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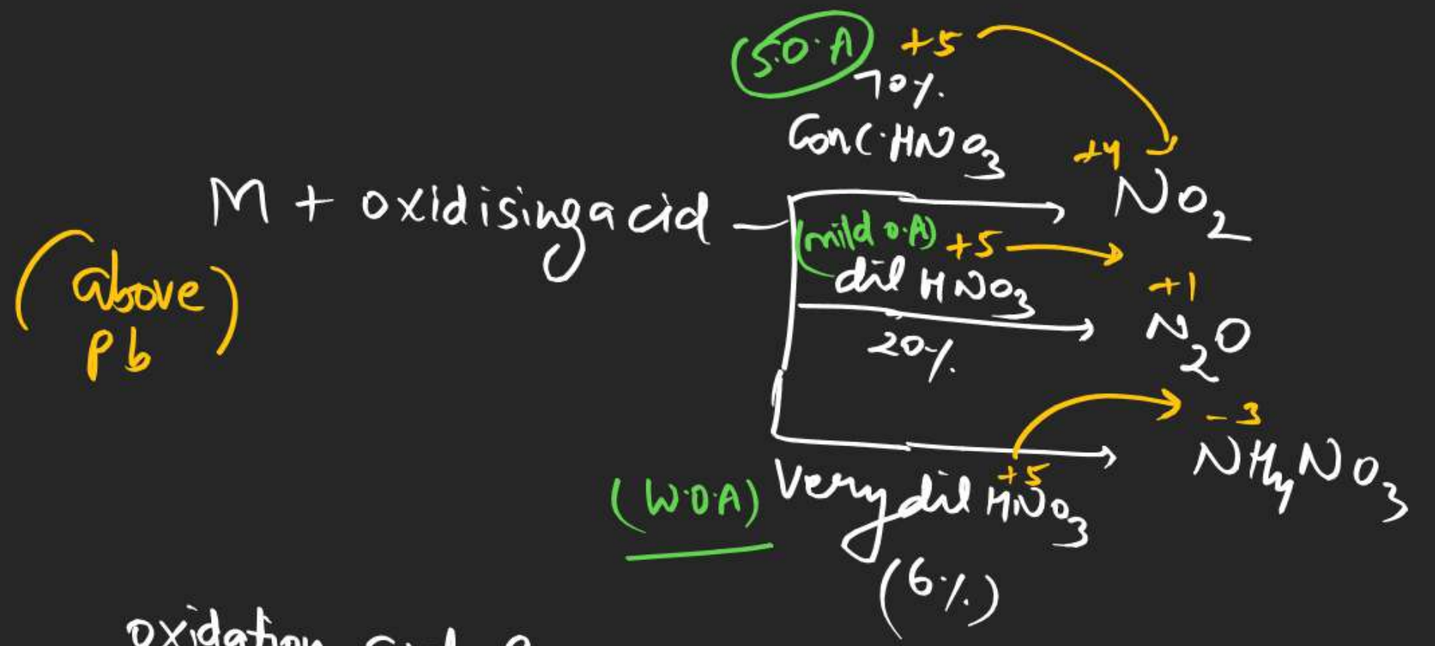

Oxidation State Range = $(n-8)$ to n

$N = \underline{2s^2 2p^3}$ $\quad n$ = no of val. e⁻

= -3 to +5

N = -3 -2 -1 0 +1 +2 +3 +4 +5

$$Zn + \text{Conc.}\ HNO_3 \longrightarrow Zn(NO_3)_2 + NO_2$$

$$Zn + \text{dil}\ HNO_3 \longrightarrow Zn(NO_3)_2 + N_2O$$

$$Zn + \text{very dil}\ HNO_3 \longrightarrow Zn(NO_3)_2 + NH_4NO_3$$

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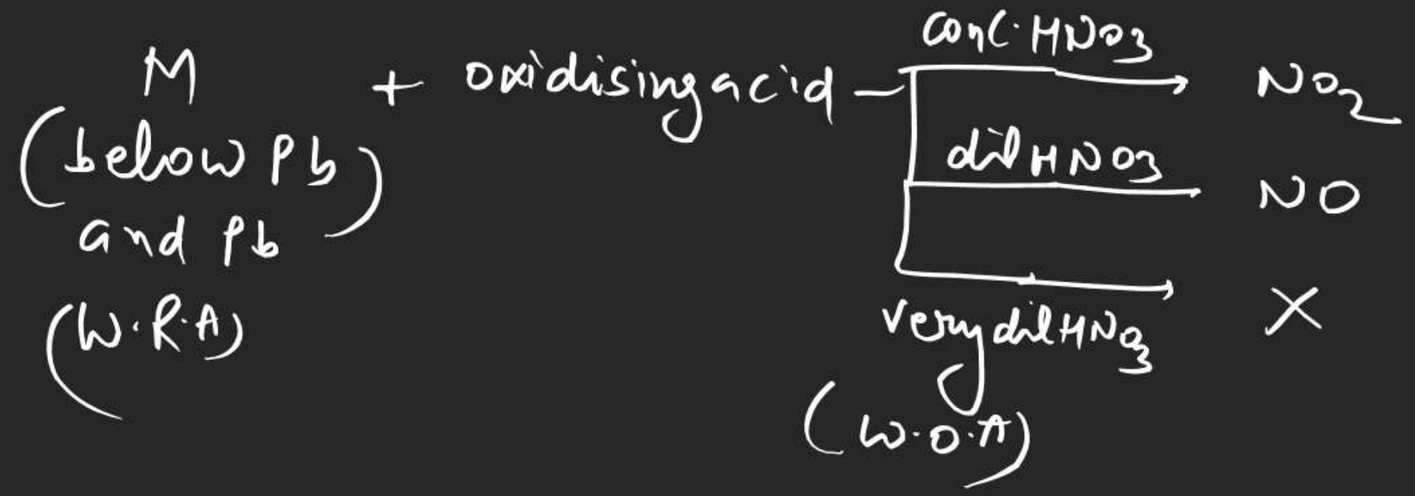

★

$Cu + Conc.\ HNO_3 \longrightarrow Cu(NO_3)_2 + NO_2$

$Cu + dil\ HNO_3 \longrightarrow Cu(NO_3)_2 + NO$

$Cu + Very\ dil\ HNO_3 \longrightarrow X$

(Meta stannic acid)

$Sn + Conc.\ HNO_3 \longrightarrow H_2SnO_3 + NO_2$

$Sn + dil\ HNO_3 \longrightarrow Sn(NO_3)_2 + NH_4NO_3$

$Sn + very\ dil\ HNO_3 \longrightarrow Sn(NO_3)_2 + NH_4NO_3$

Note ⇒ Cr and Al react with Conc. HNO_3 then they form passive layer (Protactive layer) of their oxide which donot further react.

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$Fe + \underset{80\%}{Conc.\ HNO_3} \longrightarrow$  $+ \underline{Fe_3O_4}$

Que Zn react with Conc. HNO_3 then the type of reaction is

(1) acid - base
(2) Redox
(3) both
(4) none

$$HNO_3 \xrightarrow{\text{Conc.}} NO_2 + H_2O + (O)$$

Colourless liq. (aqua fortis)
but it becomes yellow or brown due to presence of NO_2 gas
When it is Heated 60-80°C Brown / yellow disappear

Redox

$$HNO_3 \longrightarrow NO_2 + H_2O + (O)$$

$$Zn + (O) \longrightarrow ZnO$$

acid-base

$$ZnO + HNO_3 \longrightarrow Zn(NO_3)_2 + H_2O$$

(Amphoteric) (acid)

$$Zn + HNO_3 \longrightarrow Zn(NO_3)_2 + NO_2 + H_2O$$

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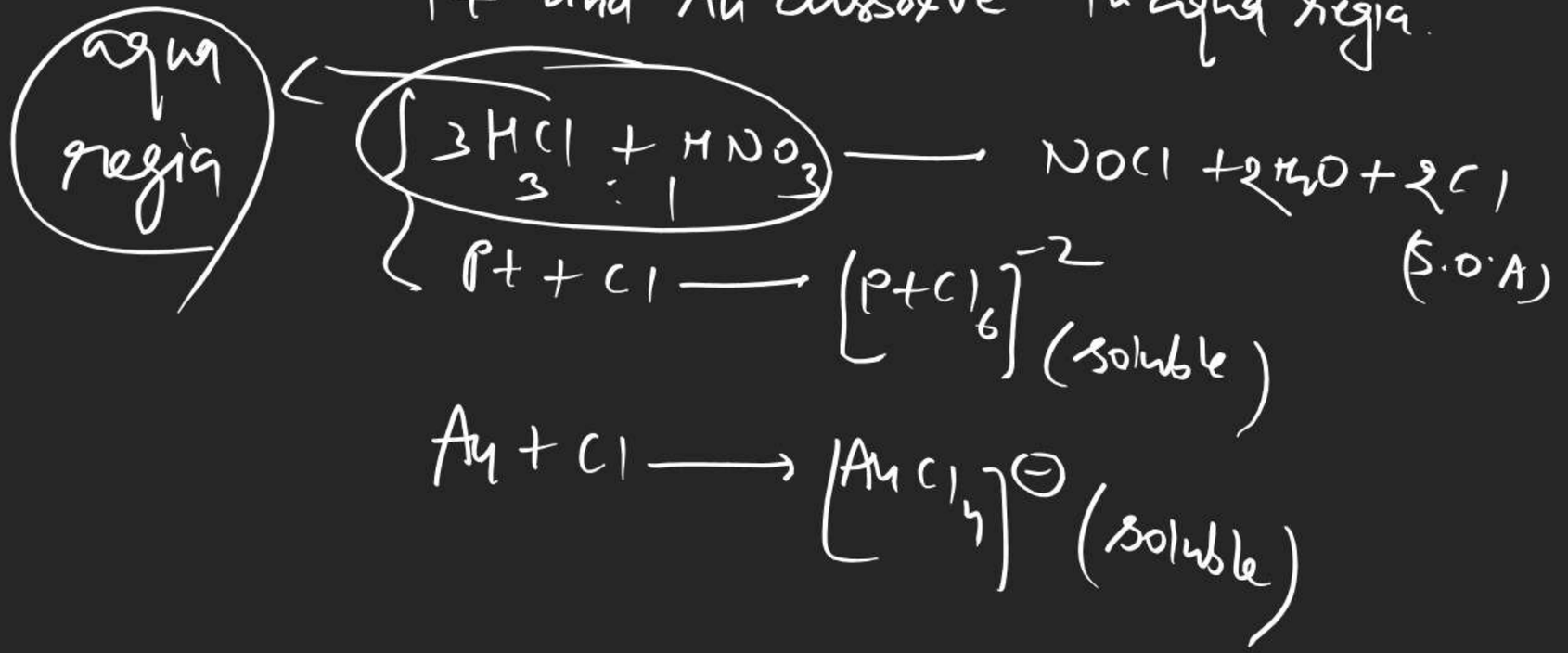
Conc. HNO_3 react with most of the metals except Pt and Au

because they are Noble metals (less reactive metals)

Pt and Au dissolve in aqua regia.



Note ⇒ freshly prep. aqua regia
colourless but in second
it is converted in
to yellow, Orange or Red due to formation
nitrosyl chloride [NOCl] and Cl

non metal / or / Metalloide + Conc. HNO_3 ⟶ ic oxyacid + NO_2

HXO_4 = Perhalic acid

HXO_3 = Halic acid

$HClO_3$ = Chloric acid

$HBrO_3$ = bromic acid

HIO_3 = Iodic acid

P_4 + Conc. HNO_3 ⟶ H_3PO_4 + NO_2

S + Conc. HNO_3 ⟶ H_2SO_4 + NO_2

C + Conc. HNO_3 ⟶ H_2CO_3 + NO_2

As + Conc. HNO_3 ⟶ H_3AsO_4 + NO_2

Sb + Conc. HNO_3 ⟶ H_3SbO_4 + NO_2

X_2 ($X = Cl/Br/I$) + Conc. HNO_3 ⟶ HXO_3 + NO_2

$$\text{non metal or metalloides} + \text{dil } HNO_3 \longrightarrow X$$

$$\text{non metal or metalloides} + \text{dil } HNO_3 \xrightarrow[\text{temp.}]{\text{high}} \text{ic acid} + \underline{NO}$$

except Pt / Au

any R.A + Conc. HNO_3 $\longrightarrow$ NO_2

any R.A + Conc. H_2SO_4 $\longrightarrow$ SO_2

$Cu + Conc.H_2SO_4 \longrightarrow CuSO_4 + SO_2$

$Zn + Conc.H_2SO_4 \longrightarrow ZnSO_4 + SO_2$

$C + Conc.H_2SO_4 \longrightarrow CO_2 + H_2O + SO_2$

$P + Conc.H_2SO_4 \longrightarrow H_3PO_4 + SO_2$

$S + Conc.H_2SO_4 \longrightarrow SO_2 + H_2O$

$NaHSO_3 + Conc.H_2SO_4 \longrightarrow NaHSO_4 + SO_2$

$As + Conc.H_2SO_4 \longrightarrow H_3AsO_4 + SO_2$

$Sb + Conc.H_2SO_4 \longrightarrow H_3SbO_4 + SO_2$

$Ag + Conc.H_2SO_4 \longrightarrow Ag_2SO_4 + SO_2$

$Mg + Conc.H_2SO_4 \longrightarrow MgSO_4 + SO_2$

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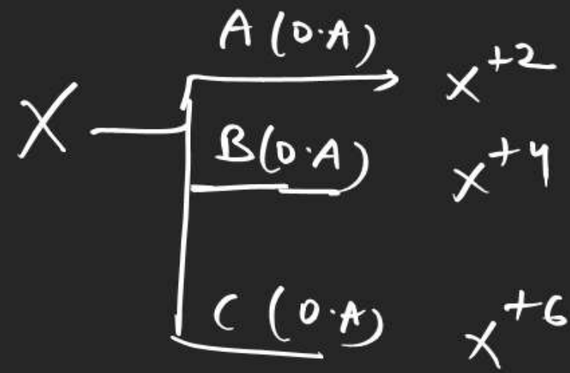
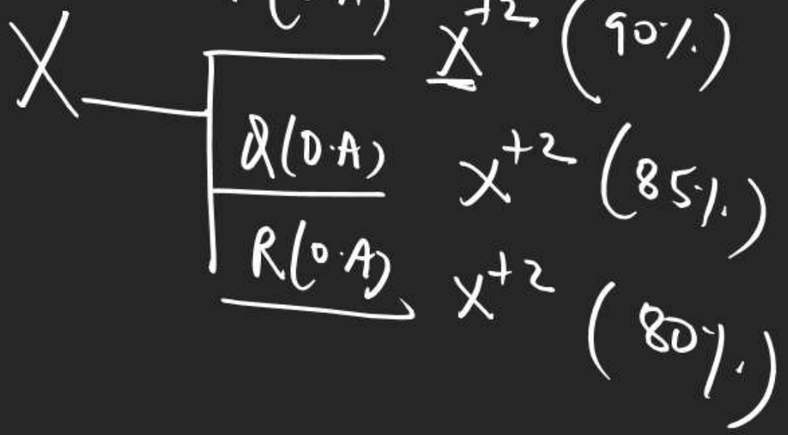


Order of oxidising agent strength

$A < B < C$



$P > Q > R$

(3) Thermal decomposition Reaction

(Intra Redox) $\overset{-3}{(NH_4)}_2\overset{+6}{Cr_2O_7} \xrightarrow{\Delta} \overset{0}{N_2} + \overset{+3}{Cr_2O_3} + O_2$

(orange colour) (green)

[If anionic part of ammonium salt is S.O.A then it will reduce N atom of NH_4^+ into N_2 or N_2O]

O.S Range = (n-8) to n

$NH_4ClO_4 \xrightarrow{\Delta} N_2 + Cl_2 + H_2O + O_2$ (R.A)

$NH_4ClO_3 \xrightarrow{\Delta} N_2 + Cl_2 + H_2O + O_2$

$NH_4IO_4 \xrightarrow{\Delta} N_2 + Cl_2 + H_2O + O_2$

$NH_4NO_2 \xrightarrow{\Delta} N_2 + H_2O$

$NH_4NO_3 \xrightarrow{\Delta} N_2O + H_2O$

$M \longrightarrow M^{+} + e^{-}$ (Oxidation)

$X + e^{-} \longrightarrow X^{\ominus}$ (Reduction)

(O.A)