EXPERIMENT NO. 7

NAME OF EXPERIMENT: TO RECOVER THE PRECIPITATE OF BARIUM SULPHATE IN PURE AND DRY STATE

APPARATUS REQUIRED

1. Beaker
2. Test tube
3. Glass rod
4. Porcelain basin
5. Funnel

CHEMICALS REQUIRED

1. Silver nitrate solution
2. Barium chloride solution
3. Sulphuric acid solution

THEORY

Barium sulphat ($BaSO_4$) can be obtained in solid state by treating barium chloride solution with excess of sulphuric acid solution. This is precipitation reaction that can be defined as the double decomposition reaction in which an insoluble solid is formed by the action of two substances in solutions. The insoluble solid formed is called precipitate. Here, $BaSO_4$ is formed as a white precipitate which can be obtained in pure state after several washings.

$$BaCl_2(aq.) + H_2SO_4(aq.) \longrightarrow BaSO_4\downarrow(s) + 2HCl(aq)$$

white ppt.

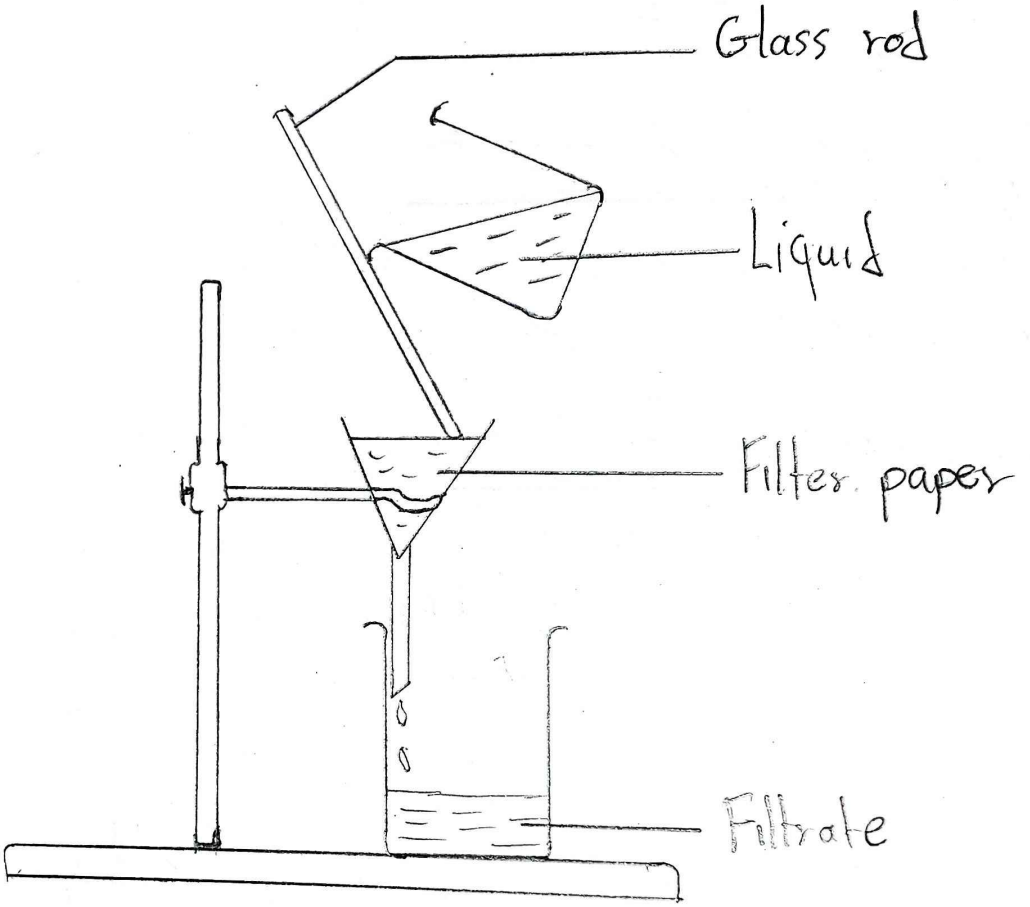

fig. Filtration

The purity of the precipitate can be checked by treating the ppt-washed water with few drops of $AgNO_3$ solution and $BaCl_2$ solution separately. Presence of chloride and sulphate ions is indicated by formation of a white precipitate respectively with these two reagents.

$$AgNO_3(aq.) + Cl^-(aq.) \longrightarrow \underset{\text{white ppt}}{AgCl\downarrow(s)} + NO_3^-(aq.)$$

$$BaCl_2(aq.) + SO_4^{--}(aq.) \longrightarrow \underset{\text{white ppt}}{BaSO_4\downarrow(s)} + 2Cl^-(aq)$$

PROCESS

1. ~~Take~~ A half test tubeful of barium chloride solution was taken in a beaker.
2. A half test tubeful of dilute sulphuric acid of equal molarity was added dropwise. ~~nearly less than a half test tubeful of~~ After each addition, the solution was stirred with a glass rod.
3. A white precipitate was formed. The solution was heated to boil and allowed to stand to enable the precipitate settle down.
4. A few ml of the supernatent liquid was taken in a test tube and 2 drops of the precipitant (i.e. H_2SO_4 solution) was added.
5. A white ppt appeared so few more drops of the precipitant were added to the solution in the beaker.

6. The solution was heated to boil, allowed to stand to settle down the ppt and the completeness of precipitation was checked as in number (4).
7. The fresh ppt was appeared in the test tube so the precipitation was incomplete so few more drops of dilute H_2SO_4 were added and the completeness of precipitation reaction was checked again.
8. After the completeness of precipitation, the solution was heated to boil. It was allowed to stand for some time and the supernatent liquid was decanted off.
9. The precipitate was washed three to four times by the process of washing by decantation.
10. The precipitate washed water was taken in two test tubes. A few drops of $AgNO_3$ and $BaCl_2$ solutions were added separately.
11. Formation of a white precipitate with $AgNO_3$ solution indicates the presence of chloride ion (either $BaCl_2$ solution or HCl solution) in $BaSO_4$ ppt. Similarly, formation of a white precipitate with $BaCl_2$ solution indicates the presence of sulphate ion (H_2SO_4 solution) in $BaSO_4$ ppt.
12. When a white ppt was appeared in any of the test tubes, the $BaSO_4$ ppt was washed again. Again, the presence of Cl^- or SO_4^{--} ions was tested in it.
13. The ppt was stopped washing when no any ppt. was further seen on treating the ppt-washed fresh water with $AgNO_3$ and $BaCl_2$ solutions separately.

14. The solution in the beaker was filtered and the pure precipitate was collected on a ~~dry~~ filter paper.
15. Finally, the precipitate was dried over the Bunsen burner.

OBSERVATIONS

Experiment	Observation	Inference
1. The precipitate-washed water was treated with few drops of $AgNO_3$ solution.	1. Curdy white precipitate was formed.	1. Presence of chloride ion in the precipitate of $BaSO_4$
2. The precipitate washed water was treated with few drops of $AgNO_3$ solution.	2. No any precipita-te was formed.	2. Absence of chloride ion in the precipi-tate of $BaSO_4$.
3. The precipitate washed water was treated with few drops of $BaCl_2$ solution.	3. White precipitate was formed (which is insoluble in HCl)	3. Presence of sulphate ion in the $BaSO_4$ ppt.
4. The precipitate washed water was treated with few drops of $BaCl_2$ solution.	4. No any ppt. was formed.	4. Absence of sulphate ion in the $BaSO_4$ ppt.

RESULT

White precipitate of Barium sulphate was obtained from

the reaction between H_2SO_4 and $BaCl_2$.

PRECAUTIONS

1. The precipitation should be complete.
2. During washing by decantation, there should not be any loss of the precipitate.
3. All the glasswares should be handled with care.
4. While drying the ppt over burner, care should be taken so that the filter paper does not burn.
5. The precipitant should never be added in a very large excess.