



CHEMISTRY

BOOKS - CBSE COMPLEMENTARY MATERIAL CHEMISTRY (HINGLISH)

The d- AND f-BLOCK ELEMENTS

Multiple Choice Questions

1. One of the characteristic of transition metals to form the complex ion is

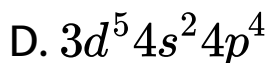
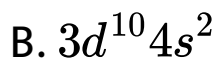
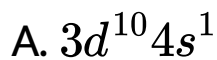
- A. Having unpaired electron in d-subshell
- B. Having paired electrons in d-subshells
- C. Providing empty d-orbitals
- D. Having small charge/size ratio

Answer: C



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2. The correct electronic configuration of copper atom is:



Answer: b



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3. In acidic medium, equivalent weight of

$K_2Cr_2O_7$ (molecular weight = M) is

A. molecule weight

B. $\frac{1}{2}$ molecular weight

C. $\frac{1}{6}$ molecular weight

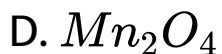
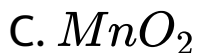
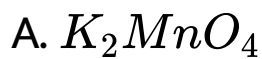
D. $\frac{1}{5}$ molecular weight

Answer: c



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4. Manganese exhibits maximum oxidation state in:



Answer: b



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5. The equivalent weight of $KMnO_4$ (formula weight M) when it is used as an oxidant in neutral medium is

A. M

B. $M / 2$

C. $M / 3$

D. $M / 5$

Answer: d



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6. Number of moles of $K_2Cr_2O_7$ can be reduced by 1 mole of Sn^{2+} ions is:

A. $1/3$

B. 3

C. $1/6$

D. 6

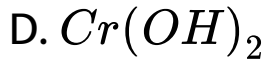
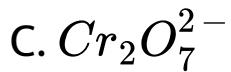
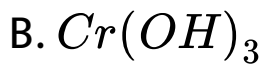
Answer: A



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7. CrO_3 dissolves in aqueous NaOH to give

A. CrO_4^{2-}



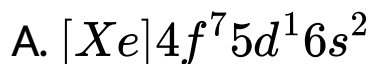
Answer: a

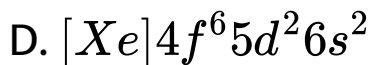
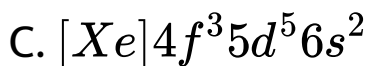
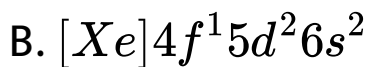


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8. The electronic configuration of gadolinium

(At. No 64) is:





Answer: b



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9. Electronic configuration of a transition element X in +3 oxidation states is $[Ar]3d^5$.

What is its atomic number?

A. 25

B. 26

C. 27

D. 24

Answer: b

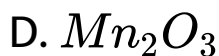
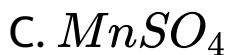
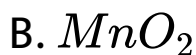
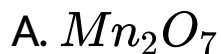


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10. On addition of small amount of $KMnO_4$ to concentrated H_2SO_4 , a green oily compound

is obtained which is highly explosive in nature.

Identify the compound from the following.



Answer: a



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11. Which of the following oxidation state is common for all lanthanoids?

A. + 2

B. + 3

C. + 4

D. + 5

Answer: b



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12. When $KMnO_4$ solution is added to oxalic acid solution, the decolourisation is slow in the beginning but becomes instantaneous after some time because

A. CO_2 is formed as the products

B. Reaction is exothermic

C. MnO_4^- catalysis the reaction

D. Mn^{2+} acts as autocatalyst

Answer: d



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13. $KMnO_4$ acts as an oxidising agent in acidic medium. The number of moles of $KMnO_4$ that will be needed to react with one mole of sulphide ions in acidic solution is

A. $\frac{2}{5}$

B. $\frac{3}{5}$

C. $\frac{4}{5}$

D. $\frac{1}{5}$

Answer: a



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14. Which of the following is amphoteric oxide?

Mn_2O_7 , CrO_3 , Cr_2O_3 , CrO , V_2O_5 , V_2O_4

A. V_2O_5 , Cr_2O_3

B. $Mn_2O_7CrO_3$

C. CrO , V_2O_3

D. $V_2O_5V_2O_4$

Answer: a



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15. What is the Spin only magnetic moment value of Cr^{3+} ion in high spin state of octahedral complex

A. 2.87 BM

B. 3.87 BM

C. 5.47 BM

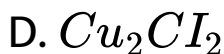
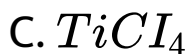
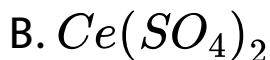
D. 3.57 BM

Answer: b



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16. Generally transition elements and their salts are coloured due to the presence of unpaired electrons in metal ions. Which of the following compounds are coloured?



Answer: ab



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17. Transition elements show magnetic moment due to spin and orbital motion of electrons. Which of the following metallic ions have almost same spin only magnetic moment?



Answer: ad



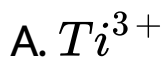
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18. Suggest the name of actinoids which show oxidation states upto + 7?



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19. Which of the following ions show higher spin only magnetic moment value?



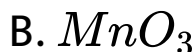


Answer: bc



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20. Which of the following will not act as oxidising agents?





Answer: C



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21. Match the components/elements given in column I with uses given in column II.

Column 1

- (A) Lanthanoid oxide
- (B) Lanthanoid
- (C) Misch metal
- (D) Magnesium based alloy
- (E) Mixed oxides of lanthanoids
are employed

Column 2

- (1) Production of iron alloy
- (2) Television screen
- (3) Petroleum cracking
- (4) Lanthanoid metal + iron
- (5) bullets
- (6) In X-ray screen

A. A-4 , B-3, C-1, D-2

B. A-3, B-4, C-1, D-2

C. A-4, B-1, C-2, D-3

D. a-2, B-1 ,C-3 , d-4

Answer:



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22. Match the solutions given in Column 1 and the colours given in column II.

Column 1

- (i) $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$
- (ii) $\text{NiCl}_2 \cdot 4\text{H}_2\text{O}$
- (iii) $\text{MnCl}_2 \cdot 4\text{H}_2\text{O}$
- (iv) $\text{COCl}_2 \cdot 6\text{H}_2\text{O}$
- (v) Cu_2Cl_2

Column 2

- (a) green
- (b) light pink
- (c) Blue
- (d) Pale green
- (e) pink
- (f) colourless



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23. Assertion: Cu^{2+} iodide is not known.

Reason: Cu^{2+} oxidises I^- to iodine.

A. Both assertion and reason are True, and reason is the correct explanation of the assertion.

B. Both assertion and reason are True, but reason is not the correct explanation of the assertion.

C. Assertion is not True, but reason is True.

D. Both assertion and reason are False.

Answer: a



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24. Give reason for the following statements

Separation of Zr and Hf is difficult.



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25. The magnetic moment of a transition metal ion is given as 4.90 BM. Using spin only formula calculate the number of unpaired electrons present in the ion is

3

4

5

6

5.5

2



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Very Short Answer Type Question

1. Explain reason for the following $CuSO_4 \cdot 5H_2O$ is blue while $CuSO_4$ is colourless ?



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2. Which element among 3d series exhibit highest oxidation state ?



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3. In 3d series (Sc to Zn), Zinc shows the lowest enthalpy of atomization. Why ?



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4. Which element among 3d series exhibit only one oxidation state ?



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5. Why is the 3rd ionization energy of Mn ($Z = 25$) is unexpectedly high ?



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6. Define alloy.



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7. Transition metals show zero oxidation state with ligands like CO. Explain.



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8. Why can't HCl acid be used to acidify $KMnO_4$ solution ?



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9. Name one ore of Mn and Cr.



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10. Why Mn^{2+} compounds are more stable than Fe^{2+} compounds towards oxidation to their + 3 state ?



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11. Give reason for the following

Transition metal (elements) show variable oxidation states ?



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12. Write any uses of pyrophoric alloy.



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13. Which is more basic $La(OH)_3$ or $Lu(OH)_3$

? Why



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14. Find out number of $Cr - O -$ bond /
bonds in CrO_4^{2-} ion.



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15. What is the effect of increasing pH on the colour of $K_2Cr_2O_7$ solution ?



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16. Why is Ce^{4+} in aqueous solution a good oxidizing agent ?



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17. Why do Zr and Hf exhibit similar properties ?



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18. Write short notes on lanthanoid contraction ?



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19. Why is Cu ($Z = 29$) considered a transition metal ?



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20. Arrange the given in increasing order of acidic character :



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21. Why $KMnO_4$ or MnO_4^- ion is coloured ?



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Short Answer Type Question

1. Give reason for the following

Chromium is typical hard metal while mercury is a liquid.



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2. Why $KMnO_4$ is used in cleaning surgical instruments in hospitals ?



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3. Most of the transition metals do not displace hydrogen from dilute acids, why ?



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4. Give reason for the following

Cu^+ is not stable in aqueous solution ?



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5. Give reason for the following

The highest oxidation state of a metal exhibited in its oxide or fluoride only



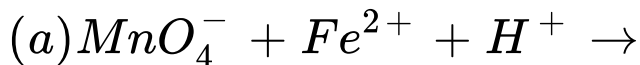
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6. Write electronic configuration of Cu^{+2} and Co^{+2}



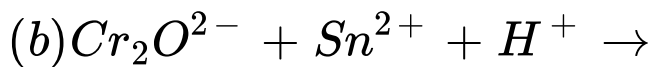
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7. Balance the following equations



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8. Balance the following equations



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9. Give reason for the following

Electronic configuration of lanthanoids are not known with certainty ?



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10. Zn, Cd, Hg are soft and have low melting point. Explain



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11. What is the effect of pH on the solution of $K_2Cr_2O_4$ solution ?



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12. In the following given elements choose which of them is/are transition element and why ?

Zn, Cd, Ag, Fe, Ni



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13. Explain interstitial compounds with a proper example.



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14. Why are Zn, Cd, Hg volatile metals ? Explain.



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15. Why is first ionization energy of 5d elements higher than those of 3d and 4d elements ?



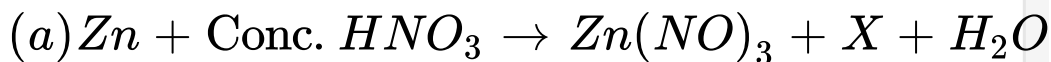
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16. Explain 'Misch metal' and write its use.



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17. The following reactions of HNO_3 with Zn are given :

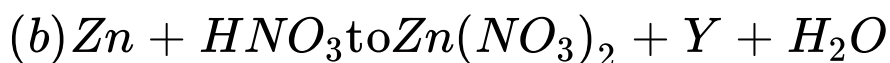


Identify X



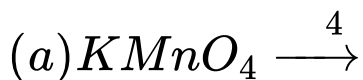
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18. The following reactions of HNO_3 with Zn are given :



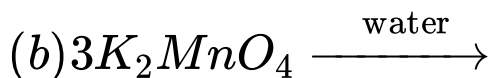
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19. Complete the equations :



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20. Complete the equations :



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21. Out of Fe and Cu, which one would exhibit higher melting point ?



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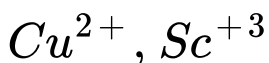
22. Sc, the first member of first transition series does not exhibit variable oxidation state. Why ?



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Short Answer II Type Question

1. (a) Deduce the number of 3d electrons in the following ions :



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2. (b) Why do transition metals form alloy ?



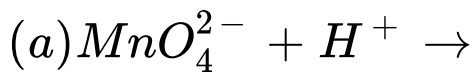
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3. (c) Explain why Zn^{+2} salts are colorless or white ?



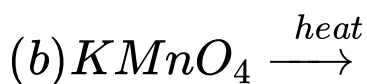
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4. Complete and balance the following equations :



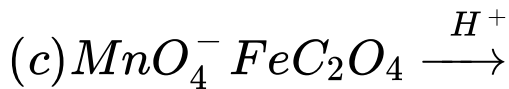
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5. Complete and balance the following equations :



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6. Complete and balance the following equations :



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7. Describe the oxidizing action of with the following. $\text{K}_2\text{Cr}_2\text{O}_7$ Write ionic equations for its reaction (acidic medium) with :



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8. Describe the oxidizing action of with the following. $K_2Cr_2O_7$ Write ionic equations for its reaction (acidic medium) with :

Iron (II)



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9. Describe the oxidizing action of with the following. $K_2Cr_2O_7$ Write ionic equations for its reaction (acidic medium) with :

H_2S



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10. Write any four differences between lanthanoids and actinoids.

Lanthanoids

Actinoids



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11. give reason for the following statement

(a) separation of lanthanoid elements difficult ?



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12. (b) Transition metal exhibit higher enthalpies of atomization. Explain why ?



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13. (c) Why do the transition metal have high enthalpy of hydration ?



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14. (a) By using Hund's rule derive the electronic configuration of Ce^{+3} ions and also calculate its magnitude moment.



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15. (b) Is lanthanum a f-block element ?



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16. Account for the following :

(a) Silver chloride dissolves in excess of NH_3



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17. Account for the following :

(b) Cuprous chloride is diamagnetic while cupric chloride is paramagnetic.



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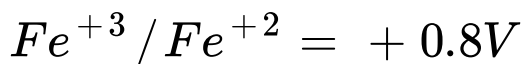
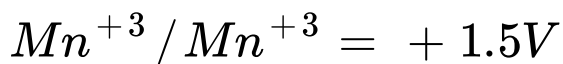
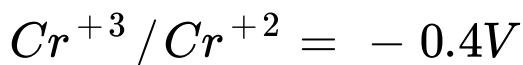
18. Account for the following :

In CrO_4^{2-} ion , all the Cr-O bond length are equal



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19. The values in respect of electrodes of Cr, Mn and iron are :



Compare the feasibilities of further oxidation of these ions.



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20. Write any three properties of interstitial compounds.



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21. Account for the following :

(a) All Scandium salts are white.

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22. Account for the following :

(b) The 1st ionization energy of the 5d series are higher than 3d and 4d, transition elements in respective groups.

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23. Account for the following :

(c) Ce^{+3} can be easily oxidized to Ce^{+4}

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24. A green chromium compound

(A) on fusion with alkali gives a yellow



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25. A green chromium compound

(B) which on acidification gives a orange coloured compound



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26. A green chromium compound

(C). Identify A, B, C. Write equations for reactions.



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27. When an oxide of Mn

(A) is fused with KOH in the presence of an oxidizing agent and dissolved in water, it gives a dark solution of compound



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28. When an oxide of Mn

(B). Compound (B) disproportionate in neutral or acidic solution to give purple compound



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29. When an oxide of Mn

(C). Identify A, B, C.



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Long Answer Type Question

1. A violet compound of manganese

(A) decomposes on heating to liberate oxygen and compounds (B) and (C) of manganese are formed. Compound (C) reacts with KOH in the presence of KNO_3 to give compound



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2. A violet compound of manganese

(B). On heating compound (C) with conc. H_2SO_4 and NaCl, Cl_2 gas is liberated and

compound (D) of manganese is formed.

Identify A, B, C, D alongwith reactions involved.



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3. Explain disproportionation of an oxidation state ? Give one example.



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4. (b) Draw the structures of



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5. (c) What is the effect of lanthanoid contraction beyond lanthanoid ?

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