College of Pharmacy	الكلية
Pharmaceutical Chemistry	القسم
Pharmaceutical Organic Chemistry II	المادة باللغة الانجليزية
الكيمياء العضوية الصيدلانية	المادة باللغة العربية
Fourth grade	المرحلة الدراسية
Assistant Lecturer : Ola Abdulhay Ali	اسم التدريسي
Preparation of Acetanilide from aniline	عنوان المحاضرة باللغة الانجليزية
تحضير الاستنلايد من الانلين	عنوان المحاضرة باللغة العربية
7	رقم المحاضرة
Morrison ,R. T & ,.Boyd, R. N. (2010). Organic Chemistry. Pearson Education.	المصادر والمراجع
Carey ,F. A & ,.Giuliano, R. M. (2016). Organic Chemistry (10th ed.). McGraw-Hill Education	
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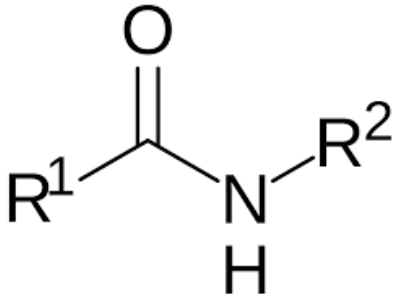
محتوى المحاضرة

Preparation of Acetanilide

1-Introduction to Amides

- **Amides are derivatives of organic acids (carboxylic acids)**
- **with the general formula ($R–CO–NR_2$), where carbon is attached to oxygen (C=O) and also attached to an amino group.**



2-Classification of Amides

- **Amides are divided into three types, according to the substituents on nitrogen:**

١-Primary amides: $R_1 = R_2 = H$

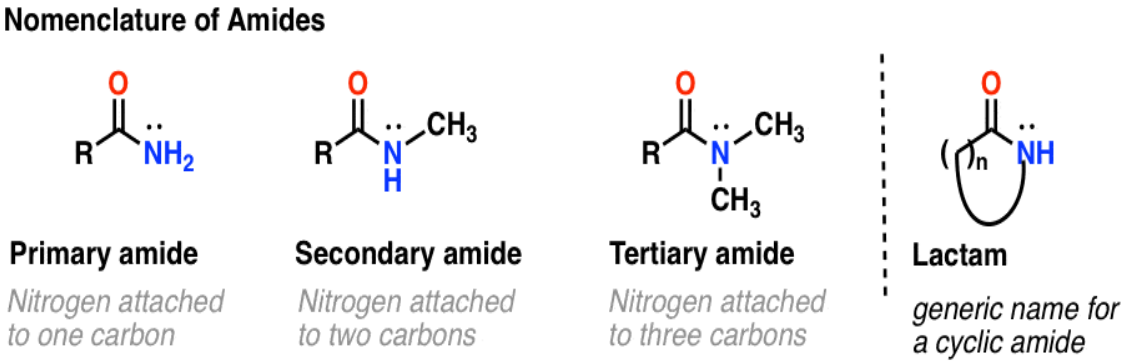
Example: Formamide, Acetamide

٢-Secondary amides: One H replaced by alkyl/phenyl

Example: N-Methyl-formamide ,N-Methyl-acetamide

٣- Tertiary amides: Both H replaced by alkyl/phenyl

Example: N,N-Dimethyl-formamide ,N,N-Dimethyl-acetamide



- **H.W :What is the main difference between amines and amides?**

Amines :nitrogen bonded to alkyl/aryl groups only.

Amides :nitrogen bonded to carbonyl carbon (C=O).

3-Acetanilide

•Solid organic compound, secondary amide

•Color: white to grey, odorless

•Molecular weight: 135.17 g/mol

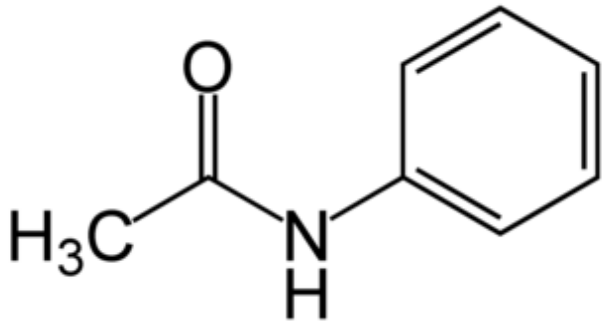
•Formula: C_8H_9NO

•**Melting point: 114.3 °C**

•**Boiling point: 304 °C**

•**Density: 1.22 g/cm³**

•**IUPAC name: N-phenylethanamide**



4- Solubility

Acetanilide is soluble in:

•**Hot water**

•**Ethanol, methanol**

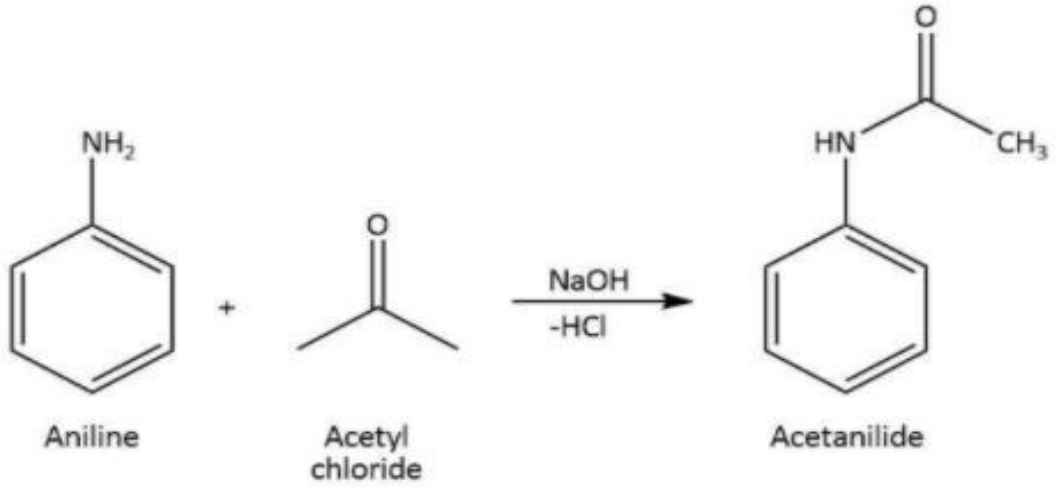
•**Ether, chloroform, acetone**

•**Glycerol, benzene**

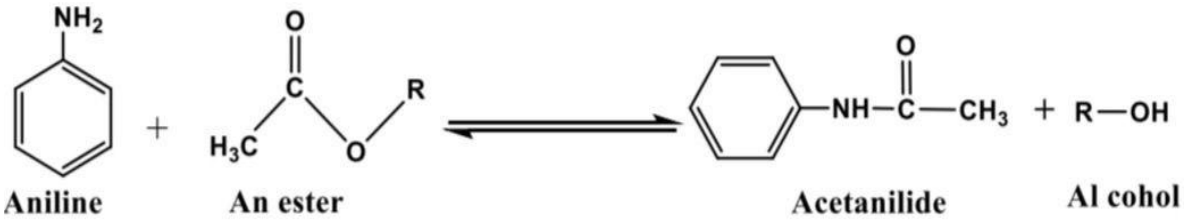
5- Methods of Preparation

1. **١-Reaction of aniline with acetyl chloride**
2. **٢-Reaction of aniline with an ester**
3. **3-Reaction of aniline with acetic acid**
4. **4-Reaction of aniline with acetic anhydride (today's reaction)**

1. Reaction of aniline with acetyl chloride



2. Reaction of aniline with an ester



3. Reaction of aniline with acetic acid

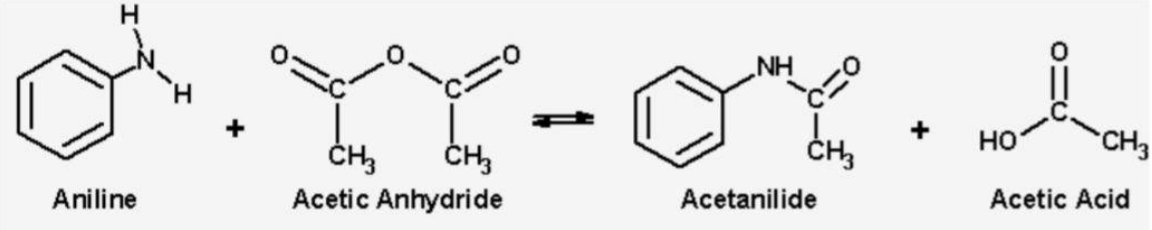
4-Reaction of aniline with acetic anhydride (today's reaction)

Synthesis of Acetanilide through nucleophilic acyl substitution (addition/elimination):

•Nucleophile: Aniline (amine)

•**Electrophile: Acyl group from Acetic Anhydride**

•**Product: Acetanilide + Acetic Acid**

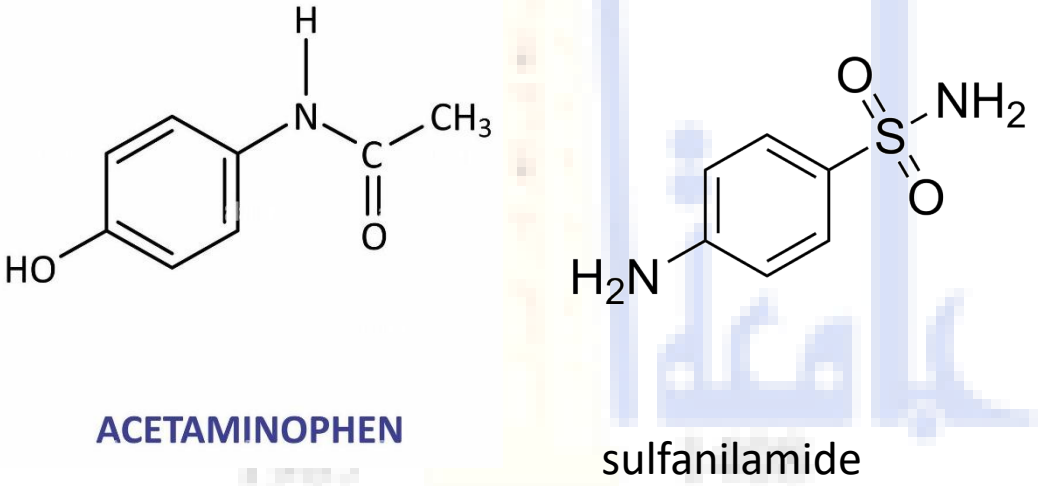


6- Uses of Acetanilide

Used to prepare substituted aromatic compounds (e.g., sulfanilamide)

Industrial use as a dye

Pharmaceutical intermediate it used as intermediate to prepare several drugs (e.g. Acetaminophen)



7- Procedure

1- In a conical flask, add 60 ml distilled water + 2 ml conc. HCl

2-Add 3 ml aniline with shaking

٣-Add 3 ml acetic anhydride stepwise (using burette), boil ~5 min

4-Add 10 ml of 10% sodium bicarbonate to hot solution

5-Cool at room temp, then in ice bath

٦-Filter precipitate

7-Dry, weigh, calculate yield

8-All additions stepwise inside fume hood