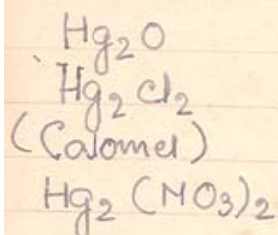
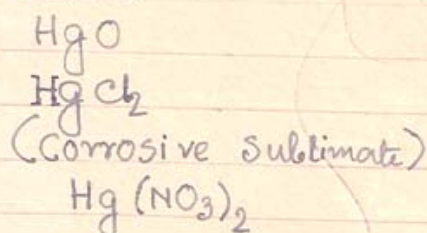




Mercurous



Mercuric



Qv. Starting from Cinnabar how is mercury extracted nowadays by modern process and refined. How the purity is tested. Discuss its reaction with (1) HNO_3 (2) H_2SO_4 (3) O_3 (4) I_2 (5) Na . Mention its uses.

Q. Write notes on (1) Corrosive sublimate (2) Calomel. (3) Convert Calomel to Corrosive sublimate and vice versa. (4) Vermilion. (5) Feroas serpent. Distinction of -ous and -ic salts.

Q. Detection of Mercurous salt in salt test.

Q. Notes on Nessler's reagent.

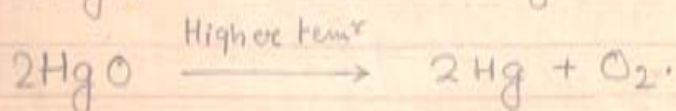
Q. What happens when HgCl_2 is added to KI .

Q. A boy by mistake took HgCl_2 thinking it to be Hg_2Cl_2 . What antidote do you suggest.

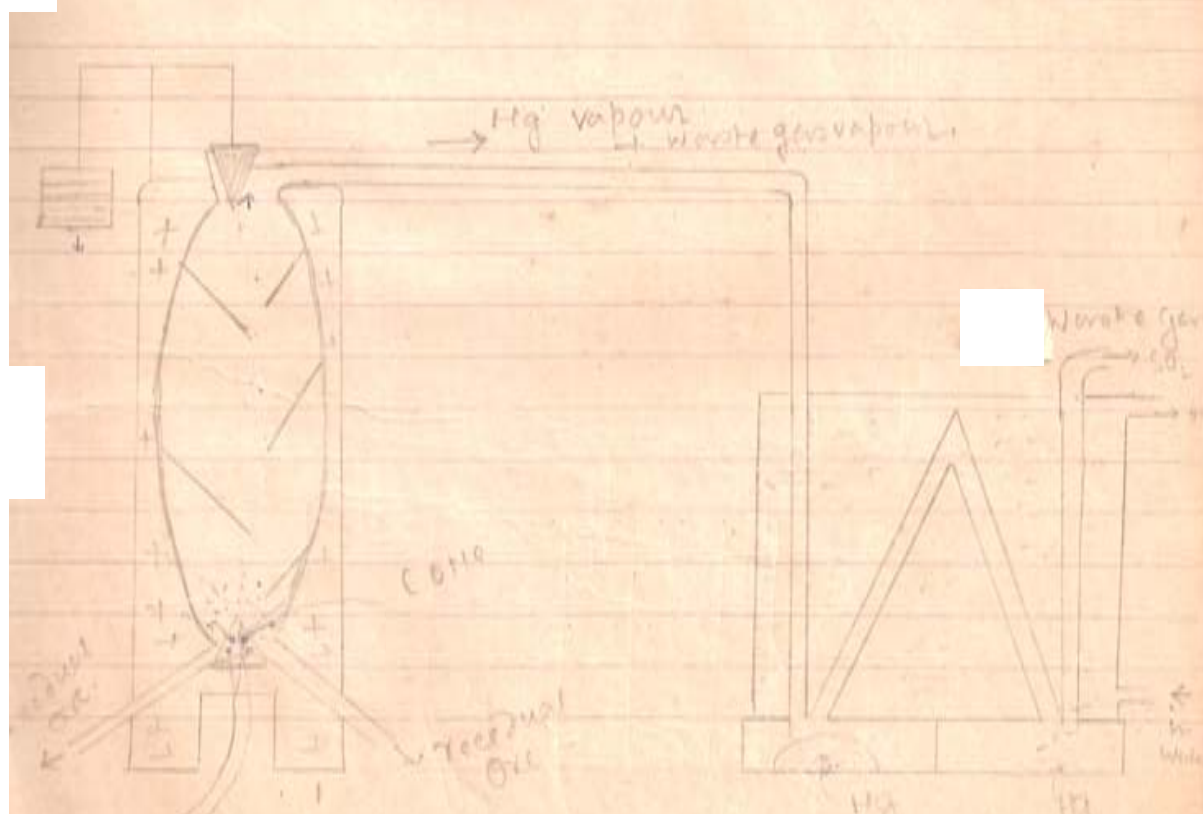
Q. How can you detect a little HgCl_2 in Hg_2Cl_2 .



Q. ① Ans Cinnabar is the Ore of Hg, from which Hg is extracted ~~by~~ ^{simultaneously} by Roasting and distillation.



Procedure: → The Ore is roasted with Charcoal (fuel) in a shaft furnace as shown in the figure. The mixture of Ore (even poor ore) and Charcoal is fed to the top of the shaft furnace ^{cup} and cone arrangement. The mixture passes down a series of sloping shelves inside the shaft furnace to get a zigzag ^{zigzag} motion. Hot Air is passed through the cone from the bottom into the furnace where by Hg is



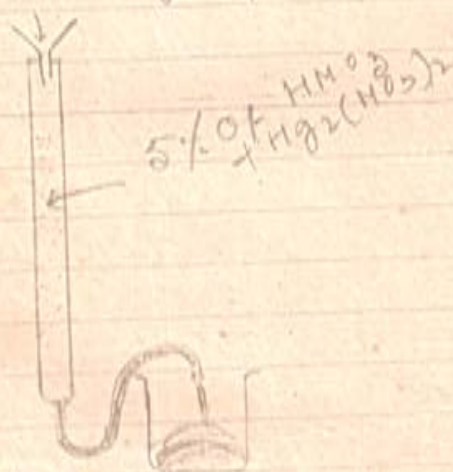


set free in the form of vapour and SO_2 gas is formed. The gases leaving the furnace at the top carry off Hg vapour and pass to a series of pipes made of earthen ware (→), ~~for~~ having cooling arrangement. Hg vapour is condensed and collected in the chambers.

It is generally preserved in bottles made of China clay cisterns (↙) / Cast Iron vessel.

Purification: ~ This sample of Hg is
 (a) filtered through Chamora leather (↘) to remove suspended impurities like stone sand
 (b) It is then passed through a long column of 5% HNO_3 with a little $\text{Hg}_2(\text{NO}_3)_2$ as shown in the figure.

(c) By distilling in vacuum.



Physical Properties:

Hg is called quick silver / live silver. Sp. gravity 13.6, liquid at room temp, the only metal. Becomes solid at -39° . B.P. 357.5°C . in Vapour state a molecule of Hg contains 1 atom only. This is the heaviest liquid known.



CHEMICAL PROPERTIES:

1. With Air \rightarrow NOT affected. But near its B.P with Air it forms red oxide of Hg. (Mercuric oxide HgO)

2. Water \rightarrow NOT affected by water

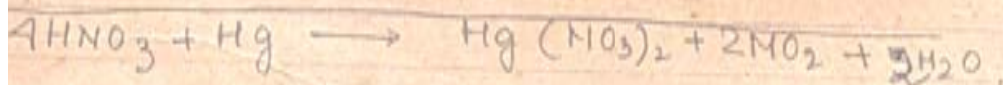
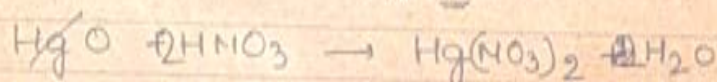
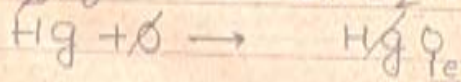
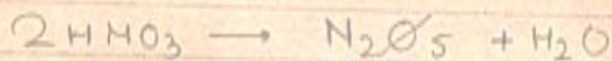
3. Acids \rightarrow

X. With HCl \rightarrow dil. or conc. NO action.

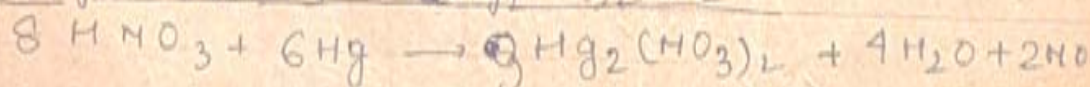
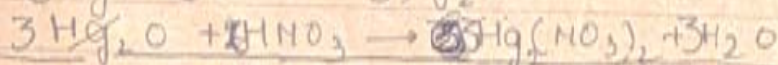
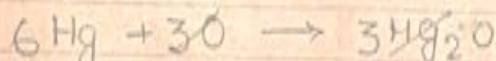
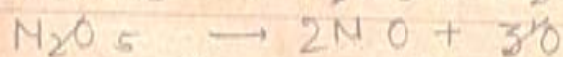
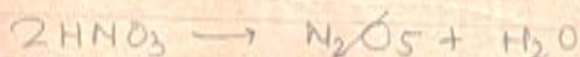
Y. $\text{H}_2\text{SO}_4 \rightarrow$ NO ACTION in COLD, but when heated with Conc. H_2SO_4 it gives SO_2 . (similar to Cu)



Z. HNO_3 : ① When Conc. HNO_3 is heated with Hg we get mercuric nitrate and NO_2 gas. and with dilute



With dil. HNO_3 : \sim it gives -ous nitrate and NO gas



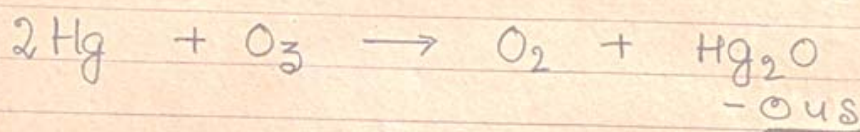


Base \rightarrow NaOH \rightarrow NO Reaction.

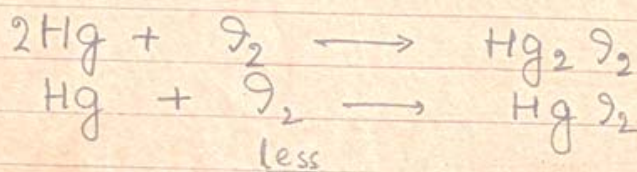
Special Special.

With O_3 :

* When Hg is added with Oxone It forms a superfacial Hg_2O now this Hg on pouring to another vessel gives stream. This peculiar phenomenon is called tail of Hg.



With I_2 : When rubbed with I_2 we get Hg_2I_2 and if less iodine is taken we get HgI_2 .



With Na: Sodium Amalgam is formed. i.e. Hg Na



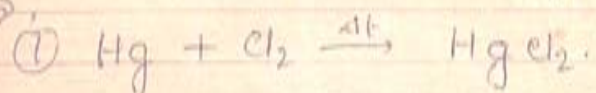


Testing of Purity:

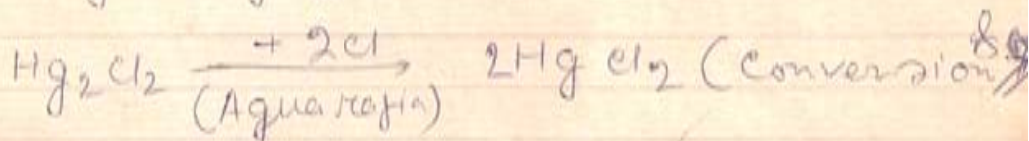
1. If it is pure it must boil at 357.25°C under 760 mm pressure.
2. Pure Hg does not wet glass.

Notes on Corrosive Sublimat: $\sim (\text{HgCl}_2)$ mercuric chloride.

Preⁿ: It is prepared by heating Hg with Cl_2 gas.

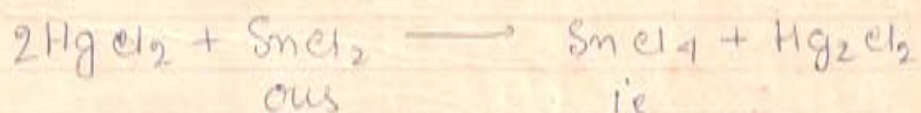


When Mercurous chloride is dissolved in aqua regia we get HgCl_2



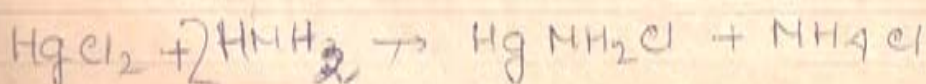
Properties: It is white, needle shaped crystalline solid, soluble in water also ether and alcohol. It is highly poisonous. The dirty-dot is the white part of an unboiled egg (albumen) which makes a complex non poisonous substance.

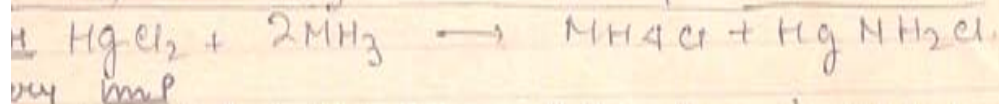
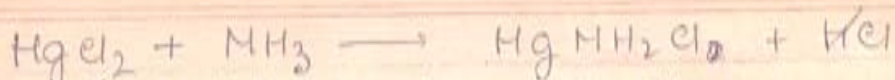
With ^{conc} $\text{SnCl}_2 \rightarrow$ It gives stannic chloride



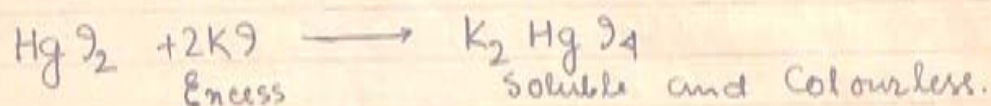
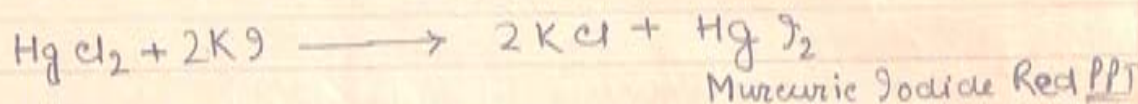
W.H

With NH_3 : When it reacts with NH_3 it gives white ppt of Ammonio mercuric chloride.





5. With K_2I solⁿ: When K_2I solⁿ is added dropwise at first it gives light yellow ppt which rapidly turns red due to the formation of Mercuric Iodide. If the addition of K_2I is continued, it is very interesting to note that the red colour ppt suddenly disappears forming a colourless solⁿ of Potassium Mercuric Iodide.



Uses

1. It is used as an antiseptic, dressing of skin and furs, at the bottom of ships used with paint to protect from bacteria.

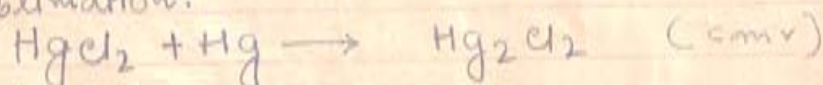
2. To prepare Nessler's reagent :-

Note On Nessler's reagent: K_2HgI_4 (Obtained from above) is alkylated with excess of KOH solⁿ is known as Nessler's reagent. It is used to detect NH_3 gas in the lab which turns brown.

(Convⁿ)

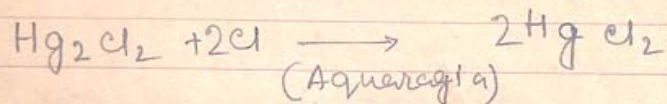
Mercurous Chloride / Calomet: Hg_2Cl_2 .

Preⁿ:- When Mercuric Chloride is heated with Hg in a closed vessel we get Hg_2Cl_2 which is purified by Sublimation.



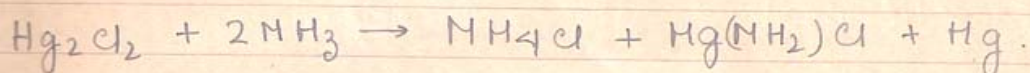


Properties: It is a tasteless non poisonous white powder insoluble in water and in dilute acids it sublimes on heating as NH_4Cl and dissolves in Aqua regia.



W.H

With NH_3 : It gives black ppt due to free mercury



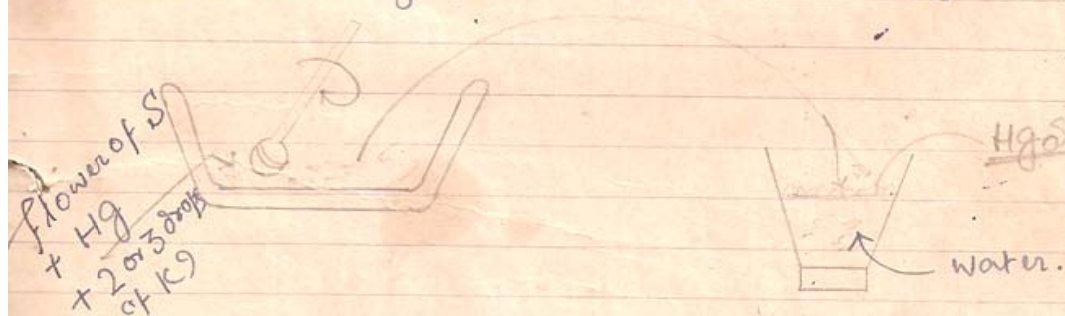
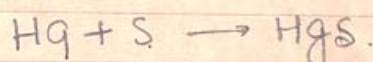
Uses: 1. It is used in medicine as a purgative.

2. To make Calomel Electrode used in lab.

Q. How can you detect a little Hg_2Cl_2 in HgCl_2
The sample is powdered in warm water filter and the filtrate is added with 2 or 3 drops of K_9 solⁿ (not excess) If we get red ppt then Hg_2Cl_2 is present.

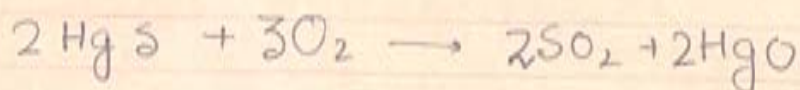
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Vermilion :- (HgS)





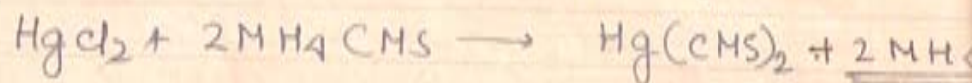
It is deep red crystalline solid. Insoluble in water. On strong heating in air it gives SO_2 .



Uses: ~ 1. It is used in medicine to prepare Auratic medicines like makarodhwaga and Rashasindura.

2. As a paint for forehead. (for Hindu ladies)

• ~~Peroxide~~ Serpent: $\text{Hg}(\text{CNS})_2$: Mercuric Thiocyanate.
Preⁿ: By heating a mixture of HgCl_2 and NH_4CNS



It is a blackish solid. The tablets of it are used for fire-works.

~~Dist~~ Distinction between Mercurous and Mercuric Salt.

Reagent	Mercurous Salt (Hg_2Cl_2)	Mercuric Salt (HgCl_2)
1. With H_2S	It gives black ppt due to $\text{Hg}_2\text{S} + \text{Hg}$	White ppt is obtained gradually turns yellow then brown and finally black of HgS .
2. With $\text{K}_2\text{Cr}_2\text{O}_7$	It gives green ppt of $\text{Hg}_2\text{Cr}_2\text{O}_7$	It gives scarlet red ppt of $\text{Hg}_2\text{Cr}_2\text{O}_7$ however with excess it disappears.



3. With NH_4OH	Black PPT. due to Mercury amino chm $\text{Hg NH}_2\text{Cl}_2 + \text{Hg}$	It gives white PPT due to $\text{Hg}(\text{NH}_2)\text{Cl}$.
4. With NaOH :	It gives black PPT of Hg_2O .	It gives yellow ppt of HgO .

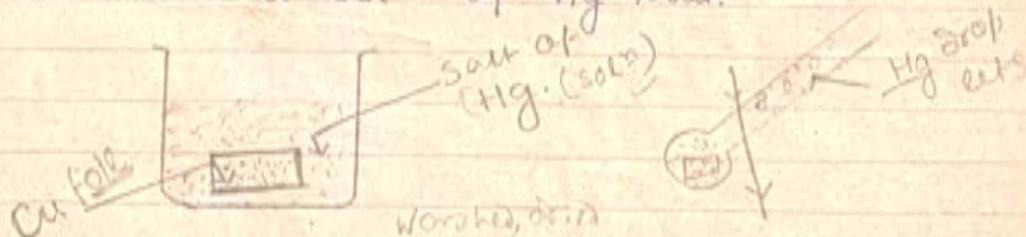
10/ Detection of Mercury salt in Salt test.

Dry test:- (1) Compounds of Mercury heated with Na_2CO_3 and Charcoal powder in a bulb tube gives a beautiful deposit of Mercury droplets on the cold surface of the tube. It is broken to remove



the bulb and the droplets are collected to get a big, shining drop of Hg.

Wet test:- A piece of bright Cu foil () is immersed in to a soln of Hg salt.



It is coated with a film of Hg and it becomes dull. It is removed, washed, dried carefully



Hg

and heated in a bulb tube. Mercury droplets are obtained in the cold surface of the bulb tube.