



CHEMISTRY

BOOKS - A N EXCEL PUBLICATION

D AND F - BLOCK ELEMENTS

Question Bank

1. Silver atom has completely-filled d-orbital ($4d^{10}5s^1$) in its ground state. How can you say- it is a transition element?



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2. In the 3d series, the enthalpy of atomisation of zinc is the lowest (126kJmol^{-1}). Why?



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3. Which of the 3d series of elements exhibits the largest number of oxidation states. Why?



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4. The $E^0_{(m^{2+}/m)}$ values for copper is positive (0.34 V). What is the reason for this?



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5. How would you account for the irregular variation of ionisation enthalpies (first and second) in the first series of transition elements?



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6. Why is the highest oxidation state of a metal exhibited in its oxide or fluoride?



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7. Which is a stronger oxidising agent Cr^{2+} or Fe^{2+} Why?



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8. Calculate the 'spin only' magnetic moment of M^{2+} (aq) ion (Atomic number Z of M= 27)



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9. Explain why Cu^{+} ion is not stable in aqueous solution?



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10. Actinoid contraction is greater from element to element than lanthanoid contraction. Why?



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11. Transition elements are d- block elements

Write any four characteristic properties of transition elements.



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12. Lanthanides and actinoids are f-block elements What is the common oxidation state of lanthanoids?



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13. Lanthanoids and actinoids are f-block elements Name the lanthanoid having oxidation state of +4



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14. Lanthanoids and actinoids are f-block elements It is difficult to separate lanthanoids in the pure state. Explain.



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15. Transition metals are widely used as catalysts in industrial processes. Name any two industrial processes in which transition elements are used as catalysts.



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16. Transition metals are widely used as catalysts in industrial processes. Transition metals exhibit catalytic properties. Why?



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17. Transition metals are widely used as catalysts in industrial processes. Why do the transition elements exhibit greater similarity in properties compared to main group elements along the period as well as down the group?



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18. Atomic sizes generally increase as we come down a group of the periodic table. But in the

4th group of the periodic table, Zr and Hf have almost the same atomic sizes. Why?



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19. E° (standard electrode potential) values generally become less negative as we move across a transition series. But E° values of Ni^{2+} / Ni and Zn^{2+} / Zn are exceptions. Justify.



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20. Transition elements are d-block elements, with some exceptions. Usually they are paramagnetic. They show variable oxidation states. They and their compounds show catalytic property Zn (atomic number 30) is not a transition element, though it is a d-block element. Why?



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21. Transition elements are d-block elements, with some exceptions. Usually they are

paramagnetic. They show variable oxidation states. They and their compounds show catalytic property. Which is more paramagnetic: Fe^{2+} or Fe^{3+} . Why?



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22. Which of the 3d series of elements exhibits the largest number of oxidation states. Why?



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23. Transition elements are d-block elements, with some exceptions. Usually they are paramagnetic. They show variable oxidation states. They and their compounds show catalytic property. What is the reason for their catalytic property?



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24. Describe the method of preparation of potassium dichromate from chromite ore.





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25. Write any one consequence of lanthanoid contraction.



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26. Transition elements are d- block elements
Write any four characteristic properties of transition elements.



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27. Account for the following: Atomic radius decreases from left to right in a period



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28. Account for the following trends in atomic and ionic radii of transition metals. The atomic radii of elements in 4d series are more than that of corresponding elements in 3d series.



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29. Account for the following trends in atomic and ionic radii of transition metals. The atomic radii of the corresponding elements in '4d' series and 5d series are virtually the same.



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30. Lanthanides and actinoids are f-block elements. What is the common oxidation state of lanthanoids?



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31. Name two important compounds of transition elements.



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32. Transition elements form a large number of complex compounds. Why?



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33. d- block elements belong to groups 3-12 in the periodic table, in which the d-orbitals are progressively filled What is misch-metal?



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34. Potassium dichromate is an orange coloured crystal and is an important compound used as an oxidant in many reactions How do you prepare $K_2Cr_2O_7$ from chromite ore?





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35. Potassium dichromate is an orange colour crystal and is an important compound used as an oxidant in many reactions. How will you account for the colour of potassium dichromate crystals?



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36. What are the characteristics of transition elements?



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37. Potassium permanganate and potassium dichromate are two transition metal compounds. Write any two uses of potassium permanganate.



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38. Potassium permanganate and potassium dichromate are two transition metal

compounds . Draw the structure of dichromate ion.



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39. Fourteen elements following Lanthanum are called Lanthanoids. What is Lanthanoid contraction? Give reason for it.



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40. Fourteen elements following Lanthanum are called Lanthanoids. $KMnO_2$ is a purple coloured crystal and it acts as an oxidant. How will you prepare from MnO_2 ?



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41. Which of the following oxidation state is common for lanthanides?

A. +2

B. +3

C. +4

D. +5

Answer: C



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42. Draw the structures of chromate and dichromate ions'.



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43. Zirconium (Zr) belongs to. '4d

and *Hafnium(Hf)belongs* \rightarrow 5d`

transition series: It is difficult to separate them. Explain.



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44. Which of the following oxidation state is not shown by Manganese?

A. +1

B. +2

C. +4

D. +7

Answer: A



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45. Potassium permanganate and potassium dichromate are two transition metal compounds. Draw the structure of dichromate ion.



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46. Potassium permanganate ($KMnO_4$) is a strong oxidizing agent. Write any two oxidizing reactions of $KMnO_4$.



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47. Transition elements are d- block elements
Write any four characteristic properties of transition elements.



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48. Transition elements are d - block elements and inner transition elements are f-block elements. Name a transition metal compound and write one use of it.



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49. Transition elements are d - block elements and inner transition elements are f-block elements. What is Lanthanoid Contraction?



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50. Transition elements are d - block elements and inner transition elements are f-block elements. Write any two consequences of Lanthanoid Contraction.



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51. Transition elements are d- block elements
Write any four characteristic properties of transition elements.



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52. transition elements are 'd' block elements.

Cr^{2+} and Mn^{3+} have d^4 configuration. But

Cr^{2+} is reducing and Mn^{3+} is oxidizing.

Why?



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53. Which of the following is not a lanthanoid element?

A. Cerium

B. Europium

C. Lutetium

D. Thorium

Answer:



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54. Zr and Hf are having similar chemical properties. This is due to_____.



55. Magnetic moments arise due to the presence of unpaired electrons' Calculated magnetic moments of two transition metal ions are given below:

Ion	Calculated Magnetic moment
Sc^{3+}	0
Ti^{3+}	1.73

Justify

these observations on the basis of spin only formula.



56. Transition metal ions are generally coloured. Why?



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57. A transition element is defined as one which has incompletely filled d - orbitals in its ground state or in any one of its oxidation states Why are Zn Cd and Hg not regarded as transition metals?



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58. Silver atom has completely-filled d-orbital ($4d^{10}5s^1$) in its ground state. How can you say- it is a transition element?



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59. Why are d block elements called transition elements?



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60. Transition elements generally have high enthalpy of atomisation and they show variable oxidation states Why do transition elements exhibit higher enthalpies of atomisation?



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61. In the 3d series, the enthalpy of atomisation of zinc is the lowest (126kJmol^{-1}). Why?



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62. Name a transition element which does not exhibit variable oxidation state and explain the reason for it.



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63. Transition elements generally have high enthalpy of atomisation and they show variable oxidation states Which element of the

3d series shows the largest number of oxidation states? Explain the reason for it.



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64. Rationalise the following observations
Scandium salts are white/colourless



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65. Atomic sizes generally increase as we come down a group of the periodic table. But in the

4th group of the periodic table, Zr and Hf have almost the same atomic sizes. Why?



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66. Rationalise the following observations Zinc salts are colourless, Cu^{2+} salts are blue



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