

Chapter: 09

Ch.Id:-ASU/GRF/EB/AEHFPOC/2022/Ch-09

DOI: <https://doi.org/10.52458/9789391842697.2022.eb.grf.asu.ch-09>

AIM: TO CARRY OUT THE QUALITATIVE TEST OF AMIDE AND NITROSO GROUP

¹Dr. KAPIL KUMAR

**¹Associate Professor, School of Pharmaceutical Sciences,
Apeejay Stya University, Gurugram, Haryana, India**

²Dr. MUKESH KUMAR KUMAWAT

**²Assistant Professor, School of Pharmaceutical Sciences,
Apeejay Stya University, Gurugram, Haryana, India**

Requirements

Chemicals

1. NaOH Solution
2. Dil. HCl
3. Ethyl Alcohol
4. Ammonium chloride
5. Zinc dust
6. Tollens's reagent
7. Tin metal
8. Sodium nitrate
9. β -Naphthol
10. Acetone

Glass wares

1. Test-tube
2. Stands
3. Brush
4. Holder
5. Glass rod
6. Beakers

Theory

Amide group: Amide, any member of one of two nitrogen-containing chemical classes linked to ammonia and amines. Covalent amides are molecules that are either neutral or very

weakly acidic. These amides are created by substituting the hydroxyl group (OH) of an acid with an amino group. The most significant category is carboxamides ($R'CONR_2$), which are generated from carboxylic acids ($R'COOH$). Similar to sulfonic acids, sulphonamides (RSO_2NR_2) are connected to sulfonic acids (RSO_3H). Generally, amides are produced from amines. In addition, they produce several chemical reactions of amines. A variety of pharmaceutical substances have amide bonds in their structures. The amide linkage - CONH- interacts with several enzymes and biomolecules within the body, therefore influencing biochemical processes.

Nitroso group: In organic chemistry, nitroso refers to a functional group that has the NO group linked to an organic molecule. As such, many nitroso groups (e.g., nitrosoalkanes; $RN=O$) can be classified as C-nitroso compounds. Nitroso compound, any member of the family of organic compounds in which the nitroso group (-N=O) is bonded to a carbon or nitrogen atom. The presence of nitroso group in a molecule may result in bioactivity. Nitrosoarenes generally engage in monomer-dimer equilibrium. The pale yellow dimers are frequently preferred in the solid state, but the dark-green monomers are preferred in dilute solution or at higher temperatures.

Functional Group Test for Amides

Preliminary test

Nature.....(solid/liquid/gas)

Colour.....(colour/colourless)

Odour.....(odour/odourless)

Solubility test: Whether soluble in water or not (amides are slightly soluble in water).

S. No.	Test	Observation	Inference
1.	<p>Sodium hydroxide test: Take 0.2 mg of the chemical, add 3g of a solution containing 20 percent NaOH, and boil the mixture.</p> $\text{R-CO-NH}_2 + \text{NaOH} \longrightarrow \text{R-COONa} + \text{NH}_3$	Ammonia smell & red litmus on top of test tube turns blue.	Amide may be present
2.	<p>Ignition test: Burning material over an open flame.</p>	Burns without soot and leaves white residue	Amide may be present
3.	<p>Nitrous acid test: Dissolve material in dil. HCl and add to the NaNO₂ solution; boil out the nitrogen and chill the test tube.</p>	Effervescence due to release of N ₂ Clear solution White ppt	Amide is confirmed
4.	<p>Biuret test: Heat 0.2 g of Urea in a clean and dry test tube until it melts, all NH₃ is released, and it resolidifies. Residue is dissolved in a few millilitres of water, add 1 millilitre of diluted NaOH solution, and then add CuSO₄ solution drop by drop.</p>	Pink, Violet or Blue colour	Amide is confirmed

Functional Group Test for Nitroso

Preliminary test

Nature.....(solid/liquid/gas)

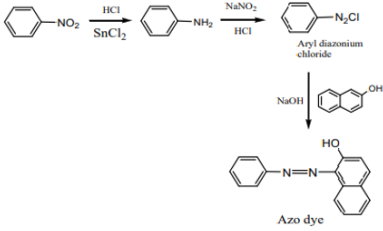
Colour.....(colour/colourless)

Odour.....(odour/odourless)

Solubility test: Solubility sin water, ether, ethanol.

S. No.	Identification Test	Observation	Inference
1	<p>Mulliken's test: Take 0.2 gm of the compound and add 2ml of ethanol, 0.1 gm of solid NH_4Cl and 0.1 gm of Zn dust in a clean and dry test tube. Boil the mixture 5 minutes and filter. Add Tollen's Reagent to the filtrate. It gives black or grey colour that indicate presence of nitroso group.</p> $\text{RNO}_2 + 4[\text{H}] + \text{Zn} + \text{NH}_4\text{Cl} \longrightarrow \text{RNHOH} + \text{H}_2\text{O}$ $\text{RNHOH} + 2\text{Ag}(\text{NH}_3)_2\text{OH} \longrightarrow \text{RNO} + 2\text{H}_2\text{O} + 2\text{Ag} + 4\text{NH}_3$	Black/Grey precipitate	Nitroso group is confirmed
2	<p>Azo dye test: This test conducted only if 1° amino group absent.</p> <p>Take 0.5 gm of the compound and add 0.5 gm of Tin metal, 2 ml of dil. HCl in a clean and dry test tube. Boil the mixture 3 minutes than cool and filter. Dilute the filtrate with 5 ml of H_2O and few drop of NaNO_2 solution. Add this sol to a cold solution of alkaline β-naphthol. It gives orange red colour that indicate presence of nitroso group.</p>	Orange red colour	Nitroso group is confirmed

Aim: to carry out the qualitative test of amide and nitroso group

	 <p style="text-align: center;">Azo dye</p>		
3	<p>Test for dinitro compound: Take 0.5 gm of the compound and add 1-2 ml of acetone in a clean and dry test tube and shake it well. To this mixture add 1-2 drops of dilute NaOH solution. It gives dark purple or violet colour that indicate presence of nitroso group.</p>	Dark purple or violet colour	Nitroso group is confirmed

Result: The results of the systemic qualitative tests performed and nitroso/amide groups were found and reported.