Part 2:
Identification Tests for Anions and Cations as per I.P.

CHAPTER-05

TO PERFORM AND REPORT IDENTIFICATION TESTS ON GIVEN SAMPLE OF SODIUM CHLORIDE AS PER I.P.

Author (s)

Dr. NARENDER YADAV

Dr. KAPIL KUMAR

Chapter Id: ASU/NSP/EB/APHPC/2022/Ch-05

doi: https://doi.org/10.52458/9789391842611.nsp2022.eb.asu.ch05

Aim:

To perform and report identification tests on given sample of sodium chloride as per I.P.

Requirements:

A. Glassware & Instruments:

a. Volumetric flask

b. Pipette

c. Burette

d. conical flask

e. Glass rod

f. Analytical balance

B. Chemicals & Reagents:

1. Sodium chloride
2. H_2SO_4
3. Magnesium uranyl acetate solution
4. Distilled water (DW)
5. dil. CH_3COOH
6. Dilute ammonia solution
7. Potassium antimonite solution
8. Potassium carbonate
9. $AgNO_3$ solution
10. Potassium dichromate
11. Potassium antimonite solution

Theory:

Knowledge of acid/base chemistry, redox chemistry, and solubility are required for any process that can provide a qualitative determination of the ions present in a simple inorganic compound. In this regard, it is significantly easier to identify a single

pure compound than a mixture. This experiment focuses solely on identifying simple compounds, defined as those containing only one cation and one anion.

Monograph of NaCl:

Chemical formula: NaCl

Molecular weight: 58.44

Organoleptic properties:

Nature: Crystals or crystalline powder

Colour: colourless/ white

Odour: Odourless

Physical Properties:

- **Solubility:** Statements of solubility are denoted by a descriptive phrase and are intended to apply between 20 and 30 degrees Celsius. Sodium chloride is freely soluble in water and slightly more soluble in boiling water; practically insoluble in ethanol.
- **Identification test:** This test is described to confirm that the examined item matches the label on the container. Failure to pass these tests indicates that the product may have been mislabeled or replaced.
- **Standards**: Sodium chloride contains not less than 99.0 percent and not More than 100.5 percent of NaCl, calculated with reference to the dried substances
- **Category:** Pharmaceutical aid (tonicity agent); fluid and electrolyte replenisher.

Procedure:

Physical Tests:

- **Organoleptic properties:** Examine the compound for these descriptions. The compound is colourless crystalline powder or crystal, and odourless.
- **Solubility:** Conduct solubility tests in the various solvents. The compound is freely soluble in water and slightly more soluble in water, practically insoluble in ethanol.

Identification Test of Sodium Ions	**Identification Test of Chloride Ions**
➢ Dissolve 0.1 g of the examined substance in 2 ml of water. When 2 ml of a 15 percent w/v K_2CO_3 solution is added and heated to boiling, no precipitate is produced. Add 4 ml of freshly prepared potassium antimonate solution and bring to a boil. Allow the solution to cool in ice and, if necessary, scratch the inside of the test tube with a glass rod; a dense, white precipitate will form. ➢ Add 0.5 ml of 1 M CH_3COOH to 2 ml of the test solution, followed by a large excess of magnesium uranyl acetate solution. ➢ Add to the test tube 0.1 g of the examined substance suspended in 2 ml of water. Add 2 ml of CH_3COOH (2M), immediately close the tube using a stopper fitted with a glass tube bent at two right angles, heat gently, and collect the gas in 5 ml of $Ba(OH)_2$ solution; a white precipitate forms and dissolves upon the addition of an excess of dilute HCl.	➢ In 2 ml of water, dissolve 0.1 g of the chemical being evaluated (equal to around 2 mg of chloride ion). Acidify with diluted HNO_3 and add 0.5 ml of $AgNO_3$ solution, then shake and let stand; The reaction produces a curdy, white precipitate that is insoluble in HNO_3 but soluble in dilute ammonia solution, from which it can be reprecipitated by adding dilute HNO_3. ➢ Add to the test tube 0.2 g of potassium dichromate and 1 ml of H_2SO_4 to 0.5 g of the chemical being tested (equal to around 10 mg of chloride ion). Place a filter paper strip wet with 0.1 ml of diphenylcarbazide solution over the test tube's opening; the paper will turn violet-red. (**Note:** Do not expose wet paper to the potassium dichromate solution.)

ISBN: 978-93-91842-61-1

Observation:

Test	Observation	Inference
Physical Tests: i. Nature ii. Colour iii. Odour iv. Solubility a. Water b. Ethanol 95%		
Identification Test: i. Sodium Ions: 1. 2. 3. ii. Bicarbonates Ions: 1. 2.		
***If observation is as specified in the procedure, write "passes the test"; otherwise, write "fails the test."**		

Results:

The given sample of NaCl complies with the tests..... and does not comply with the tests..... for identification in accordance with the I.P.

Viva Questions:

- Detail the physical characteristics of sodium chloride.
- Why is sodium chloride utilised as a tonicity agent?
- Create two assays for identifying sodium chloride.
- What is the chemical makeup of table salt?
- Write the sodium chloride storage conditions.
- Write the classification of sodium chloride.
- Cite the chemical formula and atomic mass of sodium chloride.
- Why sodium chloride is mostly recognised as a flavour enhancer.
- Mention the dry sodium chloride standard given in I.P. 1996.