

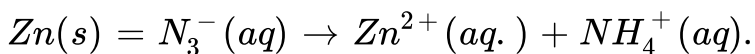
## CHEMISTRY

### BOOKS - R SHARMA CHEMISTRY (HINGLISH)

### REDOX REACTIONS

#### Example

1. Balance the following equation in alkaline medium



Strategy : Follow the seven-step procedure, one step at a time.

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2. Balance the net 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 sulphate ion.

Strategy : Follow the seven -step procedure , one step at a time.

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3. Write a balanced ionic equation to describe the oxidation of iodide ( $I^-$ ) by permanganate ( $MnO_4^-$ ) ion in basic solution to yield molecular iodine ( $I_2$ ) and manganese (IV) oxide ( $MnO_2$ ).

Strategy : We are given the formulas for two reactants and two products. We use these to write the skeletal ionic equation. We construct and balance the appropriate half-reactions using the rules just described. Then we add the half -reactions and eliminate common terms.

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## Follow Up Test 1

1. Which of the following refers to the original description of oxidation ?

- A. Addition of oxygen
- B. Addition of electronegative element
- C. Removal of hydrogen
- D. Removal of electropositive element

**Answer: A**



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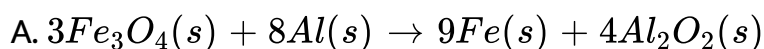
2. Which of the following refers to the original description of reduction?

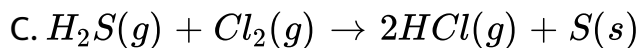
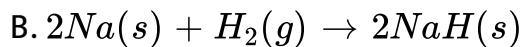
- A. Addition of hydrogen
- B. Addition of electropositive element
- C. Removal of oxygen
- D. Removal of electropositive element

**Answer: C**

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3. Which of the following reaction does not stick to the classical idea of redox reactions ?





D. None of these

**Answer: B**



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

A. Rusting of iron

B. Evaporation of water

C. Burning of gasoline

D. Human respiration

**Answer: B**

5. Which of the following is correct ?

- A. Oxidation fo a substance is followed by reduction of another substance
- B. Reduction of a substance is followed by oxidation of another substance.
- C. Oxidation and reduction are complementary processes
- D. All of these

**Answer: C**

1. Which of the following statements are correct ?

- (i) Oxidizing agents are always oxidized.
- (ii) Reducing agents are always oxidized.
- (iii) Oxidizing agents are always reduced.
- (iv) Reducing agents are always reduced.

A. (i), (ii)

B. (ii), (iii)

C. (i), (iv)

D. None of these

**Answer: B**



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2. Oxidizing agents are species which

- A. gain electrons
- B. lose electrons
- C. neither lose or gain electrons
- D. either lose or gain electrons

**Answer: A**

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3. Which of the following is not a redox reaction in terms of electron transfer reaction ?

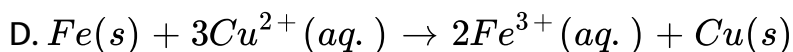
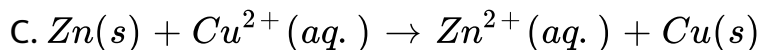
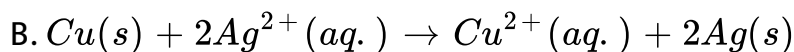
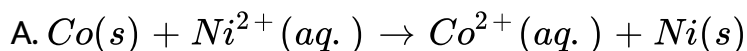
- A.  $Ba + F_2 \rightarrow BaF_2$
- B.  $2Ca + O_2 \rightarrow 2CaO$
- C.  $Cl_2 + 3F_2 \rightarrow 2ClF_3$
- D.  $2Na + S \rightarrow Na_2S$



**Answer: C**

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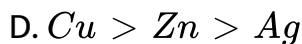
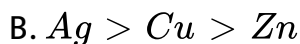
4. In which of the following redox reactions are neither the reactants nor the products favored ?



**Answer: A**

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5. Which of the following is the correct order of electron releasing tendency of the metals ?



**Answer: C**

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**Follow Up Test 3**

1. The oxidation number for an atom in a given species (molecule ion, or free atom) is the .

- A. formal charge of the atom
- B. valency of the atom
- C. actual charge of atom
- D. actual charge fo the atom if the atom exists as a mono-atomic ion or the hypothetical charge assinged to the atom in the species by simple rules

**Answer: D**



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2. Oxidation is a process which involves .

- A. loss of an electronegative radical
- B. gain of electrons
- C. gain of an electropositive radical

D. increase in the oxidation number of one of the atoms

**Answer: D**

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**3.** Reduction is a process which involves

(i) decrease in the oxidation number of one of the atoms

(ii) loss of oxygen or an electronegative element

(iii) addition of hydrogen or an electropositive element .

(iv) gain of electrons .

A. (i), (ii), (iii), (iv)

B. (i), (ii) (iii)

C. (ii), (iii), (iv)

D. (i), (iv)

**Answer: A**

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4. Which of the following has zero oxidation number for every atom ?

- A. Polyatomic ion
- B. Polyatomic molecule
- C. Polyatomic element
- D. None of these

**Answer: C**

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5. The oxidation number of nitrogen in nitride ion is

A. +3

B. -3

C. -5

D. +5

**Answer: B**



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6. The sum of oxidation numbers for all the atoms in the dichromate ion is .

A. -3

B. -1

C.  $-4$

D.  $-2$

**Answer: D**

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7. Fluorine can have an oxidation number of .

A.  $-1$  only

B.  $0$  only

C.  $-1, 0$

D.  $+1$  only

**Answer: C**

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8. The oxidation number of hydrogen is

(i) 0

(ii) +1

(iii) -1

(iv) +1 only.

A. (i), (ii), (iii)

B. (i), (ii), (iii), (iv )

C. (i), (ii)

D. (i),(iii)

**Answer: A**



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9. The oxidation number of N nitric acid molecule is .

A.  $-3$

B.  $+5$

C.  $-4$

D.  $+2$

**Answer: B**



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10. Which of the following compounds of oxygen has a fractional oxidation number ?

A.  $CaO$

B.  $OF_2$

C.  $RbO_2$

D.  $Na_2O_2$

**Answer: C**

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11. Oxidizing agents are species that

A. oxidize other substances

B. contain atoms that are reduced

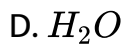
C. gain (or appear to gain ) electrons

D. exhibit any one of the above characteristics

**Answer: D**

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12. Which of the following can act as an oxidizing agent ?

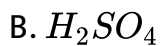


**Answer: C**



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13. Which of the following can function as a reducing agent ?

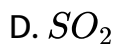
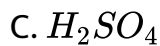
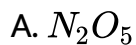




**Answer: A**

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**14.** Which of the following can function as an oxidizing as well as a reducing agent ?



**Answer: D**

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15. Which of the noble gases exhibits the maximum number of different oxidation numbers ?

A. *Kr*

B. *Xe*

C. *Ar*

D. *Ne*

**Answer: B**

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**Follow Up Test 4**

1. There are \_\_\_\_\_ general types of redox reactions .

A. three

B. five

C. four

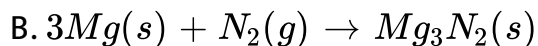
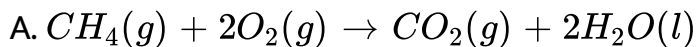
D. two

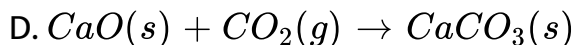
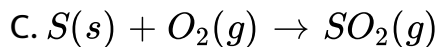
**Answer: C**



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

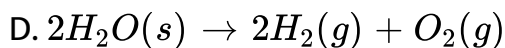
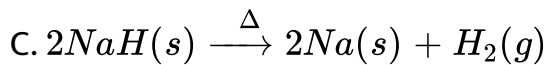
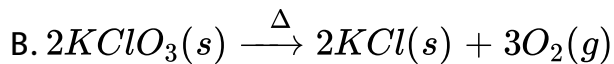
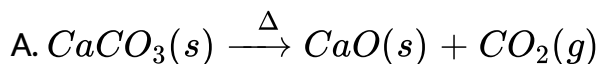




**Answer: D**

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**3.** Which of the following decomposition reactions is not a redox reaction ?



**Answer: A**

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4. Which of the following metals cannot displace hydrogen from cold water ?

A. *K*

B. *Mg*

C. *Ca*

D. *Na*

**Answer: B**

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5. Which of the following cannot displace hydrogen from steam ?

A. *Cd*



B. *Fe*

C. *Cr*

D. *Zn*

**Answer: A**



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**6.** Which of the following metals cannot displace hydrogen from nonoxidizing acids ?

*Pb* (ii) *Sn*

(iii) *Ni*

(iv) *Zn*.

A. (i), (ii), (iii)

B. (ii), (iii), (iv)

C. (i), (ii), (iii) (iv)

D. (i), (ii)

**Answer: C**

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7. Which fo the following metals can displace hydrogen from cold water, steam, and nonoxidizing acids ?

A. *Ni*

B. *Li*

C. *Mn*

D. *Mg*

**Answer: B**



8. Which fo the following metals cannot deplace hydrogen from nonoxidizing acids ?

(i) *Au*      (ii) *Pt*

(iii) *Ag*      (iv) *Cu*

A. (i) , (ii), (iii)

B. (ii), (iii), (iv)

C. (i), (ii)

D. (i), (ii), (iii), (iv)

**Answer: D**



9. A redox reaction is

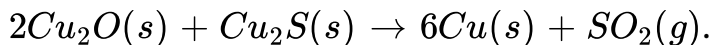
- A. endothermic
- B. exothermic
- C. either endothermic or exothermic
- D. neither endothermic nor exothermic

**Answer: B**



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10. Which of the following is true for the following reaction ?



- A. It is a redox reaction.
- B.  $Cu_2O$  is an oxidant

C.  $Cu_2S$  is a reductant.

D. All of these

**Answer: D**

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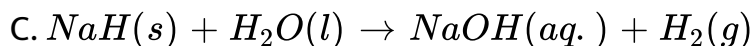
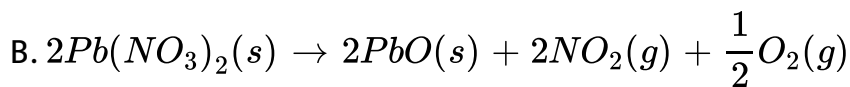
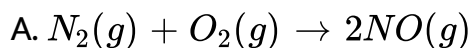
11. Which of the following species does not show disproportionation reaction?



**Answer: A**

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12. Which of the following redox reaction is a displacement reaction ?



D.



**Answer: C**



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13. Which of the following will release a gaseous product from  $Pb_3O_4$ ?

A.  $HCl$

B.  $HNO_3$

C. Both (1) and (2)

D. Neither (1) nor (2)

**Answer: A**



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14. The oxidation states of the most electronegative element in the products of the reaction between  $BaO_2$  with dilute  $H_2SO_4$  are

A.  $-2$  and  $0$

B.  $-1$  and  $-2$

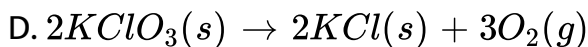
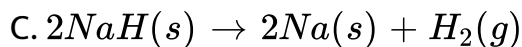
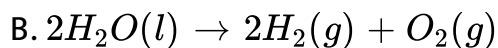
C.  $0$  and  $-1$

D.  $-2$  and  $+1$

**Answer: B**

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15. Which of the following reactions is an example of intramolecular redox reaction ?



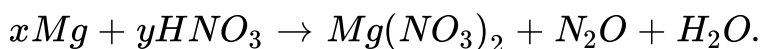


**Answer: D**

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## Follow Up Test 5

1. In the reaction



A.  $x = 2, y = 5$

B.  $x = 4, y = 10$

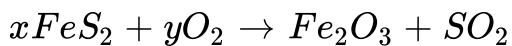
C.  $x = 3, y = 8$

D.  $x = 5, y = 9$

**Answer: B**

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2. In the reaction



A.  $x = 4, y = 11$

B.  $x = 3, y = 10$

C.  $x = 2, y = 5$

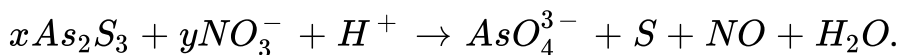
D.  $x = 4, y = 13$

**Answer: A**



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3. In the reaction



A.  $x = 4, y = 9$

B.  $x = 2, y = 10$

C.  $x = 4, y = 11$

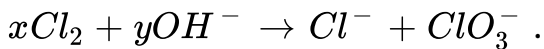
D.  $x = 3, y = 10$

**Answer: D**



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**4. In the reaction**



A.  $x = 2, y = 4$

B.  $x = 3, y = 6$

C.  $x = 4, y = 8$

D.  $x = 5, y = 10$

**Answer: B**

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5. The value of  $n$  in  $\text{NO}_3^- + 4\text{H}^+ + ne^- \rightarrow 2\text{H}_2\text{O} + \text{NO}$  is .

A. 2

B. 4

C. 5

D. 3

**Answer: D**

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6. The number of electrons transferred (lost and gained ) during the reaction  $Fe + H_2O \rightarrow Fe_3O_4 + H_2$  is .

A. 8

B. 6

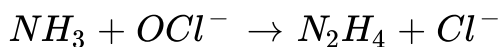
C. 4

D. 2

**Answer: A**

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7. Consider the following reaction in basic medium :



The coefficient for  $N_2H_4$  in the balanced equation will be .

A. 4

B. 3

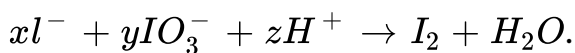
C. 1

D. 2

**Answer: C**

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**8.** In the following reaction, the values for  $x$ ,  $y$  and  $z$  respectively, are



A. 5, 6, 1

B. 5, 1, 6

C. 6, 1, 5

D. 1, 5, 6

**Answer: B**

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## Follow Up Test 6

1. Which fo the following is a correct statement ? Itbtgt (i)

Titration is a process in which the solutions of two reagents are allowed to react .

(ii) Titration is carried out by adding the standard solution fo one reagent taken in a burette to the known volume (10 ro  $20\text{cm}^3$  , mesured by a pipette) of the solution of the other reagent taken in a flask called then titration flask.

(iii) The solution taken the burette is called the titrant while that taken in the titration flask is called the analyte.

(iv) An acid-base indicator is an organic dye which changes color with the pH of the solution at the equivalence point .

A. (i), (ii), (iii)

B. (ii), (iii), (iv)

C. (i), (ii) , (iv)

D. (i),(ii) (iii),(iv)

**Answer: D**



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2. Which of the following statements is correct ?

(i) Phenolphthalein is colorless in the acid solution but turns pink in the basic solution.

(ii) Methyl orange is yellow in acid solution but turns red in the basic solution.



(iii) Phenolphthalein is pink in the acid solution but turns colorless in the basic solution .

(iv) Methyl orange is red in acid solution but turns yellow in the basic solution.

A. (i),(ii)

B. (ii), (iii)

C. (i), (iv)

D. (iii), (iv)

**Answer: D**



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3. Which of the following oxidizing reagents is used as a selfindicator ?

A.  $KMnO_4$

B.  $K_2Cr_2O_7$

C.  $CuSO_4$

D. both (1) and (2)

**Answer: A**



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4. Iodometric titrations are carried out in \_\_\_\_\_ steps.

A. three

B. two

C. only one

D. four

**Answer: B**

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5. When we divide the formula weight by change in oxidation number, we get

- A. equivalent weight of an oxidant
- B. equivalent weight of a reductant
- C. equivalent weight of either an oxidant or a reductant
- D. equivalent weight of neither an oxidant nor a reductant

**Answer: C**

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6. The equivalent weight of  $KMnO_4$  in a redox reaction in a neutral medium is .

A.  $M/5$

B.  $M$

C.  $M/3$

D.  $M/4$

**Answer: C**

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7. In the reaction  $Cr_2O_7^{2-} + 14H^+ + 6e^- \rightarrow 2Cr^{3+} + 7H_2O$ , the equivalent weight for  $K_2Cr_2O_7$  will be .

A.  $M/6$

B.  $M/3$

C.  $M/12$

D.  $M/9$

**Answer: A**



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8. The equivalent weight for  $Na_2S_2O_3$  in the reaction  $2Na_2S_2O_3 + I_2 \rightarrow Na_2S_4O_6 + 2NaI$  will be .

A.  $M/2$

B.  $M$

C.  $M/0.5$

D.  $M/8$

**Answer: B**

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9. How many milliliters of a  $0.05\text{M KMnO}_4$  solution are required to oxidize  $2.0\text{g FeSO}_4$  in a dilute acid solution ?

A.  $32.56\text{mL}$

B.  $62.53\text{mL}$

C.  $25.36\text{mL}$

D.  $52.63\text{mL}$

**Answer: D**

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10. If  $10.0\text{mL}$  of hypo solution ( $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$ ) is decolorized by  $15\text{mL}$  of  $M/40$  iodine solution, then the concentration of hypo solution is  $\text{---gdm}^{-3}$ .

A. 24.6

B. 8.6

C. 18.6

D. 31.6

**Answer: C**

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**Follow Up Test 7**

1. In a galvanic cell .

- A. the flow of electrons through a wire is not possible
- B. the anode is the positive terminal and the cathode is the negative terminal
- C. chemical energy is converted into electrical energy
- D. electrical energy is converted into chemical energy

**Answer: C**



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2. A half-cell contains \_\_\_\_\_ of an element .

- A. the oxidized form
- B. the reduced form
- C. the redox form
- D. the oxidized and reduced forms



**Answer: D**

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**3.** A salt bridge contains \_\_\_\_\_ and agar-agar.

(i) a saturated solution for  $HCl$

(ii) A saturated solution for  $KNO_3$

(iii) a saturated solution of  $NH_4NO_3$ .

A. (i), (ii), (iii)

B. (i), (ii)

C. (ii), (iii)

D. (iii) only

**Answer: A**

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4. The function of a salt bridge is to .

- A. eliminate the impurities present in the electrolyte
- B. eliminate liquid-junction potential where the ions are present in excess at the junction
- C. decrease the cell potential at the negative electrode
- D. increase the cell potential at the positive electrode

**Answer: B**

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5. In a Daniell cell, when a Zn electrode and a Cu electrode are connected with a wire

- A. electrons flow from the Zn electrode to the Cu electrode  
through the wire
- B. electrons flow from the Cu electrode to the Zn electrode  
through the wire
- C. current flow from the Zn electrode to the cu electrode  
through the wire
- D. electrons flow from the Zn electrode to the cu electrode  
through the cell

**Answer: A**



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6. The substance that will reduce  $Ag^+$  to Ag but will not reduce  $Ni^{2+}$  to Ni is.

A. *Al*

B. *Mg*

C. *Pb*

D. *Zn*

**Answer: C**

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7. The standard electrode potential corresponding to the reaction  $Au^{3+}(aq) + 3e^{-} \rightarrow Au(s)$  is  $1.42V$ . This implies that .

(i) gold dissolves in  $1M HCl$

(ii) metallic gold will be precipitated on passing hydrogen gas through gold salt solution

(iii) gold does not dissolve in  $1M HCl$  solution

(iv) metallic gold will not be precipitated on passing hydrogen gas through gold salt solution.

A. (i), (ii)

B. (i), (iv)

C. (ii), (iv)

D. (ii), (iii)

**Answer: D**



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**8.** According to international convention, standard reduction potentials are now called standard potential.

(i) the oxidizing power of the species on the left side of the reaction decreases

(ii) the reducing power of the species on the right-hand side of

the reaction increased

(iii) the oxidizing power of the species on the left side fo the reaction increases

(iv) the reducing power of the species on the right side fo the reaction decrease .

A. (iii), (iv)

B. (i), (ii)

C. (i), (iii)

D. (ii), (iii)

**Answer: B**



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**9.** By electromotive force we mean .

- A. the potential difference of a cell measured when there is a flow of current from the anode to the cathode and the cell is operating irreversibly
- B. the potential difference of a cell measured when there is a flow of current from the cathode to the anode and the cell is operation reversibly
- C. the potential difference of a cell when there is no flow of current and the cell is operating irreversibly
- D. the potential difference of a cell when there is no flow of current and the cell is operating reversibly

**Answer: D**



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10. Which of the following statements is incorrect ?

- A.  $E_{\text{electrode}}^{\ominus}$  changes sign whenever we reverse a cell reaction.
- B. The half-cell reactions are not reversible.
- C. Changing the stoichiometric coefficients of a half-cell reaction does not affect the value of  $E^{\ominus}$
- D. The more positive the  $E^{\ominus}$  value, the greater the tendency for the substance to be reduced.

**Answer: B**

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Question Bank



1. The oxidation number of carbon in  $CH_2O$  is.

A. +2

B. 0

C. +4

D. -2

**Answer: B**



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2. In the conversion of  $Br_2$  to  $BrO_3^-$ , the oxidation state of  $Br$  changes from.

A. zero to +5

B. zero to -3

C. +1 to +5

D. +2 to +5

**Answer: A**

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**3.** The oxidation state of chromium in the final product formed in the reaction between  $KI$  and acidified potassium dichromate solution is

A. +4

B. +6

C. +2

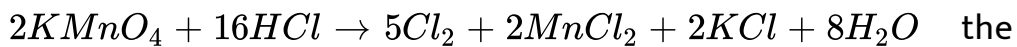
D. +3

**Answer: D**

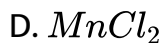
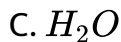


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4. In the reaction



reduced product is .



**Answer: D**



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5. The set of numerical coefficients that balances the following equation is



A. 2, 2, 1, 1, 1,

B. 2, 1, 1, 2, 1

C. 1, 1, 2, 2, 1

D. 2, 2, 1, 2, 1

**Answer: D**



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6. Saturated solution of  $KNO_3$  is used to make "salt bridge" because .

A.  $KNO_3$  is highly soluble in water

B. Velocity of  $NO_3^-$  is greater than that of  $K^+$

C. Velocities of both  $K^+$  and  $NO_3^-$  are nearly the same

D. Velocity of  $K^+$  is greater than that of  $NO_3^-$

**Answer: C**

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7. The reaction

$P_4 + 3NaOH + 3H_2O \rightarrow 3NaH_2PO + PH_3$  is an example of.

A. disproportionation reaction

B. displacement reaction

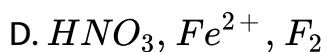
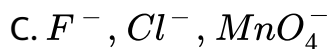
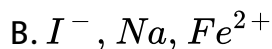
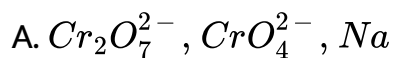
C. combination reaction

D. decomposition reaction

**Answer: A**

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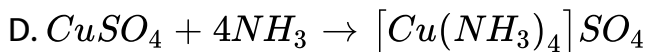
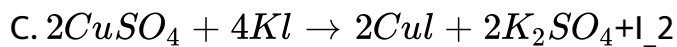
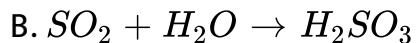
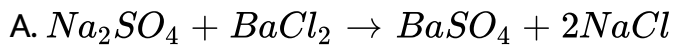
**8. Which of the following is a set fo reducing agents ?**



**Answer: B**

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**9. Which fo the following is a redox reaction ?**

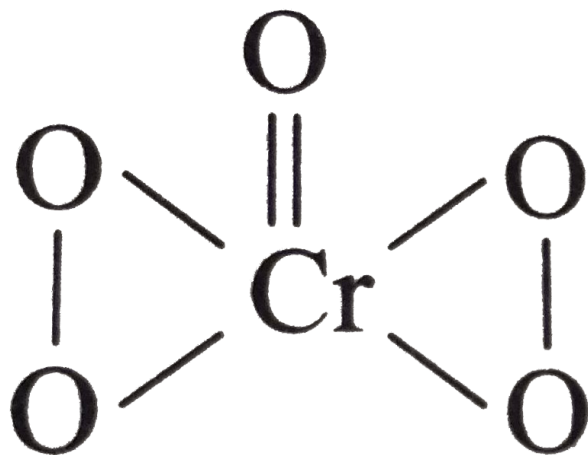


**Answer: C**



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10. Compound  $CrO_5$  has structure as shown



Itbtgt The

oxidation number fo Cr in the above compound is .

- A. 10
- B. 5
- C. 4
- D. 6

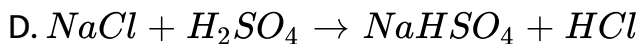
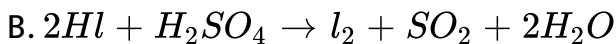
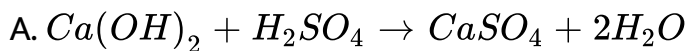
**Answer: D**



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11. Which of the following chemical reactions depicts the oxidizing behavior of  $H_2SO_4$ ?



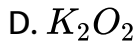
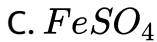
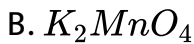
**Answer: B**



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12. Which of the following will not be oxidized by  $O_3$ ?



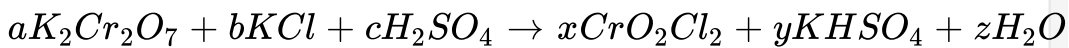


**Answer: A**



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**13.**



The above equation balances when

A.  $a = 4, b = 2, c = 6$  and  $x = 6, y = 2, z = 3$

B.  $a = 6, b = 4, c = 2$  and  $x = 6, y = 3, z = 2$

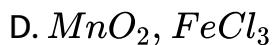
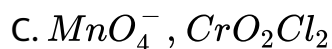
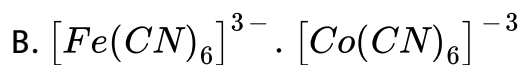
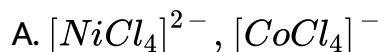
C.  $a = 1, b = 4, c = 6$  and  $x = 2, y = 6, z = 3$

D.  $a = 2, b = 4, c = 6$  and  $x = 2, y = 6, z = 2$

**Answer: C**

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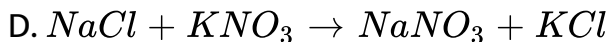
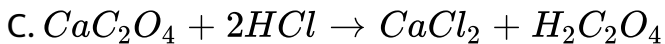
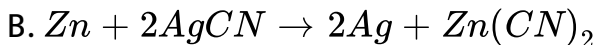
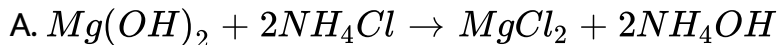
**14.** The pair of compounds having metals in their highest oxidation state is .



**Answer: C**

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15. which of the following is a redox reaction ?

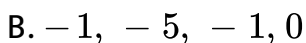
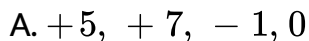


Answer: B



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16. Oxidation numbers fo iodine in  $IO_3^-$ ,  $IO_4^-$ ,  $KI$ , and  $I_3$  , respectively, are .



C.  $-2, -5, -1, 0$

D.  $+3, +5, +7, 0$

**Answer: A**

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17. In which of the following has the oxidation number of oxygen been arranged in increasing order ?

A.  $KO_2 < OF_2 < O_3 < BaO_2$

B.  $BaO_2 < KO_2 < O_3 < OF_2$

C.  $BaO_2 < O_3 < OF_2 < KO_2$

D.  $OF_2 < KO_2 < BaO_2 < O_3$

**Answer: B**

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18. Consider a titration of potassium dichromate solution with acidified Mohr's salt solution using diphenylamine as indicator. The number of moles of Mohr's salt required per mole of dichromate is:

- A. 4
- B. 5
- C. 6
- D. 3

**Answer: C**

19. Potassium iodide reacts with acidified  $K_2Cr_2O_7$ . How many moles of KI are required for one mole of  $K_2Cr_2O_7$  ?

A. 3

B. 6

C. 2

D. 7

**Answer: A**

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20. Excess of  $KI$  reacts with  $CuSO_4$  solution and  $Na_2SO_3$  solution is added to it. Which of the following statements is incorrect for the reaction?

A.  $Cu_2I_2$  is formed

B.  $CuI_2$  is formed

C. Evolved  $I_2$  is reduced,.

D.  $Na_2S_2O_3$  is oxidized`.

**Answer: B**

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21. When  $KMnO_4$  acts as an oxidising agent and ultimately from  $MnO_4^{2-}$ ,  $MnO_2$ ,  $Mn_2O_3$ , and  $Mn^{2+}$ , then the number of electrons transferred in each case, respectively, are

A. 1, 3, 4, 5

B. 3, 5, 7, 1

C. 1, 5, 3, 7



D. 4, 3, 1, 5

**Answer: A**

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22. When KI is added to acidified solution of sodium nitrite,

A.  $N_2$  gas is liberated and  $HOI$  is produced

B.  $N_2O$  gas is liberated and  $I_2$  is set free

C.  $N_2$  gas is liberated and  $HI$  is produced

D.  $NO$  gas is liberated and  $I_2$  is set free

**Answer: D**

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23. The oxidation number of  $Cl$  in  $CaOCl_2$  is

A. +1

B. -1

C. +1 - 1

D. 0

**Answer: C**



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24. Which of the following statements are correct concerning redox properties?

(i) The reducing power of hydrogen halides increases from hydrogen chloride to hydrogen iodide.

(ii) The oxidizing power of halogens decreases from chlorine to iodine.

A metal M for which  $E^\ominus$  for the half-reaction



is very negative will be a good reducing agent.

A. (i) ,(ii) ,(ii)

B. (i), (iv)

C. (ii), (iii)

D. (i), (iii)

**Answer: A**

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**25.** What products are expected from the desproprtionation reactin of hypochorous acid ?

A.  $HClO_2$  and  $HClO_4$

B.  $HClO_3$  and  $Cl_2O$

C.  $HCl$  and  $Cl_2O$

D.  $HCl$  and  $HClO_3$

**Answer: D**



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**26.** The oxidation number of  $S$  in  $H_2S_2O_8$  is

A. +7

B. +4

C. +6

D. +2

**Answer: C**

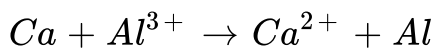
## Archives

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

- A. +3, +6 and +6
- B. +5, +6 and +6
- C. +3, +6, and +5
- D. +5, +3, and +6

**Answer: B**

2. What is the stoichiometric coefficient for Ca in the reaction ?



A. 2

B. 1

C. 3

D. 4

**Answer: C**



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3. The number of moles of  $KMnO_4$  that will be needed to react with one mole of ferrous sulphite in acidic solution is

A. 1

B. 3/5

C. 4/5

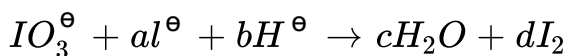
D. 2/5

**Answer: B**



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4. 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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5. The number of moles of  $KMnO_4$  reduced by 1mol of  $KI$  in alkaline medium is

A. one

B. two

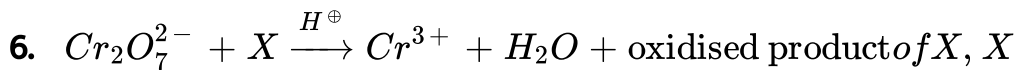
C. five

D. one-fifthe

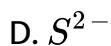
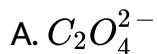
**Answer: B**

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in the above reaction cannot be

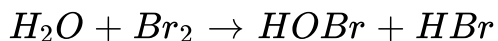


**Answer: C**



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7. Which is the best description of the behaviour of bromine in the reaction given below



- A. Proton acceptor only
- B. Both oxidized and reduced
- C. Oxidized only
- D. Reduced only

**Answer: B**

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8. For the decolorization of 1 mol of  $KMnO_4$ , the moles of  $H_2O_2$  required are .

- A.  $1/2$
- B.  $3/2$
- C.  $5/2$
- D.  $7/2$

**Answer: C**

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9. The element which forms oxides in all oxidation states  $+I$  to  $+V$  is.

A. *N*

B. *P*

C. *As*

D. *Sb*

**Answer: A**

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10. The oxidation number of carbon in  $.CH_2Cl_2$  is .

A. 0

B. 2

C. 3

D. 5

**Answer: A**



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11. What is the net charge on ferrous ion ?

A. +2

B. +3

C. +4

D. +5

**Answer: A**

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12. Which of the following is the strongest oxidizing agent ?

A.  $\text{HOCl}$

B.  $\text{HClO}_2$

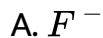
C.  $\text{HClO}_3$

D.  $\text{HClO}_4$

**Answer: A**

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13. Which of the following is the most powerful reducing agent ?

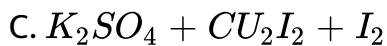
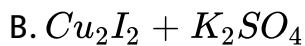


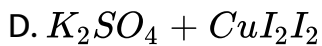
Answer: D



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14.  $KI$  and  $CuSO_4$  solution when mixed give .





**Answer: C**



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15. What is the equivalent mass of  $IO_4^-$  when it is converted into  $I_2$  in acid medium ?

A.  $M/6$

B.  $M/7$

C.  $M/5$

D. None fo these

**Answer: B**



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16. In acidic medium, dichromate ion oxidizes ferrous ion to ferric ion. If the gram molecular weight of potassium dichromate is  $294g$ , its gram equivalent weight is \_\_\_\_\_ $g$ .

A. 294

B. 127

C. 49

D. 24.5

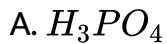
**Answer: C**



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17. Which of the following is both oxidizing as well as reducing agent ?

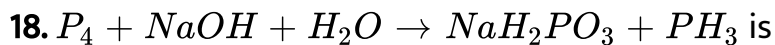




**Answer: C**



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A. oxidation reaction

B. reduction reaction

C. both oxidation and reduction reaction

D. none of these

**Answer: C**

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19.  $MnO_4^{2-}$  (1 mole) in neutral aqueous medium is disproportionate to

A.  $2/3$  mol of  $MnO_4^-$  and  $1/3$  mol of  $MnO_2$

B.  $1/3$  mol of  $MnO_4^-$  and  $2/3$  mol of  $MnO_2$

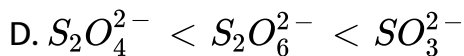
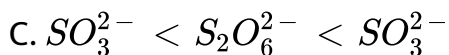
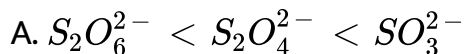
C.  $1/3$  mol of  $Mn_2O_7$  and  $1/3$  mol of  $MnO_2$

D.  $2/3$  mol of  $Mn_2O_7$  and  $1/3$  mol of  $MnO_2$

**Answer: A**

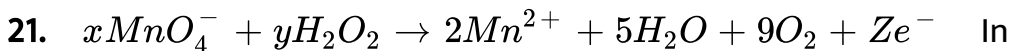
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20. The oxidation states of sulphur in the anions  $SO_3^{2-}$ ,  $S_2O_4^{2-}$ , and  $S_2O_6^{2-}$  follow the order

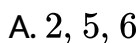


**Answer: B**

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this reaction, the values of  $x$ ,  $y$ , and  $z$ , respectively, are .



B. 5, 2, 9

C. 3, 5, 5

D. 2, 6, 6

**Answer: A**



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22. The oxidation number of sulphur in  $Na_2S_4O_6$  is .

A. 1.5

B. 2.5

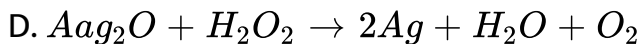
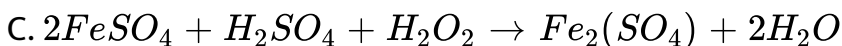
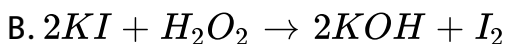
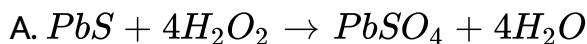
C. 3.0

D. 2.0

**Answer: B**

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23. The reaction in which hydrogen peroxide acts as a reducing agent is .



Answer: D

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24.  $HNO_3$  acts as .

- A. acid
- B. oxidizing agent
- C. reducing agent
- D. both (1) and (2)

**Answer: D**

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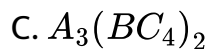
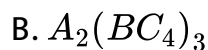
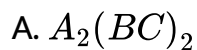
**25.** When  $KMnO_4$  is reduced with oxalic acid in acidic solution, the oxidation number of  $Mn$  changes from

- A. From 7 to 2
- B. From 6 to 2
- C. From 5 to 2
- D. From 7 to 4

**Answer: A**

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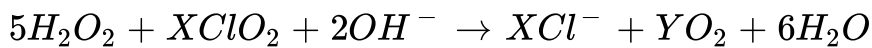
26. The oxidation state of  $A$ ,  $B$ , and  $C$  in a compound are  $+2$ ,  $+5$ , and  $-2$ , respectively. The compound is



**Answer: C**

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27. The reaction



is balanced if

A.  $x = 5, y = 2$

B.  $x = 2, y = 5$

C.  $x = 4, y = 10$

D.  $x = 5, y = 5$

**Answer: B**



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28. In  $H_2O_2$ , the oxidation state of oxygen is .

A.  $-2$



B.  $-1$

C.  $0$

D.  $4$

**Answer: B**



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**29.** The oxidation state of  $Fe$  in  $Fe(CO)_5$  is

A. zero

B.  $5$

C.  $-5$

D.  $+3$

**Answer: B**



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