CHEMISTRY

BOOKS - SURA CHEMISTRY (TAMIL ENGLISH)

TRANSITION AND INNER TRANSITION ELEMENTS

Choose The Correct Answer

1. Sc (Z=21) is a transition element but Zinc (Z=30) is not because

A. both SC^{3+} and Zn^{2+} ions are colourles and form white compounds.

B. in case of Sc ed orbital are partially filled but in Zn these are completely filled

C. last electron as assumed to be added to 4s level in case of zinc

D. both Sc and Zn do not exhibit variable oxidation states

Answer: B

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2. Which of the following d block element has half filled penultimate d sub shell as well as half filled valence sub shell ?

A. Cr

B. Pd

C. Pt

D. none of these

Answer: A

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3. Among the transition metals of 3d series the one that has highest negative $\left(\frac{M^{2+}}{M}\right)$ standard electrode potential is

A. Ti

B. Cu

C. Mn

D. Zn

Answer: A

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4. Which one of the following ions has the same number of unpaired electrons as present in V^{3+} ?

A. Ti^{3+}

B. Fe^{3+}

C. Ni^{2+}

D. Cr^{3+}

Answer: C

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5. The magnetic moment of Mn^{2+} ion is

A. $5.92BM$

B. $2.80BM$

C. $8.95BM$

D. $3.90BM$

Answer: A

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6. Which of the following compound is colourless ?

A. Fe^{3+}

B. Ti^{4+}

C. Co^{2+}

D. Ni^{2+}

Answer: B

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7. The catalytic behaviour of transition metals and their compounds is ascribed mainly due to

A. their magnetic behaviour

B. their unfilled d orbitals

C. their ability to adopt variable oxidation states

D. their chemical reactivity

Answer: C

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8. the correct order of increasing oxidizing power in the series .

A. $VO_2^+ < Cr_2O_7^{2-} < MnO_4^-$

B. $Cr_2O_7^{2-} < VO_2 + < MnO_4^-$

C. $Cr_2O_7^{2-} < MnO_4^- < VO_2^+$

D. $MnO_4^- < Cr_2O_7^{2-} < VO_2^+$

Answer: A

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9. The alloy of coper that contain Zinc is

A. Monel metal

B. Bronze

C. bell metal

D. brass

Answer: D

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10. Which of the following does not gives oxygen on heating

A. $K_2Cr_2O_7$

B. $(NH_4)_2Cr_2O_7$

C. $KCiO_3$

D. $Zn(CiO_3)_2$

Answer: B

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11. In acid medium potassium pernanganate oxidizes oxalic acid to

A. oxalate

B. carbon dioxide

C. acetate

D. acetic acid

Answer: B

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12. Which of the following statements is not true ?

A. on passing H_2 S through acidified $K_2Cr_2O_7$ solution a milky colour is observed .

B. $Na_2Cr_2O_7$ is perferred over $K_2Cr_2O_7$ in volumetric analysis

C. $K_2Cr_2O_7$ solution in acidic medium is orange in colour

D. $K_2Cr_2O_7$ solution becomes yellow on increasing the P^H beyond 7

Answer: B

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13. Permanganate ion changes to _____ in acidic medium

A. MnO_4^{2-}

B. Mn^{2+}

C. Mn^{3+}

D. MnO_2

Answer: B

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14. A white crystalline salt (A) react with dilute HCI to liberate a suffocating gas (B) and turns potassium dichromate acidifiel with dil H_2SO_4 to a green coloured solution (c) A, B and C are respectively

A. $Na_2SO_3, SO_2, Cr_2(SO_4)_3$

B. $Na_2S_2O_3, SO_2, Cr_2(SO_4)_3$

C. $Na_2S, SO_2, Cr_2(SO_4)_3$

D. $Na_2SO_4, SO_2, Cr_2(SO_4)_3$

Answer: A

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15. MnO_4^- react with Br^- in alkaline P^H to give

A. $BrO_3^- MnO_2$

B. $Br_2MnO_4^{2-}$

C. Br_2MnO_2

D. $BrO_4^- MnO_4^{2-}$

Answer: A

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16. How many moles of I_2 are liberated when 1 mole of potassium dichromate react with potassium iodide?

A. 1

B. 2

C. 3

D. 4

Answer: C

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17. the number of moles of acidified $KMnO_4$ required to oxidize 1 mole of ferrous oxalate (FeC_2O_4) is

A. 5

B. 3

C. 0.6

D. 1.5

Answer: C

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18. When a brown compound of Mn (A) is treated with HCI it gives gas (B). The gas (B) taken in excess reacts with NH_3 to give an

explosive compound (C). The compound A, B and C are

A. MnO_2, CI_2, NCI_3

B. MnO, CI_2, NH_4CI

C. Mn_3O_4, CI_2, NCI_3

D. MnO_3, CI_2, NCI_2

Answer: A

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19. Which one of the following statements related to lanthanons is incorrect ?

A. Europium show + 2 oxidation state.

B. The basicity decreases as the ionic radius decreases from Pr to Lu .

C. All the lanthanons are much more reactive than aluminium.

D. Ce^{4+} solution are widely used as oxidising agents in volumetric analysis .

Answer: C

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20. which of the following lanthanoid ions is diamagnetic ?

A. Eu^{2+}

B. Yb^{2+}

C. Ce^{2+}

D. Sm^{2+}

Answer: B

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21. Which of the following oxidation states is most common among the larthanoids ?

A. 4

B. 2

C. 5

D. 3

Answer: D

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22. Assertion : Ce^{4+} is used as an oxidizing agent in volumetric analysis .

Reson : Ce^{4+} has the tendency of attaining + 3 oxidation state.

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

B. Both assertion and reason true reason is not the correct explanation of assertion

C. Assertion is true but reason is false .

D. Both assertion and reason are false.

Answer: A

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23. The most common oxidation state of actinoids is `

A. $+2$

B. $+3$

C. $+4$

D. $+6$

Answer: C

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24. The actinoid elements which show the highest oxidation state of +7 are

A. Np, Pu, An

B. U, Fm, Th

C. U, Th, Md

D. Es, No, Lr

Answer: A

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25. Which one of the following is not correct

A. $La(OH)_2$ is less basic than $(OH)_2$

B. In lanthaniod series ionic radius of ln^{3+} ions decreases

C. La is actually element of transition metal series rather than lanthanide series

D. Atomic radii of Zr and Hf are same because of lanthanide contraction .

Answer: A

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Answer The Following Question

1. What are transition metals Give four examples.

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2. Explain the oxidation states of 4d series elements.

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3. What are inner transition elements ?

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4. Justify the position of lanthanides and actinides in the periodic table .

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5. What are actinide ? Give three example .

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6. Why Gd^{3+} is colourless ?

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7. Explain why compounds of Cu^{2+} are coloured but those of Zn^{2+} are colourless.

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8. (a) Describe the preparation of potassium dichromate.

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9. What is lanthanide contraction and what are the effects of lanthanide contraction ?

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10. Complete the following

$a.\ MnO_4^{2+} + H^+ \rightarrow\ ?$

$b.\ C_6H_5CH_3 \xrightarrow[KmnO_4]{\text{acidified}}$

$c.\ MnO_{40^-} + Fe^{2+} \rightarrow\ ?$

$d.\ KMnO_4 \xrightarrow[\text{Red hot}]{\Delta}$

$e.\ Cr_2O_7^{2-} + I^- H^+ \rightarrow\ ?$

$F.\ Na_2Cr_2O^+ KCI \rightarrow$

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11. What are interstitial compounds ?

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12. Calculate the number of unpaired electrons in Ti^{3+}, Mn^{2+} and calculate the spin only

magnetic moment.

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13. Write the electronic configuration of Ce^{4+} and Co^{2+}

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14. Explain briefly how +2 states becomes more and more stable in the first half of the first

row transition elements with increasing atomic number .

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15. Which is more stables ? Fe^{3+} or Fe^{2+} - explain .

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16. Explain the variation in $E^{0}_{m^{2+}}/M$ 3d series .

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17. Compare Lantanides and actinides.

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18. Explain why Cr^{2+} strongly reducing while Mn^{3+} is strongly oxidizing .

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19. Compare the ionization enthalpies of first series of the transition elements.

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20. Actinod contraction is greater from element to element than the lanthanoid contraction, why ?

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21. Comparing $La(OH)_3$ and $Lu(OH)_3$, which is more basic and explain why?

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22. Why Europium (ii) is more stable than Cerium (ii) ?

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23. Why do zirconium and Hafnium exhibit similar properties?

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24. Which is stronger reducing agent Cr^{2+} or Fe^{2+} ?

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25. The $E^0_{M^{2+}/M}$ value for cpper is positive Suggest a possible reason for this .

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26. Predic which of the following will coloured in aqueous solution $Ti^{2+}, V^{3+} Sc^{4+} Cu^{+}, Sc^{3+}, Fe^{3+}, Ni^{2+}$ and Co^{3+}

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27. Desrible the variable oxidation state of 3d series elements .

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28. Which metal in the 3d series exhibits +1 oxidation state most frequently and why ?

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29. Why first ionization enthalpy of chromium is lower than that of zinc.

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30. Transition metals show high melting points why ?

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Evaluate Yourself

1. Compare the stability of Ni^{4+} and pt^{4+} from their ionisation enthalpy value .

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2. Why iron is more stable in +3 oxidation state than in + 2 and the reverse is trure for Manganese ?

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Choose The Correct Answer

1. The catalytic activityy of transition metal is due to

A. the formation of a variety of oxidation state

B. the formation of intermediate products

C. the capability of forming interstitial compounds

D. all the above

Answer: D

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2. Most of the transition metal ions are coloured because of the

A. presence of unpaired electrons

B. energy gap between two energy levels is very small

C. both (a) and (b)

D. neither (a) nor (b)

Answer: C

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3. Which of the following is wrong with respect to lanthanide contraction ?

A. Decrease in ionic radii

B. Increase in tendency to act as reducing agents

C. Decreases in basic character

D. Resembles seconds and thir row of d-block elements

Answer: D

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4. Hybridisation of chromium ions and dichromate ions is

A. Sp^2

B. Sp^3d

C. both (a) and (b)

D. none of these

Answer: B

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5. the highest possible oxidation state shown byy osmium in its compound is

A. $+4$

B. $+6$

C. $+8$

D. $+10$

Answer: C

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6. Identify the paramgnetic species

A. Cu^+

B. Cr^+

C. MnO_4^-

D. Zn^{2+}

Answer: B

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7. The trend in ionisation enthalpy of a transition element is not regular because ,

A. removal of one electron alters te relative energies of 4s and 3d orbitals

B. due to different electronic configuration (stability)

C. Poor screening of 3p- orbital

D. due to decrease in effective nuclear charge

Answer: A

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8. Oxygen stabilies higher oxidation state because

A. it is electronegative

B. of its tendency for form multiple bond

C. of large size

D. of small size

Answer: B

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9. Which one of the following exhibits highest oxidation state ?

A. Ni

B. Mn

C. V

D. Zr

Answer: B

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10. Ce (Z=588) and Yb (Z= 70) exhibits stable +4 and +2 oxidation states respectively . This is because

A. Ce^{4+} and Yb^{2+} acquire f^7 configuration

B. Ce^{4+} and Yb^{2+} acquire f^0 configuration

C. Ce^{4+} and Yb^{2+} acquire f^7 and f^{14} configuration

D. Ce^{4+} and Yb^{2+} acquire f^0 and f^{14} configuration

Answer: D

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11. Which o of the following is coloured due to charge transfer ?

A. MnO_4^-

B. Cro_4^{2-}

C. Cu_2O

D. All of these

Answer: D

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12. The lanthanide contraction is responsible for the fact that

A. Zr and Zn have the same oxidation state

B. Zr and Hf have almost the same radius

C. Zr and Nb have similar oxidation state

D. Zr and Y have similar radius

Answer: B

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13. What are the species X and Y in the following

$$X + H_2O \rightarrow H_2Cr_2O_7 \xrightarrow{OH^-}$$

A. CrO_3, CrO_4^{2-}

B. CrO_3, Cr_2O_3

C. $CrO_4^{2-}, Cr_2O_7^{2-}$

D. $H_2CrO_4, H_2Cr_2O_7$

Answer: A

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14. Which of the following is not coloured ?

A. Mn^{2+}

B. Zn^{2+}

C. Cr^{3+}

D. Cu^{2+}

Answer: B

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15. The correct statement is

A. cu_2CI_2 and Ag_2S are coloured

B. Upon strong heating paramagnetic gases are evolved by Na NO_3 and

$AgNO_3$

C. Green vitriola and blue vitriol are isomorphus

D. $KMnO_4$ and $K_2Cr_2O_7$ are coloured due to

Answer: B

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16. Which of the following statement is correct for 3d- transition element ?

A. All metal except Zn and Sc from MO oxide

B. All metals except Sc forms MO Oxide

C. All metal except Zn form MO Oxide

D. All metals except Mn form MO Oxide .

Answer: B

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17. The colour Of $k_2Cr_2O_7$ and Fe^{2+} ions are respectively due to

A. Crystal defects and charg transfer spectra

B. d-d transition and charge transfer spectra

C. Charge transfer spectra and crystal defects

D. Charge transfer spectra and d-d transition

Answer: D

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18. CrO_3 is coloured due to

A. Low I.E.

B. Crystal defects

C. Charge transfer spectra

D. Unpaired electons

Answer: C

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19. The reaction of aquesous $KMnO_4$ with H_2O_2 in acidic condition gives

A. Mn^{4+} and MnO_2

B. Mn^{4+} and O_2

C. Mn^{2+} and O_2

D. Mn^{2+} and O_3

Answer: C

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20. Identify the correct reason for lanthanide contraction

A. Decreasing nuclear charge

B. Decreasing secreening effect

C. Increasing nuclear charge

D. Negligible screening effect

Answer: D

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21. Which of the following ions will exhibit colour in aqueous solutions?

A. $SC^{3+}(Z=21)$

B. $Ti^{3+}(Z=22)$

C. $La^{3+}(Z=57)$

D. $Lu^{3+}(Z=71)$

Answer: B

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Fill In The Blanks

1. Sometimes vessels made of copper or bronze show traces of green colur. This is due to the formation of _____

A. $Cu(OH)_2$

B. $CuCO_3$

C. $Cu(OH)_2CuCO_3$

D. $Cu(OH)_2CuSO_4$

Answer: C

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2. On oxidation with $KMnO_4$ in acidic medium SO_2 is oxidised to _____

A. SO_2

B. H_2

C. SO_3^{2-}

D. H_2S

Answer: B

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3. Electrode potential of M^{2+}/M for Ni is abnormal because of _____

A. high $IE_1 + E_2$

B. High hydration energy

C. ΔH atomisation

D. Electronic configuration of Ni^{2+}

Answer: D

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4. Coinage metals are _____

A. normal metals

B. transition metals

C. active metals

D. alkali metals

Answer: B

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5. Acifified solution of chromic acid on treatment with H_2O_2 give blue colour which is due to _____

A. $CrO_3 + H_2O + O_2$

B. $H_2Cr_2O_7 + H_2O + CO_2$

C. $Cr_2O_3 + H_2O + O2$

D. $CrO_5 + H_2O$

Answer: D

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6. $FeSO_4$ on heating gives _____

A. SO_2 and O_2

B. SO_2 and SO_3

C. SO_2

D. SO_3

Answer: B

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7. Value of magnetic moment of a divalent metal ion is 5.92 BM. Toal number of electron in its atom would be _____

A. 24

B. 25

C. 26

D. 27

Answer: B

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8. In black and white photography theh developed film is fixed by washing with _____

A. Hype solution

B. AgBr solution

C. Na_2S_4O solution

D. FeC_2O_4 solution

Answer: A

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9. Except _____ all element from Rf to Cn are synthetically preared and have very low half life periods .

A. cadmium

B. actinium

C. ytrium

D. cadmium

Answer: B

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10. The electronic configuration of Sc is _____

A. $[Ar]3d^14s^2$

B. $[Ar]3d^2 4s^1$

C. $[Ar]3d^5 4s^1$

D. $[Ar]3d^3 4s^1$

Answer: A

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11. The general electronic configuration of d-block element is _____

A. [Noble gas] n - $1d^{1-10} ns^{1-2}$

B. [Noble gas] $n-1d^{10}np^{1-6}$

C. [Noble gas] $n-2d^{10}ns^{1-2}$

D. [Nolbe gas] n-2 $d^{10}ns^{1-6}$

Answer: A

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12. _____ has the highest electrics conductivity at roomm temperature .

A. Chromium

B. Copper

C. Silver

D. Cadmium

Answer: C

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13. Of these statement which statement incorrect In most of the transition element are _____

A. hexagonal close packed

B. cubic close packed

C. face centered cubic

D. symmetrical distribution

Answer: D

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14. If the standard electrode potential (E°) of a metal is _____ and _____ the metal is a powerful reducting agent .

A. large negative

B. large positive

C. small negative

D. small postive

Answer: A

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15. In chromyl chloride test A _____ precipitale fo lead chromate is obtained

A. White

B. red

C. yellow

D. blue

Answer: C

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16. Equivalent weight of $KMnO_4$ I acidic medium is _____ .

A. 3.16

B. 31.6

C. 158

D. 52.67

Answer: B

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17. The general electronic configuration of 4f - series of elements can be writeen as _____

A. $[Xe]4s^{2-14}5d^{0-4}6s^2$

B. $[Xe]4f^{2-14}5d^{0-4}6s^1$

C. $[Xe]4f^{1-14}5d^{0}6s^1$

D. $[Xe]4f^{2-14}5d^{0-4}6s^1$

Answer: A

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18. The common oxidation state of lanthanoids is _____

A. $+3$

B. -3

C. 0

D. $+2$

Answer: A

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19. The element corresponding to the electronic configuration $[Rn]5f^36d^17s^2$ is

_____

A. Neptunium

B. Plutonium

C. Uranium

D. Americium

Answer: C

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20. _____ is known as Bayer's reagent

A. Hot dilute alkaline $KMnO_4$

B. Cold dilute alkaline $KMnO_4$

C. Hot conc. Acidic $KMnO_4$

D. Cold conc. Acidic $KMnO_4$

Answer: B

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21. A mixture of $TiCI_4$ and trialkyl aluminium is _____

A. hydroformylation of obfine

B. Zeigler - Natta Catalyst

C. Interstitial compounds

D. ferromagnetic

Answer: B

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Assertion Reason

1. Assertion : FeO is basic in charcter

Reason : Oxides of transition metals are basic

when metal is in lower oxidation state.

A. Both assertion and reason true and reason is the correct explanation of theh assertion .

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

C. Assertion is true reason is false .

D. Both assertion and reason are false.

Answer: A

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2. Assertion : Equivalent mass of $K_2Cr_2O_7$ when it acts as an oxidising agent in acidic medium is $M/6$

Reason : During reduction oxidation number of chromium change from +6 to + 3

A. Both assertion and reason are true and reason is the correct explanation of theh assertion

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

C. Assertion is true but reason is false

D. Both assertion and reason are false.

Answer: A

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3. Assertin : All Cr- O bond length in $K_2Cr_2O_7$ are equal

Resson : Both the Cr are present in dsp^2 hybrid state.

A. Both assertin 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 true but reason false.

D. Both assertion and reason are false.

Answer: B

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4. Assertion : $FeCI_3$ reacts with $KCNS$ to give blood red colour .

Reason : $FeCI_3$ reacts with $KCNS$ to form potassium ferro-ferricyanide .

A. both assertion and reason are true reason is the correct explanation of the assertion .

B. both assertin and reason are true but reason is not correct explanation of the assertion

C. Assertion is true but reason is false

D. Both assertion and reason are false.

Answer: C

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5. Assertion : $La(OH)_3$ is less basic than Lu $(OH)_3$

Reason : Basic character of hydroxides of lanthanides increases on moving from La^{3+} to Lu^{3+}

A. both assertion and reason are true reason is the correct explanation of the assertion .

B. both assertin and reason are true but reason is not correct explanation of the assertion

C. Assertion is true but reason is false

D. Both assertion and reason are false.

Answer: D

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6. Assertion : Mn shows exceptional melting point in 3d series.

Reason : Its outer configuration is $4s^2 3d^5$

A. both assertion and reason are true reason is the correct explanation of the assertion .

B. both assertin and reason are true but reason is not correct explanation of the assertion

C. Assertion is true but reason is false

D. Both assertion and reason are false.

Answer: A

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7. Assertion : $Cr_2O_7^{2-}$ becomes equilibrium with CrO_4^{2-} at pH gt 5

Reason : $Cr_2O_7^{2-}$ is tetrahedral having Cr-O - Cr angle $109^\circ 28$

A. both assertion and reason are true reason is the correct explanation of the assertion .

B. both assertin and reason are true but reason is not correct explanation of the assertion

C. Assertion is true but reason is false

D. Both assertion and reason are false.

Answer: D

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8. Assertin : Cu^{2+} is the only ion $\left(M^{2+}\right)$ which has positive E° red $\left(M^{2+}/M\right)$ in 3d series

Reason : Cu has lower hydration enthalpy as comparison to its ionisation enthalpy and ΔH atm.

A. both assertion and reason are true reason is the correct explanation of the assertion .

B. both assertin and reason are true but reason is not correct explanation of the assertion

C. Assertion is true but reason is false

D. Both assertion and reason are false.

Answer: A

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9. Assertion : 3d transition metal ions in paramagnetic solids often have a magnetic diple moments corresponding to theh electric spin contribution .

Reason : The magnetic moment of the ion is $\mu = g\sqrt{s(S+1)\mu_\beta}$

A. both assertion and reason are true reason is the correct explanation of the assertion .

B. both assertin and reason are true but reason is not correct explanation of the assertion

C. Assertion is true but reason is false

D. Both assertion and reason are false.

Answer: A

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10. Assertion : Potassium -di - chromate is a powerful oxidising agent acidic medium

Reason : The oxidation state of chromium changes from $Cr^{6}+$ to Cr^{3+}

A. both assertion and reason are true reason is the correct explanation of the assertion .

B. both assertin and reason are true but reason is not correct explanation of the assertion

C. Assertion is true but reason is false

D. Both assertion and reason are false.

Answer: A

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11. Statement 1 : The atomic and ionic radii of d- block elements are smaller than p- block and larger than s- block elements .

Statement II : The colour of transition metal

ions is due to the presence of the paired electrons.

A. both assertion and reason are true reason is the correct explanation of the assertion .

B. both assertin and reason are true but reason is not correct explanation of the assertion

C. Assertion is true but reason is false

D. Both assertion and reason are false.

Answer: D

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12. Statement I : The basicity of lanthanides decreases .

Statement II : The regular decrease in ionic radii is lanthanide contraction.

A. both assertion and reason are true reason is the correct explanation of the assertion .

B. both assertin and reason are true but reason is not correct explanation of the assertion

C. Assertion is true but reason is false

D. Both assertion and reason are false.

Answer: B

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Correct The Statement S

1. Which of the following statements is correct when SO_2 is passed through acidified $K_2Cr_2O_7$ solution ?

A. The solution turns blue

B. the solution is decolourized

C. Green $Cr_2(SO)_4$ is formed

D. SO_2 is reduced

Answer: C

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2. I . Alloys are formed by blending a metal

II. Alloys are formed by blending a non- metal

III. Alloys have high melting points .

IV. Alloys have low meting points .

A. I and II only

B. III and IV only

C. I, II and III only

D. I, II , III and IV

Answer: C

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3. I . First transition metal scandium exhibits + 3 oxidation state .

II. Mn has 3 different oxidation states .

III. No of oxidation state decreases with the no of electrons .

IV. No of oxidation state increases as the no . of paired electrons increases.

A. I , III and IV Only

B. I, II ,IV and III only

C. I , II and III only

D. I, II , and III

Answer: A

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4. About "Potassium dichromate "

I. It is an orange red crystalline solid

II. It is melts at 671 K .

III . It is moderatley soluble in hot water .

IV It is much soluble in cold water . `

A. I, II and III only

B. II and IV only

C. I and II only

D. I , II , III and IV

Answer: C

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5. I. Transition elements do not have tendency to form corrdination compounds

II. Transition metal ions are highly charged .

III. Transition metal ions have vacant low energy orbitals

IV . Transition metal hydrides are used as powerful reducing agents .

A. I , II and III only

B. I, II and IV only

C. I, II and IV only

D. I, II , III and IV

Answer: D

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6. I . Mixture of $TiCI_4$ and trialky aluminium is used for polymerization .

II Acetic acid can be prepared fromm acetaldehyde.

III. Oxidation no of metal in metal oxides ranges from +3 to +5 .

IV. Oxidation no . Of metal in metal oxides ranges from + 2 to +7 .

A. I, II , IiI and IV

B. I ,II and IV only

C. I , III and IV

D. I, II , II and IV

Answer: B

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7. I. Transition metal oxides are formed by the reaction of transition metals with molecular oxygen at high temperature .

II. The oxidation number of metal in metal oxides ranges from +2 to + 7

III. First member of 3d series elements form ionic metal oxides.

IV Higher oxides are basic in nature.

A. I , and II only

B. I, II, and IV only

C. I, III and IV

D. I, II ,III and IV

Answer: A

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8. I. Transition metal ions are small and highly charged.

II. Transition metal ions have low energy orbitals accepts an electron pair.

III. Metallic carbides are chemically inert .

IV . Lower oxides are acidic in nature .

A. I , II and III only

B. I, II and IV only

C. I ,III and IV

D. I , II , III and IV

Answer: A

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9. I. Potassium dichromate ore is concentrated by gravity separation.

II. Concentrate sulphuric acid is used to convert sodium chromate into sodium dichromate.

III. Potassium dichromate emits toxic chromium fumes upon cooling .

IV . It is used in quantiative analysis for thhe estimation of iron compounds adn iodides .

A. I , II and IV only

B. I , Ii , and III only

C. I, II , III and IV

D. I ,II , and IV onlyy

Answer: A

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10. Choose the correct statement :

SO_3 vanadium pentoxide is used as a catalyst to oxide SO_2. In this reaction V_2O_s is _____

A. Vanadium pentoxide is Oxidised

B. Reduced to Vanadium (iV) Oxide (VO_2)

C. Vanadium (IV) Oxide is oxidised

D. Oxidised to Vanadium IV Oxide

Answer: B

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Incorrect Statement S

1. Consider the following statements and find out the incorrect statement (S)

(I) Paramagnetic substances are repelled by magnetic field .

(II) . Absence of unpaired electron gives rise to diamagnetic character.

(III) Larger the magnetic moment value greater is the paramagnetic character .

A. Only I

B. Only II

C. Both (ii) and (iii)

D. Both (I) and (iii)

Answer: A

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2. Consider the following statement and identify the incorrect one.

(i) Pu belongs to lanthanide series

(ii) ND echibits + 3 , +4 ,+2 oxidation states

(III) Actinide contraction is due to imperfect shielding of 4f electrons.

A. only iii

B. only ii

C. I and iii

D. I , ii and iii

Answer: C

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3. Which one fo the following statements related to lanthanide series is incorrect .

A. the basicity decreases as the ionic radius decreases from Pt to Lu .

B. All the lanthanoids are much more reactive than aluminium

C. Ce^{+4} solutions are widely used as oxidising agent in volumetric analysis

D. Europium show + 2 oxidation state .

Answer: B

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4. Which one fo the following statements related to lanthanide series is incorrect .

A. Potassium dichromate are is prepared from acetic acid

B. Chromate ion is oxo anions of chromium

C. Dichromate ion is oxo anions of chromium

D. potassium dichromate is a powerful oxidising agent in acidic medium.

Answer: A

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5. about " potassium permanganate "

A. Potassium permanganate is prepared from pyrolusite ore.

B. It melts at 513 k

C. It boils at $50^{\circ} C$

D. It exits in the form of dark purple crystals.

Answer: C

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6. about " potassium permanganate "

A. Cold dilute alkaline $KMnO_4$ is known as Bayer's reagent .

B. Permanganate ion has tetrahedral geometry .

C. Potassium permanaganate is a strong oxidising agent .

D. Potassium permanganate is a colourless substance

Answer: D

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7. about " potassium permanganate "

A. Oxidation state of lanthanoids is +3

B. $KMnO_4$ is a strong reducing agent .

C. $KMnO_4$ is used to treat the fungal infectins of the foot.

D. $KMnO_4$ is used in quantitative analysis

Answer: B

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8. about " potassium permanganate "

A. Equivalent weight of $KMnO_4$ in acid medium is 31.6.

B. Equivalent weight of $KMnO_4$ in boric medium is 158 .

C. Equivalent weigh of $KMnO_4$ neutral medium is 52.67

D. Lanthanoids are previously called as actinides.

Answer: D

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Very Short Answer

1. Write the electronic configuration of the element with atomic number 102.

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2. Write ionic equation for thhe reaction between $Cr_2O_7^{2-}$ ions and Fe^{2+} ions in acidic medium .

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3. What are coinage metals ?

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4. Give the general electronic configuratin of actinides ?

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5. Why lanthanoids are called f block elements

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6. Write the outer electronic configuration of Cr atom $(Z = 14)$

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7. Why is Ce^{4+} aquesous solution is a good oxidising agent ?

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8. Why do transition metals have high enthalpy of hydration ?

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9. Calculate the magnetic moment of Fe^{3+} ion (atomic no. of Fe=26)

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10. Arrange the following in increasing order of acidic character ?

CrO_3, CrO, Cr_2O_3

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11. Why transition elements form complexes ? (OR) why do d-block elements form complexes ?

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12. Why Zn^{2+} salts are white Ni^{2+} salts are coloured ?

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13. Comparing $La(OH)_3$ and $Lu(OH)_3$, which is more basic and explain why?

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14. Silver atom has completely filled d- orbitals $\left(4d^{10}\right)$ in its ground state . How can you say that it is transition element ?

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15. (i) Name the element showing maximum number of oxidation states among the first series of transition metals from Sc (z=21) to Zn (Z=30)

(ii) name the element which shows only + 3 oxidation state .

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16. What happens when $KMnO_4$ is treated with KI?

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17. Complete the following equations .

(i) $2CrO_4^{2-} + 2H^+ \rightarrow$

(ii) $KMnO_4 \rightarrow$

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18. Orange colour of $Cr_2O_7^{2-}$ ion charges to yellow in alkali and yellow solution turns out orange on adding H^+ ions. Explain why ?

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19. Define standard electrode potential.

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20. Many industrial processes use transition metal or their compounds as catalyst . Why ?

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21. What is hydroformylation of olefins ?

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22. Write the equation involving the preparation of acetic acid from acetaldehyde.

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23. What is Zeigler -Natta catalyst? In which reaction it is used? Give equation.

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24. What is an alloy ? Give an example

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25. What are the conditions for alloy formation ?

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26. How are interstitial compounds formed ?

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27. Draw the structure of permanganate ion.

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28. Write the equation for the action of heat on $KMnO_4$

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29. What is Bayer's reagent

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Short Answer

1. What is meant by lanthanoid contraction ?

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2. Write chemical equation for the reaction involved in tehh manufacture of potassium permanganate from pyrolusite ore .

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3. Discuss the general characteristic of the 3d series of the transition elements with special reference to their

(i) Atomic size

(ii) Enthalpies of atomisation

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4. Complete the following equations

(i) $Cr_2O_7^{2-} + 2OH^- \rightarrow$

(ii) $MnO_4^- + 4H^+ + 3e^- \rightarrow$

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5. What are the general properties of f-block elements (lanthanides and Actinides)

(i) Electronic configuration

(ii) Oxidation state

(iii) Radii of tripositive ions.

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6. Explain why oxidation states of transition elements increases first from Sc to Mn and then decrease ?

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7. Give reason for thhe following

(i) Mn^3 is a good oxidising agent.

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8. Account for thhe folllowing

(i) Cobalt (ii) is stable in aqueous solution but in the presence of complexing reagents it is easily oxidised.

(ii) The d^1 configuration is very unstable in ions.

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9. Give reason for the following

(i) compounds of transition element are

generally coloured .

(ii) MnO is basic while Mn_2O_7 is acidic

(iii) Calculate the magnetic moment a divalent ion in aqueous medium if its atomic number is 26.

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10. (i) name the transition metal

(a) Which is used in the manufacture of sulphuric acid.

(d) that is used in Haber's process .

(c) That have light sensitive properties and act as valuable source in photo graphic industry.

(ii) Write the equation which are involved in the oxidation of hydrogen sulphide to sulphur by $KMnO_4$ solution

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11. Give reason for the following :

(i) A transition metal exhibits highest

oxidation state in oxides fluories .

(ii) Cu^{2+} is unstable in an aqueous solution.

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12. Why are NI (II) compounds thermodynamically more state than Pt (II) compounds ?

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13. What are redox reactions ?

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14. Complete the following reactions?

(i) $Cr^2 + 2e^- \rightarrow$

(ii) $Mn^{2+} + 2e^- \rightarrow$

(iii) $Fe^{2+} + 2e^- \rightarrow$

(iv) $Co^{2+} + 2e^- \rightarrow$

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15. Write the properties of intersitial compound.

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16. Do transition elements form complex co-ordinate compounds ?

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17. What is chromyl chloride test ? Give equation

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18. What are the uses of potassium dichromate ?

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19. Explain the preparation of potassium permanganate from pyrolusite

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20. What happens to potassium permanganate on chemical oxidation ?

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21. Give the ionic reaction of electrolytic of aqueous solution of $KMnO_4$

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22. What happens to $KMnO_4$ when it reacts with (i) cold conc. $H_2SO_4 (ii)$ Hot Conc H_2SO_4

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23. Explain the oxidising property of $KMnO_4$ in neutral medium .Give the equations.

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24. Explain the oxidising property of $KMnO_4$ in alkaline medium .

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25. Explain the oxidising property of $KMnO_4$ in acid medium

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26. Why HCI and HNO_3 cannot be used for making the $KMnO_4$ medium acidic ?

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27. Give the uses of $KMnO_4$

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28. What are the causes of lanthanoids contraction ?

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29. Draw the structure of dichromate ion.

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30. Which is the last element in the series of the actinoids ? Write the electronic configuration of this element comment on the possible oxidation state of this element.

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Long Answer

1. Justify the followijng statement .

" Elements of the first transition series posses

many properties different from those of heavier transition elements "

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2. Why is there a variation of atomic and ionic size as we move from Sc to Zn ?

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3. Write a note on the ionization enthalpy of transition elements.

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4. Write a short note on the oxidation states of 3d series elements.

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5. How are materials classified based on their magnetic properties?

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6. Complete the following reaction :

$(i) Cr_2O_7^{2-} \rightarrow$

$(ii) Cr_2O_7^{2-} + 6I^- + 14H^+ \rightarrow$

$(iii) Cr_2O_7^{2-} + 3S^{2-} + 14H^+ \rightarrow$

$(iv) Cr_2O_7^{2-} + 3SO_2 + 2H^+ \rightarrow$

$(v) Cr_2O_7^{2-} + 3Sn^{2+} + 14H^+ \rightarrow$

$(vi) K_2Cr_2O_7 + 8H_2SO_4 + 3CH_3CH_2OH \rightarrow$

$(vii) 2MnO_4^- + 5(COO)^{2-} + 6H^+ \rightarrow$

$(viii) 2MnO_4^- + 10I^- + 16^+ \rightarrow$

$(ix) 2MnO_4^- + 5S^{2-} + 16H^+ \rightarrow$

$(x) 2MnO_4^- + 5NO_2 + 6H^+ \rightarrow$

$(\xi) 2KMnO_4 + 3H_2SO_4 + 5CH_3CH_2OH \rightarrow$

$(\xi i) 2MnO_4^- + 5SO_3^{2-} + 6H^+ \rightarrow$

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Value Based Question

1. A poster sugests the following life style on the part of families / individuals

(i) Which environmental values are promoted through these life style ?

(ii) Suggest one additional life style action for

promotion of green chemistry.

(iii) Give reason for te bleaching action of $KMnO_4$

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