WEIRD CHEMIST

d-Block Elements

Melting point and Atomic size

DPP – 02

Topic: Melting point and Atomic size **Questions:** 32 Questions **Exam:** NEET / JEE

▶ TYPE 1 : Melting Point & Enthalpy of Atomisation

Q1. From Sc (Z = 21) to Zn (Z = 30) in 3d series, the lowest value of enthalpy of atomisation is for

[NCERT Pg. 218]

(1) Cu (2) V (3) Ni (4) Zn

Q2. The melting point of Zn is lower as compared to those of the other elements of 3d series elements because

(1) The d-orbitals are completely filled
(2) The d-orbitals are partially filled
(3) Zn is a transition element
(4) All of these

Q3. In general melting point of transition elements in a series can be explained by following relation

(1) Melting point $\propto$ atomic weight
(2) Melting point $\propto$ no. of unpaired valence electrons
(3) Melting point $\propto$ Internuclear distance
(4) Melting point $\propto \dfrac{1}{\text{atomic weight}}$

Q4. In the series Sc to Zn the enthalpy of atomisation of 'Zn' is the lowest because

(1) Zn exists in molecular state
(2) In the crystal of Zn interatomic distance is small
(3) IP of Zn is minimum in the series
(4) No 3d orbital involved in metallic bonding.

Q5. Assertion: In first transition series Zn has highest melting point.
Reason: In Zn there are 5 unpaired electrons.

(1) Both Assertion and Reason are true, Reason gives correct explanation
(2) Both Assertion and Reason are true, Reason doesn't give correct explanation
(3) Assertion is correct but Reason is false

(4) Both Assertion and Reason are false

Q6. The melting point of Zn is lower as compared to those of the other elements of 3d series because

(1) the d-orbitals are completely filled
(2) the d-orbitals are partially filled
(3) d-electrons do not participate in metallic bonding
(4) very weak metallic bond

Q7. Assertion: The metal of 4d and 5d series have greater enthalpies of atomisation than the corresponding elements of the series.
Reason: More frequent metal-metal bonding in compound of the heavy transition metals.

(1) If both Assertion & Reason are True and the Reason is a correct explanation of the Assertion.
(2) If both Assertion & Reason are True but Reason is not a correct explanation of the Assertion.
(3) If Assertion is True but the Reason is False.
(4) If both Assertion & Reason are False.

Q8. The melting point of Zn is lower as compared to those of the other element of 3d series because

(1) The d-orbitals are completely filled
(2) The d-orbitals are partially filled
(3) Zn is a transition element
(4) All of these

Q9. The elements with maximum and minimum melting points in the second transition series respectively are

(1) Cr and Zn
(2) Ti and Cu
(3) Ru and Hg
(4) Mo and Cd

Q10. Which metal has the highest melting point?

(1) Platinum (2) Gold (3) Tungsten (4) Iridium

Q11. Volatile metals are

(1) Cu, Ag, Au
(2) Zn, Cd, Hg
(3) C, Pb
(4) Fe, Co, Ni

Q12. Assertion: Transition metal have high melting point.
Reason: Transition metal are attributed to the involvement of greater number of electrons from $(n-1)d$ in addition to the ns electron in the interatomic metallic bonding.

(1) If both Assertion & Reason are True and the Reason is a correct explanation of the Assertion.
(2) If both Assertion & Reason are True but Reason is not a correct explanation of the Assertion.
(3) If Assertion is True but the Reason is False.

(4) If both Assertion & Reason are False.

▶ TYPE 2 : Atomic & Ionic Size

Q13. Which of the following pairs has the same size?

[AIPMT (Prelims)-2010]

(1) Fe^{2+}, Ni^{2+}
(2) Zr^{4+}, Ti^{4+}
(3) Zr^{4+}, Hf^{4+}
(4) Zn^{2+}, Hf^{4+}

Q14. Which of the following atomic radii is incorrect.

(A) Fe < Co < Ni
(B) Sc > Ti > V > Cr > Mn
(C) Fe = Co = Ni
(D) Ti > Zr > Hf
(E) Ti < Zr = Hf

(1) A, D (2) B, C, E (3) B, D, E (4) Only A

Q15. Match the column

Metal	Similar size metal
A. Zr	i. Co
B. Fe	ii. Hf
C. Nb	iii. W
D. Mo	iv. Ta

(1) A–ii; B–i; C–iv; D–iii
(2) A–ii; B–i; C–iii; D–iv
(3) A–i; B–ii; C–iv; D–iii
(4) A–i; B–ii; C–iii; D–iv

Q16. In which of the following the ionic radius of Fe is minimum?

(1) $Fe(CO)_5$
(2) $K_4[Fe(CN)_6]$
(3) Mohr Salt
(4) $K_3[Fe(CN)_6]$

Q17. Which elements have minimum difference in size?

(1) Na, K
(2) Sc, La
(3) Ti, Zr
(4) Mo, W

Q18. Which of the following pairs has the same size?

(1) Zn^{2+}, Hf^{4+}
(2) Fe^{2+}, Ni^{2+}
(3) Zr^{4+}, Ti^{4+}
(4) Zr^{4+}, Hf^{4+}

Q19. Zr and Hf have almost equal atomic and ionic radii because

(1) of diagonal relationship
(2) of lanthanide contraction
(3) of actinide contraction
(4) both belong to same transition series

Q20. Which of the following ions has smallest radius?

(1) Mn^{2+} (2) Ni^{2+} (3) Ti^{2+} (4) V^{2+}

▶ TYPE 5: Ionisation Enthalpy

Q21. The correct order of decreasing second ionisation enthalpy of Ti(22), V(23), Cr(24) and Mn(25) is

[AIPMT (Prelims)-2008]

(1) Ti > V > Cr > Mn
(2) Cr > Mn > V > Ti
(3) V > Mn > Cr > Ti
(4) Mn > Cr > Ti > V

Q22. Four successive members of the first row transition elements are listed below with their atomic numbers. Which one of them is expected to have the highest third ionization enthalpy?

[AIPMT (Prelims)-2005]

(1) Vanadium (Z = 23)
(2) Chromium (Z = 24)
(3) Iron (Z = 26)
(4) Manganese (Z = 25)

Q23. First IE of 5d series elements are higher than those of 3d and 4d series elements. This is due to

(1) Bigger size of atoms of 5d-series elements than the size of 3d-series elements
(2) Greater effective nuclear charge is experienced by valence electrons because of the weak shielding of the nucleus by 4f-electrons in 5d series
(3) *d*-*d* transition
(4) All of these

Q24. Which among the following orders of second IP is correct?

(1) Mn > Cr
(2) Zn > Cu
(3) Na > Cu
(4) Cr > K

Q25. Which among the following statements regarding IP is incorrect?

(1) IP_1 of Mn is greater than its IP_2

(2) IP of Mn^{2+} is greater than IP of Fe^{2+}

(3) IP_3 of Mn is greater than IP_3 of Cr

(4) IP of 3d series element increases from Sc to Zn in irregular manner.

Q26. The atomic no. of V, Cr, Mn and Fe are 23, 24, 25 & 26 respectively. Which of the following has highest value of their second ionization enthalpy?

(1) V (2) Cr (3) Mn (4) Fe

Q27. For the process Cu(g) $\longrightarrow$ Cu$\equiv$(g) + e^- the electron is to be removed from

(1) 3d subshell

(2) 4s subshell

(3) 3p subshell

(4) any of the above

Q28. The correct order of decreasing third ionisation enthalpy of Ti, V, Cr, Mn is

(1) Mn > Cr > V > Ti

(2) Ti > V > Cr > Mn

(3) Cr > Mn > V > Ti

(4) V > Mn > Cr > Ti

Q29. The atomic numbers of V, Cr, Mn, and Fe are respectively 23, 24, 25 and 26. Which one of these may be expected to have the highest second ionization enthalpy?

(1) Cr (2) Mn (3) Fe (4) V

Q30. The correct order of ionisation energy is

(1) Cu > Ag > Au

(2) Cu > Au > Ag

(3) Au > Cu > Ag

(4) Ag > Au > Cu

Q31. Which of the following does not correctly represent the order of the property indicated against it?

(1) Ti < V < Cr < Mn : Increasing number of oxidation states

(2) $Cr_2O_7^{2-}$ < MnO_4^- : Increasing oxidising power

(3) Ti < V < Cr < Mn : Increasing melting point

(4) Lu^{3+} < Eu^{3+} < La^{3+} : Increasing order of ionic radii

Q32. Which one of the following does not correctly represent the correct order of the property indicated against it?

[AIPMT (Mains)-2012]

(1) Ti < V < Cr < Mn: increasing number of oxidation states

(2) Ti^{3+} < V^{3+} < Cr^{3+} < Mn^{3+}: increasing magnetic moment

(3) Ti < V < Cr < Mn: increasing melting points

(4) Ti < V < Mn < Cr: increasing 2nd ionization enthalpy