following reaction occur ?

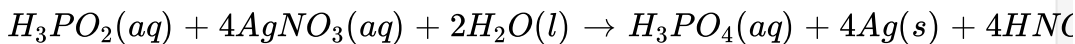


What conclusion about the compound Na_4XeO_6 (of which XeO_6^{4-} is a part) can be drawn from the reaction.

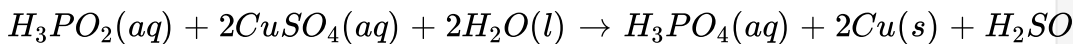
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17. Consider the reactions :

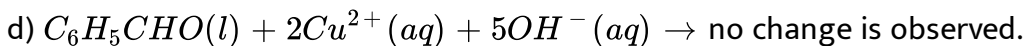
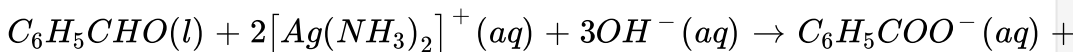
a)



b)



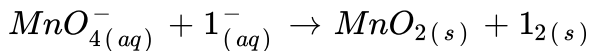
c)



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

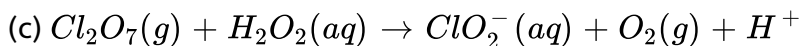
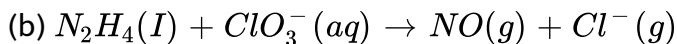
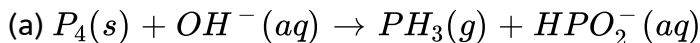
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18. Balance the following redox reaction in basic medium by ion-electron method :



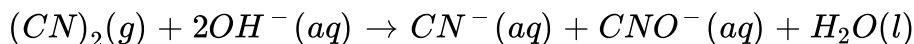
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19. Balance the following equations in basic medium by ion-electron method and oxidation number methods and identify the oxidising agent and the reducing agent.



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



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21. The Mn^{3+} ion is unstable solution and undergoes disproportionation to give Mn^{2+} , MnO_2 and H^+ ion. Write 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 exhibit both positive and negative oxidation states
- Identify the element which neither exhibit the negative nor does the positive oxidation state.

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

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

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

b) Select the metals that can show disproportionation

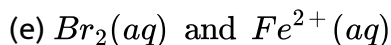
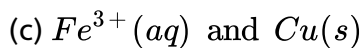
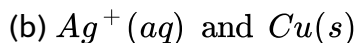
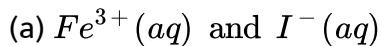
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25. In Ostwal's process for the manufacture of nitric acid the first step involves the oxidation of ammonia gas by oxygen gas to give nitric oxide gas and steam. What is the maximum weight of nitric oxide that can be obtained starting only with 10.00 g of ammonia and 20.00 g of oxygen.



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26. Using the standard electron potentials given in the Table 8.1, predict if the reaction between the following is feasible :



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

(i) An aqueous solution of $AgNO_3$ with silver electrodes.

(ii) An aqueous solution of $AgNO_3$ with platinum electrodes.

(iii) A dilute solution of H_2SO_4 with platinum electrodes.

(iv) An aqueous solution of $CuCl_2$ with platinum electrodes.



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28. i) 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

ii) Calculate the molarity of sodium carbonate in a solution prepared by dissolving 5.3 g in enough water to form 250 ml of the solution.

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29. The standard potentials of some electrodes are as follows. Arrange the metals in an increasing order of their reduction power.

1) $K^+ / K = -2.93V$ 2) $Ag^+ / Ag = 0.80V$ 3) $Cu^{2+} / Cu = 0.34V$
4) $Mg^{2+} / Mg = -2.37V$ 5) $Cr^{3+} / Cr = -0.74V$ 6) $Fe^{2+} / Fe = -0.44V$

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30. Depict the galvanic cell in which the reaction $Zn(s) + 2Ag^+(aq) \rightarrow Zn^{2+}(aq) + 2A(s)$ takes place. Further show.

(i) Which of the electrode is negatively charged?

(ii) The carriers of the current in the cell.

(iii) Individual reaction at each electrode.



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