

Problem 1:

The chemical reactivity of lanthanides resemble to which other elements of the periodic table?

Solution:

The chemical reactivity of the starting lanthanides resemble calcium due to similar first and second ionization energy. But latter lanthanides resemble Al due to ability of showing +3 oxidation state and similarity in I.E.

Problem 2:

Enthalpies of atomization of transition elements are higher than those of alkali and alkaline earth metals. Explain.

Solution:

The number of unpaired electrons in transition elements are more when compared to these in alkali and alkaline earth metals. As a result, the metallic bonds in transition metals are stronger and enthalpies of atomization are higher than those of alkali and alkaline earth metals.



Problem 3:

Explain the following:

(a) Chromium is a typical metal while mercury is a liquid metal.

(b) Zinc readily liberates H_2 from cold dil. H_2SO_4 but not from cold conc. H_2SO_4 .

Solution:

(a) Chromium has five unpaired electrons in its d-orbitals which make its metallic bond very strong, whereas in mercury there is no unpaired d-electrons so its metallic bond is very weak, hence it is a liquid.

(b) Since, conc. H_2SO_4 act as an oxidizing agent hence does not evolve H_2 when it reacts with zinc.



Problem 5:

Cu^+ ion has $3d^{10} 4s^0$ configuration and colourless but Cu_2O is red and Cu_2S is black. Explain.

Solution:

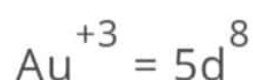
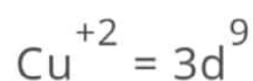
Cu^+ ion has $3d^{10} 4s^0$ configuration, i.e. it has no unpaired electron hence there is no d-d transition possible and it is colourless. But Cu_2O and Cu_2S are coloured due to charge transfer of electrons from O^{2-} or S^{2-} to the vacant orbital of Cu^+ ion.

Problem 6:

While Cu, Ag and Au are considered as transition elements but Zn, Cd and Hg are not considered as transition elements although all the mentioned elements have complete d-orbitals. Explain.

Solution:

Although Cu, Ag and Au have their d-orbitals complete in the elemental state. They do have incomplete d orbitals in their compound state. So they are included in transition elements.



Zn, Cd and Ag have their d-orbitals

