

USE AND MAINTENANCE

APPLICATION AND LIMITATIONS

FUSIONS:

The Pure platinum recipients can be used to melt the following;

1. Sodium or Potassium carbonate.
2. Sodium carbonate, sodium nitrite or nitrate.
3. Sodium borate or sodium metaphosphate. (The platinum is slightly attacked at very high temperature or in reducing atmosphere.
4. Alkaline bifluorides.
5. Alkaline bisulphate. (The platinum is slightly attacked above 700 degree centigrade; this can be reduced through the addition of ammonium sulphate)
6. Alkaline or alkaline earth chlorides in natural atmosphere (The platinum is slightly attacked in the presence of air and above 1000 degree centigrade through the release of chlorine. There is no attack in natural atmosphere.

Nevertheless, platinum does have certain application limits. Thus the following should not be melted in such recipients.

- A. Free metals.
- B. Alkaline Oxides, hydroxides and peroxides.
- C. Salts of heavy metals (Lead, Tin, Bismuth, Antimony) as well as their organic compounds.
- D. Phosphates in the presence of substances which reduce compounds capable of releasing chlorine.
- E. Cyanides or sulphides.

EVAPORATION:

The pure platinum recipients may be used for evaporation with:

- a. Sulphuric acid in the presence or absence of hydrofluoric acid.
- b. Hydrofluoric acid in the absence of chlorides and other halides.
- c. Hydrochloric acid in absence of oxidizing agents.
- d. Hydroxides or alkaline carbonates.

All basic or neutral solutions may be evaporated in platinum recipient, as can acid solutions except for those containing hydrochloric acid in the presence of an oxidizing agent.

ELECTROLYSIS:

Platinum is used:

1. As an anode in most electrolytes, except for strongly hydrochloric solutions.
2. As a cathode for deposition of metals using acid solution.

For electrolysis of tin, silver, zinc, gallium and bismuth salts, the platinum electrodes should first be copper plated to prevent superficial alloying with the deposited metal.

PRECAUTION TO BE TAKEN WHEN USING PLATINUM EQUIPMENT:

Chemists using platinum laboratory apparatus must take the following precautions to prevent irreparable damage to them:

HEATING:

0. Flame heating.
Platinum instruments must always be heated in an oxidizing atmosphere, i.e. out side the reducing part of the flame.
In order to prevent contamination while the crucible or dish is being heated, it is to be placed on a triangle made of platinum and not on a base metal screen or triangle.
1. Electric heating in air is the choice procedure and the heating plates are to be covered with clean asbestos sheet. In general, a higher temperature than is absolutely necessary should be held neither needlessly nor to long.
2. Platinum undergoes superficial alternation when heated in an atmosphere of ammonia, sulphuric gas or chlorine.

HANDLING:

GENERAL PRECAUTION:

1. Platinum apparatus are to be handled only with platinum tipped tongs. When they are hot, they must only be set on platinum supports or on thoroughly cleaned pure alumina sheets.
2. Up on removal from an oven or a flame, sudden contact with cold metal surfaces must be avoided.

3. New instruments must never be placed touching each other in an oven since they may stick together above temperature of 1000 degree centigrade. This phenomenon disappears with use. Likewise, the use of new covers and new crucibles together should be avoided.

SPECIAL PRECAUTION:

IGNITIONS :

When organic substance or precipitates deposited on filter paper are to be calcinated, heating is to take place slowly at low temperature until complete oxidation of the carbon is achieved. The substance may then be brought to its calcinations temperature.

ELECTROLYSIS :

At the end of electrolysis, the electrodes are removed from the bath by lowering the recipient without switching off the current to keep the deposited metal from dissolving in an acid medium which in particular would be the case of copper in a nitric medium. The electrodes are then washed in distilled water, then in alcohol, dried and weighed.

The deposited metal is re-dissolved in dilute nitric acid and the oxide such as PbO_2 and MnO_2 in diluted nitric acid added with hydrogen peroxide.

Naturally, aqua-regia can not be used nor may hydrochloric acid in presence of peroxide.

MAINTENANCE & CLEANING:

Cleaning & polishing platinum apparatus immediately after use greatly extend their service lives. Immediately after use, the platinum recipients are to be cleaned:

1. Either by pouring nitric acid solution (diluted with hydrogen peroxide if need be) or a hydrochloric solution in to them.
2. Or by melting potassium bisulphate, sodium carbonate or borax in them.

Aqua regia or hydrochloric acid in the presence of peroxide are not suited for this owing to the formation of free chlorine which dissolves the platinum.

The recipient is then washed in boiling water and if mechanical clearing proves to

be necessary, it is polished with very fine and clean sand or talc. (DO not use hard tools or emery cloth).

If the existence of a base metal alloyed with the platinum is suspected, immerse the recipient in boiling hydrochloric acid for a few minutes, rinse it and then immerse it in boiling nitric acid.

If the weight or appearance has not changed and if the acid baths have not reacted with the base metals, you can be assured the latter are not present.

After using the approximate solvents to rid the electrodes of their metal deposits, they are washed in distilled water and then in alcohol before being dried in a stream of hot air. It is best to avoid anything the electrodes over a Bunsen burner, the heat of which might alloy the traces of deposited metals eventually remaining with the platinum.

The clean electrodes are to be carefully stored upright away from impact in a large beaker or in compartmentalized box.

The platinum tipped crucible tongs must always be placed so that the ends are facing upwards away from any contamination.

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