



Is zinc not regarded as a transition element?

Answer:

It is because neither Zn nor Zn^{+2}

ions have incompletely filled d-orbitals.

Question 2:

Copper atom has completely filled d-orbitals in its ground state but it is a transition element. Why?

Answer:

It is because Cu^{+2}

has $3d^9$, incompletely filled d-orbitals, therefore, it is a transition metal.

Question 3:

Zn^{+2} salts are white while Cu^{+2} salts are coloured. Why?

Answer:

Zn^{+2} salts are white because it does not have unpaired electron, whereas Cu^{+2} salts are coloured because it has unpaired electron and undergoes d-d transition by absorbing light from visible region and radiate blue colour.

do transition elements show variable oxidation states? How is the variability in oxidation states of d-block different from that of the p-block elements?

Answer:

It is due to similar energy of $(n - 1)d$ and ns orbitals, electrons from both can be lost. In p-block, lower oxidation state is more stable due to inert pair effect, whereas in d-block elements higher oxidation states are more stable. In d-block, oxidation states differ by one, whereas in p-block, it differs by two.

Question 5:

(i) Why do actinoids show wide range of oxidation states?

(ii) Why is actinoid contraction greater than lanthanoid contraction?

Answer:

(i) It is because $5f$, $6d$ and $7s$ have comparable energy.

(ii) $5f$ orbitals have poor shielding effect than $4f$ orbitals, therefore, effective nuclear charge is more in actinoids than lanthanoids.

Question 6:

What are the transition elements? Write two characteristics of the transition elements.

Answer:

Those elements which either themselves or their ions have incompletely filled d-orbitals are called transition elements. Characteristics:

- (i) They show variable oxidation state.
- (ii) They form coloured ions.

Question 7:

Write one similarity and one difference between the chemistry of lanthanoids and that of actinoids.

Answer:

Similarity:

Lanthanoids show lanthanoid contraction like actinoids contraction.

Dissimilarity:

Lanthanoids show mostly +3 oxidation state. Few show +2 and +4, whereas Actinoids show +3, +4, +5, +6 and +7 oxidation states.

Question 8:

Why do transition elements show variable oxidation states? In 3d series (Sc to Zn), which element shows the maximum number of oxidation states and why?

Answer:

Transition elements show variable oxidation states because electrons from both s and d orbitals take part in bond formation. In 3d series, 'Mn' shows maximum number of oxidation states because it has maximum number of electrons in s as well as in d orbitals which can take part in bond formation.