05 JANUARY
WEDNESDAY
005-360° WK 2

JANUARY

As we move along the period of transition series, the stability of +2 oxidation state decreases. This means that the tendency of the metals to give electrons becomes more as we move in a period, therefore the reducing power of oxidation of transition elements increases in a period from left to right.

Eg. VO and CrO are strong reducing agents.

(K) Potassium dichromate → $K_2Cr_2O_7$ (+6)
Potassium chromate → K_2CrO_4 (+6)
Potassium permanganate → $KMnO_4$

Potassium dichromate & Potassium chromate:
$K_2Cr_2O_7$ & K_2CrO_4.

$K_2Cr_2O_7$

Properties: (1) It is an orange red crystalline solid having m.p 670°C.

(2) It is moderately soluble in cold water but readily soluble in hot water.

(3) Action of heat:

$4K_2Cr_2O_7 \xrightarrow{\Delta} 4K_2CrO_4 + 2Cr_2O_3 + 3O_2$

Potassium Dichromate → Potassium chromate

2011

(4) Reaction with alkalies:

On heating with alkalies, the orange colour of dichromate solution changes to yellow due to the formation of chromate ion:

$K_2Cr_2O_7 + 2KOH \rightarrow 2K_2CrO_4 + H_2O$

(Orange) — Pot. chromate (yellow)

On acidifying the yellow solution, the colour again changes to orange red due to the reversible reaction.

$2K_2CrO_4 + H_2SO_4 \rightarrow K_2Cr_2O_7 + K_2SO_4 + H_2O$

yellow — orange.

i.e. In an alkalic solution, chromate ions are present while in acidic solution, dichromate ions are present.

Chromyl chloride test:

↳ It is used for the confirmatory test of chloride ion.

$K_2Cr_2O_7 + 4NaCl + 6H_2SO_4 \rightarrow 2KHSO_4 + 4NaHSO_4$

$+ 2CrO_2Cl_2 + 3H_2O$

chromyl chloride.

(6) Reaction with HCl:

$\overset{+6}{K_2Cr_2O_7} + 14HCl \rightarrow 2KCl + 2\overset{+3}{Cr}Cl_3 + 7H_2O + 3Cl_2$

$K_2Cr_2O_7$: Reduced (O.A.); HCl: oxidised (R.A.)

In this reaction, $K_2Cr_2O_7$ is reduced in which O.N. of Cr is decreased from +6 to +3.

2011