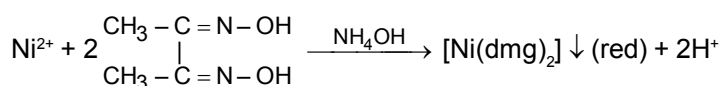
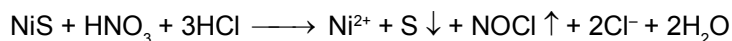
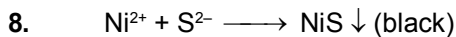
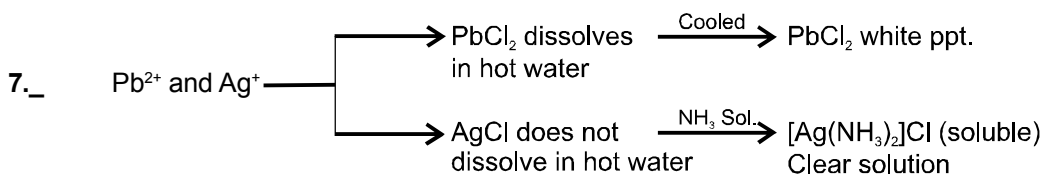
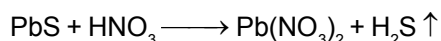
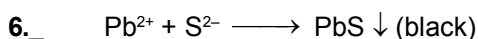
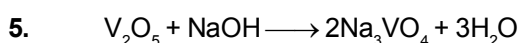
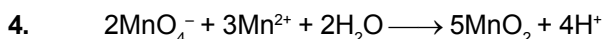
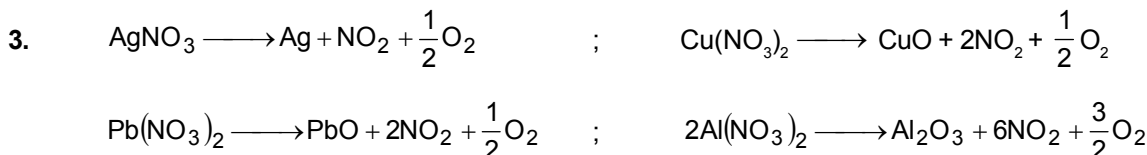


CHEMISTRY

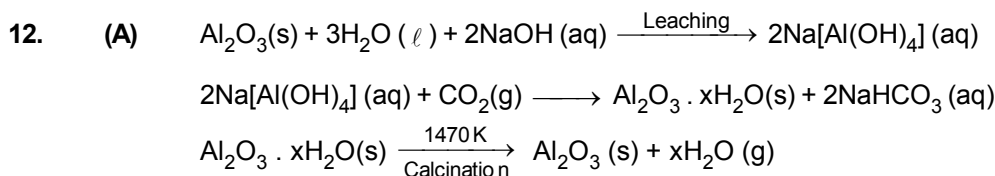
1. (A) There is irregular trend in the first ionisation enthalpy of the 3d metals.

	Se	Ti	V	Cr	Mn	F	Co	Ni	Cu	Zn
In kJ/mol :	631	656	650	653	717	762	758	736	745	906

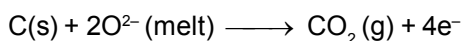
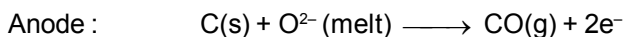
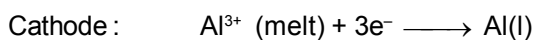


9. Carbon monoxide is better reducing agent than carbon below 983 K.

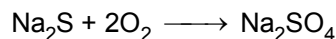
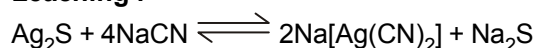
10. (a) \rightarrow van – Arkel method for Zr – Hg
 \rightarrow Based on volatile nature of halides of methods.



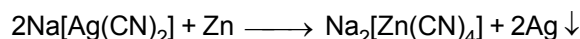
Electrolytic reduction of molten pure Al_2O_3 mixed with Na_3AlF_6 or CaF_2
 Method is known as Hall-Heroult process



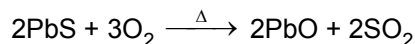
(B) Leaching :



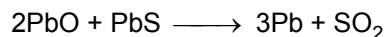
Displacement by zinc in aqueous solution :



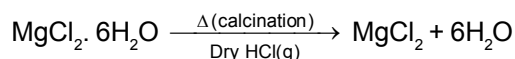
(C) Roasting :



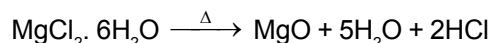
Self reduction :



(D) Calcination :

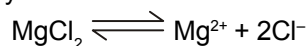


It is not made anhydrous by simple heating because it gets hydrolysed



Electrolytic reduction :

Electrolytic reduction of molten anhydrous carnallite.



At cathode : $\text{Mg}^{2+} + 2\text{e}^- \longrightarrow \text{Mg} (99\% \text{ pure}) ;$

At anode : $2\text{Cl}^- \longrightarrow \text{Cl}_2 + 2\text{e}^-$

13. HgCl_2 due to covalent characters, sufficient chloride ions are not obtained.

16.* (D) Oxidation state of iron in Mohr's salt, $\text{FeSO}_4 \cdot (\text{NH}_4)_2\text{SO}_4 \cdot 6\text{H}_2\text{O}$ is +2

17.* (A) $2\text{Cu}^{2+} + 5\text{I}^- \longrightarrow \text{Cu}_2\text{I}_2 \text{ (white)} + \text{I}_3^- ; \quad \text{Pb}^{2+} + 2\text{I}^- \longrightarrow \text{PbI}_2 \downarrow \text{ (yellow)}$

(B) $\text{Cu}^{2+} + 4\text{NH}_3 \longrightarrow [\text{Cu}(\text{NH}_3)_4]^{2+}$ (deep blue solution)

$\text{Pb}^{2+} + 2\text{NH}_3 + 2\text{H}_2\text{O} \longrightarrow \text{Pb}(\text{OH})_2 \downarrow \text{ (white)} + 2\text{NH}_4^+$ (Pb^{2+} does not form soluble complex)

(C) $\text{Cu}^{2+} + 2\text{OH}^- \longrightarrow \text{Cu}(\text{OH})_2 \downarrow \text{ (blue)} ; \quad \text{Pb}^{2+} + 2\text{OH}^- \longrightarrow \text{Pb}(\text{OH})_2 \downarrow \text{ (white)}$

$\text{Pb}(\text{OH})_2 \downarrow + 2\text{OH}^- \longrightarrow [\text{Pb}(\text{OH})_4]$ soluble complex.

(D) $\text{Pb}^{2+} + 2\text{Cl}^- \longrightarrow \text{PbCl}_2 \downarrow \text{ (white)} ; \quad \text{Cu}^{2+} + 2\text{Cl}^- \longrightarrow \text{CuCl}_2 \text{ (green solution)}.$

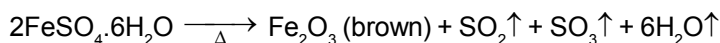
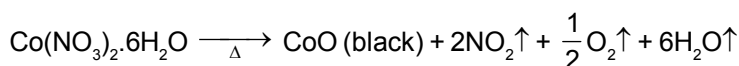
18.* $\text{Na}_3[\text{AlF}_6] \longrightarrow 3\text{NaF} + \text{AlF}_3$

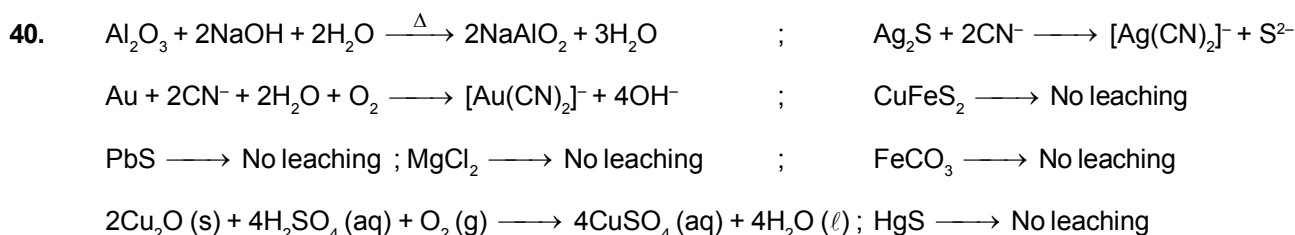
NaF and AlF_3 both are ionic compounds and so ionise to give ions. This increases the electrical conductivity and lowers the melting point of Al_2O_3 .

At cathode : $\text{Al}^{3+} (\text{melt}) + 3\text{e}^- \longrightarrow \text{Al}.$

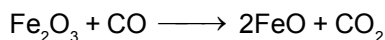
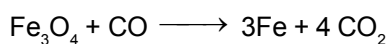
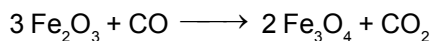
At anode : $\text{C}(\text{s}) + \text{O}^{2-} (\text{melt}) \longrightarrow \text{CO} (\text{g}) + 2\text{e}^- ; \quad \text{C}(\text{s}) + 2\text{O}^{2-} (\text{melt}) \longrightarrow \text{CO}_2 (\text{g}) + 4\text{e}^-.$

19.* $\text{ZnCO}_3 \xrightarrow{\Delta} \text{ZnO} + \text{CO}_2 \uparrow$. ZnO is yellow when hot.
(white)





41. At 500 – 800 K (lower temperature range in the blast furnace)



At 900 – 1500 K (higher temperature range in the blast furnace):

