

## PHARMACEUTICAL INORGANIC CHEMISTRY- BP104T

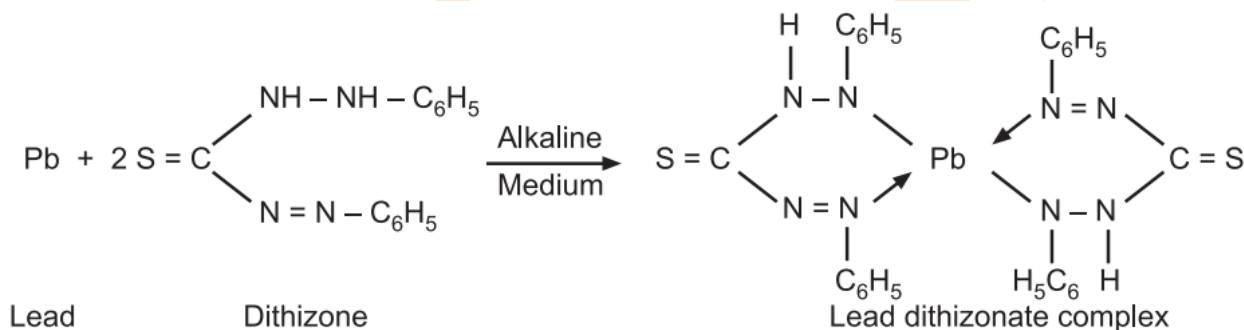
UNIT: 1 (IMPURITIES IN PHARMACEUTICAL SUBSTANCES)

CLASS: 7

### TOPIC: LIMIT TEST FOR LEAD

Lead is a most undesirable impurity in medical compounds and comes through use of sulphuric acid, lead lined apparatus and glass bottles use for storage of chemicals.

**Principle:** Limit test of lead is based on the reaction of lead and diphenyl thiocabazone (dithizone) in alkaline solution to form lead dithizone complex which is read in color. Dithizone is green in color in chloroform and lead-dithizone complex is violet in color, so the resulting color at the end of process is red.



Dithizone forms green coloured solution of dithizone-chloroform extraction solution because dithizone is soluble in chloroform and this solution is used as a quantitative method for extraction of lead impurity from alkaline aqueous solution of test substance. The final product, lead dithizonate, in chloroform is red in colour and the mixture of lead dithizonate (red) and dithizone chloroform (green) forms a violet colour and the intensity of this violet colour produced in chloroform is compared with the standard solution. It should not be more than the standard solution. Ammonium citrate, potassium cyanide, hydroxylamine hydrochloride is used to make pH optimum so interference and influence of other impurities have been eliminated. Phenol red is used as indicator to develop the color at the end of process

**Procedure:**

| Test                                                                                                              | Standard                                                                                                          |
|-------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| A known quantity of sample solution is transferred in a separating funnel                                         | A standard lead solution is prepared equivalent to the amount of lead permitted in the sample under examination   |
| Add 6ml of ammonium citrate                                                                                       | Add 6ml of ammonium citrate                                                                                       |
| Add 2 ml of potassium cyanide and 2 ml of hydroxylamine hydrochloride                                             | Add 2 ml of potassium cyanide and 2 ml of hydroxylamine hydrochloride                                             |
| Add 2 drops of phenol red                                                                                         | Add 2 drops of phenol red                                                                                         |
| Make solution alkaline by adding ammonia Solution                                                                 | Make solution alkaline by adding ammonia Solution                                                                 |
| Extract with 5 ml of dithizone until it becomes green                                                             | Extract with 5 ml of dithizone until it becomes green                                                             |
| Combine dithizone extracts are shaken for 30 mins with 30 ml of nitric acid and the chloroform layer is discarded | Combine dithizone extracts are shaken for 30 mins with 30 ml of nitric acid and the chloroform layer is discarded |
| To the acid solution add 5 ml of standard dithizone solution                                                      | To the acid solution add 5 ml of standard dithizone solution                                                      |
| Add 4 ml of ammonium cyanide                                                                                      | Add 4 ml of ammonium cyanide                                                                                      |
| Shake for 30 mins                                                                                                 | Shake for 30 mins                                                                                                 |
| Observe the color                                                                                                 | Observe the color                                                                                                 |

**Preparation of standard lead solution (1 ppm Pb):** Dissolve 0.400 g of lead nitrate in water containing 2 ml of dilute nitric acid and add sufficient water to produce 250.0 ml. This gives Standard lead solution (1% Pb). Standard lead solution (1 ppm Pb) is prepared by diluting 1 volume of standard lead solution (1% Pb) to 1000 volumes with water.

**Preparation of dithizone extraction solution:** Dissolve 30 mg of dithizone in 1000 ml of chloroform and add 5 ml of ethanol (95%). The solution is stored in refrigerator. Before use, the solution is shaken with about half of its volume of 1% v/v nitric acid solution and acid is discarded.

**Preparation of Dithizone standard solution:** Dissolve 10 mg of dithizone in 1000 ml of chloroform.

**Observation:** The intensity of the color of complex is depends on the amount of lead in the solution. The color produce in sample solution should not be greater than standard solution. If color produces in sample solution is less than the standard solution, the sample will pass the limit test of lead and vice versa.

### 2 MARKS QUESTIONS

1. Write the principle involved in limit test for lead

### 5 MARKS QUESTIONS

1. Explain the principle and procedure involved in limit test for lead

### 10 MARKS QUESTIONS

1. Write the principle, procedure, reaction & role of reagents involved in limit test for lead