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 the transition elements.

$Cu^{+2} = 3d^{9}$

$Au^{+3} = 5d^{8}$

Zn, Cd and Ag have their d-orbitals complete in their elemental state as well as compound state. So they are not included in the transition elements.

$Zn^{+2} = 3d^{10}$

$Hg^{+2} = 5d^{10}$

Problem 7:

(i) CrO_3 is an acid anhydride. Explain.

(ii) Between Na^+ and Ag^+ which is a stronger Lewis acid and why?

Solution:

(i) $CrO_3 + H_2O \longrightarrow H_2CrO_4$, i.e CrO_3 is formed by loss of one H_2O molecule from chromic acid.

(ii) Between Na^+ and Ag^+, Ag^+ is stronger Lewis acid. Because Ag^+ has pseudo noble gas configuration which makes it more polarizing.

Problem 8:

It is well known that alkali and alkaline earth metals displace hydrogen from dilute acids. But most of the transition elements do not behave so. Explain.

Solution:

Alkali and alkaline earth metals have positive oxidation potential. But most of the transition elements have negative oxidati potentials. So they are not as good oxidizing agents as the alkali and alkaline earth metal are.

Problem 9:

In the melting point curves of transition metals, one observes a dip in the curves at the end i.e. Cu, Ag & Au and Zn, Cd & Hg have lower melting points when compared to other transition metals. Explain.

Solution:

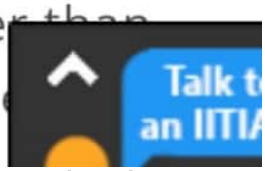
In the last two groups of transition elements i.e. Cu, Ag, Au, Zn, Cd and Hg all the electrons are paired which can not take part in metallic bonding. As a result, metallic bond in these elements is weak resulting in the lower melting points of these metals.

Problem 10:

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 those in alkali and alkaline earth metals. As a result, the metallic bon in transition metals are stronger and enthalpies of atomization are highe than those of alkali and alkaline earth m



Problem 11:

Explain the following:

(a) Scandium forms no coloured ions, yet it is regarded as a transition element.

(b) Transition elements have many irregularities in electronic configurations.

Solution:

(a) Scandium in the ground state has one d electron. Hence it is regarded as transition element.

(b) In the transition elements, the (n – 1)d subshell and ns subshell have very small difference in energy. The incoming electron may enter into either ns or (n-1)d subshell. Hence they show irregularities in their electronic configurations.

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