Department of Drug Administration
National Medicines Laboratory
ANALYTICAL METHOD VALIDATION COMMITTEE FOR NON PHARMACOPOEIAL PRODUCT

Potassium Iodide, Sodium Chloride & Calcium Chloride Ophthalmic solution

Analytical Profile No.: PSCO 075/076/AP 055

Potassium Iodide, Sodium Chloride & Calcium Chloride ophthalmic solutioncontains not less than 95% and not more than 105% of the stated amount of Potassium Iodide, Sodium Chloride ofCalcium Chloride.

1. Identification:

1.1 For Calcium Chloride

i) Calcium: To 1ml of sample add 2% w/v solution of ammonium oxalate. A white precipitate is obtained that is sparingly soluble in dilute acetic acid but soluble in hydrochloric acid.

ii) Chloride: To 1ml of sample add 0.2g of potassium dichromate and 1ml of sulphuric acid. Place a filter paper moistened with 0.1ml of diphenylcarbazide solution over the mouth of test tube. The paper turns violet red.

1.2 ForPotassium Iodide

i) Potassium: To 1ml of sample add 1ml dilute acetic acid and 1ml of freshly prepared 10% w/v solution of sodium cobaltnitrite. A yellow or orange colored precipitate is formed.

ii) **Iodide:** Acidify 1ml of sample with dilute nitric acid and add 0.5ml of silver nitrate solution. A curdy pale yellow precipitate is formed which does not dissolve in 10M ammonia solution.

1.3 For Sodium Chloride

i)Sodium: Acidify 1ml of sample with 1ml of acetic acid and a large excess of magnesium uranyl acetate solution. A yellow crystalline precipitate is formed.

ii)**Chloride:** To 1ml of sample add 0.2g of potassium dichromate and 1ml of sulphuric acid. Place a filter paper moistened with 0.1ml of diphenylcarbazide solution over the mouth of test tube. The paper turns violet red.

2. pH:5.0 to 8.0

3. Particulate matter (By Light Obscuration Particle Counter)

As per Indian Pharmacopoeia (latest edition)

3.1 Limit:

≥10 µm: 50 particles/ml

≥25 µm: 5 particles/ml

≥50 µm: 2 particles/ml

4. Sterility test

As per Indian Pharmacopoeia (latest edition)

4.1 Limit: Shows no growth of microorganisms.

5. Assay

5.1 Determination of Calcium Chloride:

Transfer 5ml of sample in a 250ml iodometric flask, add 50ml of water and add 5ml of ammonia ammonium chloride buffer pH 10 and titrate with 0.05M EDTA solution using mordant black II as indicator.

Each ml of 0.05M EDTA is equivalent to 0.007353g of Calcium Chloride

Calculation:

$$= \frac{B.R.x\ 0.007353\ xActualMolarityofEDTAx\ 100}{5\ x\ 0.05}$$

5.2 Determination of Potassium Iodide:

Transfer 5ml of sample in a 250ml iodometric flask, add 10ml of conc hydrochloric acid .cool to room temperature, add 5ml of chloroform and titrate with 0.05M potassium iodate solution until the purple color of iodine disappears from the chloroform layer. Add the last portion of iodate solution dropwise while shaking the solution vigorously. Allow the mixture to stand for 5 minutes. If the chloroform layer develops a purple color, titrate further till chloroform layer remains colorless.

Each ml of 0.05M potassium iodate is equivalent to 0.0186g of Potassium Iodide

Calculation:

$$= \frac{B.R.x\ 0.0166\ xActualMolarityofEDTAx\ 100}{5\ x\ 0.05}$$

5.3 Determination of Sodium Chloride:

Transfer 5ml of sample in a 250ml iodometric flask, add 10ml of water and titrate with 0.1M silver nitrate using 1ml of potassium chromate solution.

Calculations:

Volume in ml of silver nitrate solution consumed in the titration = X ml $AgNO_3$

Volume in ml of silver nitrate solution consumed by potassium iodide (Y ml) =

$$= \frac{\%\ of KI x\ 0.1\ x\ 5}{100\ x Actual Molarity of \text{AgNO3} x\ 0.0166}$$

Thus, $AgNO_3$ used by sodium chloride and calcium chloride

$$= \frac{Zml x\ 0.003545\ x Actual Molarity of AgNO3\ x\ 100}{5\ x\ 0.1}$$

Now, 147.1g of calcium chloride = 70.9g of chloride ions

i.e; 1.325 calcium chloride = 0.639% of chloride ions

% of chloride ions due to $CaCl_2$

$$= \frac{0.639\ x Actual\ \%\ of CaCl2}{1\ x\ 100}$$

= B% of chloride ions

% chloride due to NaCl = A% of chloride ions – B% of chloride ions

= C% of chloride ions

$$\% \text{ Sodium Chloride} = \frac{C\ \%\ x\ 0.83}{0.584}$$

6. Other tests: As per pharmacopoeial requirements.