Aim: To carry out limit test of given sample of Arsenic.

Requirement:

Apparatus: Gutzeit's apparatus, measuring cylinder, conical flask, glass rod, dropper.

Chemicals: Potassium iodide, Zinc, arsenic trioxide, sodium hydroxide, distilled water,

Principle:

The official process is a development of the Gutzeit test. All arsenic present is duly converted into arsine gas (AsH_3) by reduction with Zn and HCl. Further its depend upon the fact that when arsine comes into contact with dry paper permeated with mercuric chloride it produces a yellow strain. The intensity of yellow strain is directly proportional to the quantity of arsenic present. The various chemical reactions involved may be expressed by the following equations:

$$Zn + 2HCl \longrightarrow ZnCl2 + 2(H)$$

$$2As + 6(H) \longrightarrow 2AsH_3 \uparrow$$

$$HgCl_2 + AsH_3 \longrightarrow \underbrace{HgCl_2.AsH_3}$$

Yellow complex

Preparation of Reagents:

1. **Preparation of 1M KI Solution:**
   Dissolve 16.6 g of KI in 50 ml of distilled water and make up the final volume upto 100 ml in a volumetric flask.
2. **Preparation of arsenic standard solution (10 ppm):**
   Dissolve 0.330 g of arsenic trioxide in 5 ml of 2 M sodium hydroxide and diluted up to 250 m with water. Dilute 1 volume of this solution to 100 volumes with water.

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Procedure:

1. Take the test solution into the bottle or conical flask, add 5 ml of 1M KI and 10 g of Zn. Immediately assemble the apparatus and immerse the flask in a water bath at constant temperature so that uniform evaluation of the gas should be maintained.
2. Take 1 ml of arsenic standard solution 10 ppm into the bottle or conical flask, add 5 ml of 1 M of KI and 10 g of Zn. Immediately assemble the apparatus and immerse the flask in a water bath at constant temperature so that uniform evaluation of the gas should be maintained.
3. Observe the presence of stains in the mercuric chloride paper and compare the sample and standard.
4. If the intensity of stain is less in test sample then it passes the limit test for arsenic.

Result:

The given sample passed/failed the limit test for arsenic.