



# PRODUCTION OF PARACETAMOL

UNIT OPERATION

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## PRODUCTION OF PARACETAMOL (ACETAMINOPHEN)

### 1. Introduction

#### 1.1 Background

Paracetamol also known as acetaminophen (APAP) is a medicine to treat pain and fever. APAP is generally safe at recommended doses. APAP was first made in 1877.

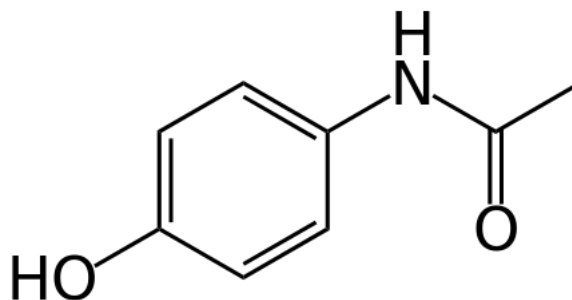


Figure 1: N-acetyl-para-aminophenol (APAP)

Paracetamol consists of a benzene ring core, substituted by one hydroxyl group and the nitrogen atom of an amide group in the *para* (1,4) pattern. The amide group is acetamide (ethanamide). Paracetamol is part of the class of drugs known as "aniline analgesics"; it is the only such drug still in use today. It is not considered an NSAID because it does not exhibit significant anti-inflammatory activity.

#### 1.2 Medical Use

- Fever
- Pain
- Headaches
- Dental use
- Postoperative pain

## 2. Unit Operation

No.	Unit Operation	Function
1.	Grind API	Is a process utilized in the tablet manufacturing process to reduce the size to increase uniformity
2.	Dry Blend Mixing	The ingredients is precisely mix to achieve product consistency and ensure product safety by promoting homogeneity in the final product
3.	Wet Granulation	Is important in forming particles that are able to endure the manufacturing process, prevent the segregation API and excipients, improve flowability and compressibility, reduce toxic dust, better tolerate environmental stresses and increase bulk density.
4.	Nano Milling	Milling is the process of reducing the size of the granules
5.	Fluid Bed Drying	The drying step of the wet granulation production process involves removing the solvent/liquid solution added during the granulation step.
6.	Screening	Once the particles are dry, they are run through a sieve to ensure appropriate diameters.
7.	Mixing	Ensures the uniformity of products composition and removes any lumping or aggregations.
8.	Tablet Press	Producing tablets from the mixture formed during the milling and final blending step. Correct number of granules are weighed and compressed into tablet via rotating tablet press.
9.	Tablet Coating	The surfaces of uncoated tablets produced during tablet compression are coated with specific material

# DRY GRANULATION

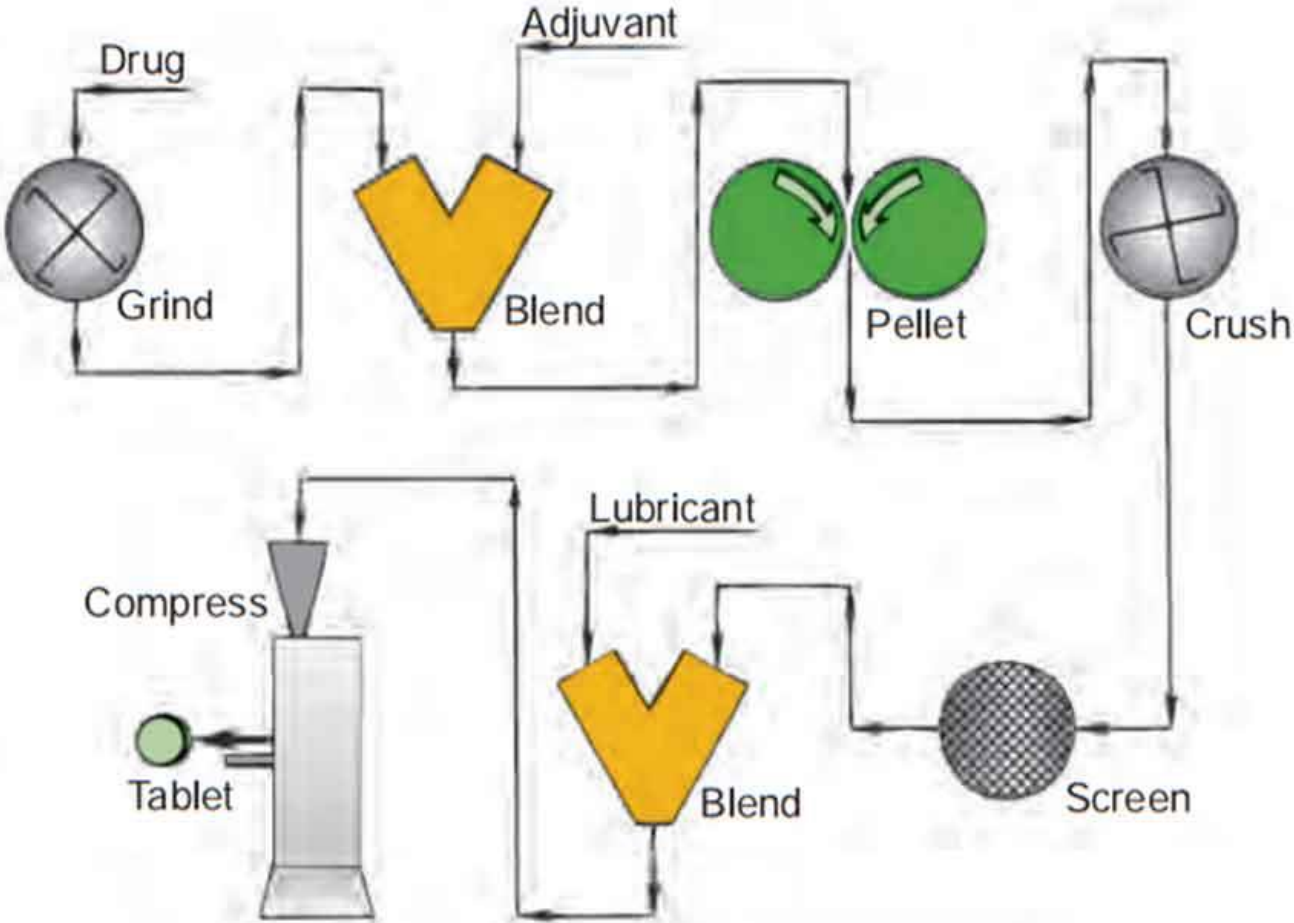


Photo credit: Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems. Philadelphia: Lipincott Williams and Wilkins.

### 3. Chemical Substances in each unit operation

#### 1. Grind

- Acetaminophen (0.116 kg/batch)

#### 2. Blend

- Acetaminophen (0.116 kg/batch)
- Microcrystalline Cellulose (0.436 kg/batch)
- Croscarmellose Sodium (0.014 kg/batch)

#### 4. Nano Milling

- Reduce all the substance.

#### 3. Wet granulation

- Water (5 kg/batch)
- Hydroxypropyl Methylcellulose (0.012kg/batch)

#### 5. Fluid Bed Drying

- Pressure: 0.3 bar
- Inlet Air Temp: 60 C
- Time: 35 min

#### 6. Screen

- run through a sieve to ensure appropriate diameters.

#### 8. Lubricant

- Magnesium Stearate (0.003 kg/batch)

#### 7. Mixing

- Rate: 25 RPM
- Room Temp: 19 C
- Time: 55 min

#### 9. Compress

- Rate: 25 RPM
- Pressure setting: 86.6 KN
- Time: 45 min

#### 10. Tablet

- Tablet Coating:
- Pan Speed: 5 RPM
- Flow Rate: 5 g/min
- Inlet Air Temp: 45 C
- Time: 40 min