



# PHARMSOL NEWS

## MUPS - A PROMISING & FLEXIBLE CONTROLLED DRUG DELIVERY SYSTEM

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The oral route of drug administration is the most important and user-friendly route of administration for controlled drug delivery system which acquired very important role in pharmaceutical research and development. Controlled drug delivery systems offer various advantages over conventional immediate release dosage forms in terms of

- 1) Altering drug release and absorption with an intention to deliver the drug to different regions of GIT or for timely release of the dose.
- 2) Maintaining the required plasma level of the drug over a specified prolonged period of time.
- 3) Reducing the dosing frequency and chances of dosing error.

The controlled release formulation can be a single unit dosage forms (capsules or tablets) and multiple-unit dosage forms (pellets or pellets in capsules or as tablet dosage form).

As a relatively more acceptable and novel approach Multiple Unit Pellets System (MUPS) combines the features of both controlled release tablets and modified release capsules in one dosage form.

MUPS offer various advantages over other systems, like reduced risk of local irritation and toxicity, predictability, bioavailability, reduced likelihood of inter subject variability than conventional formulations. Tableting of pellets reduces the esophageal residence time, compared with capsules, and improves physicochemical stability, compared with suspensions.

### Application of MUPS Tablets

1. For controlled release drug delivery system.
2. For enteric release and colon targeted drug delivery system.
3. Designing of Mouth-melting taste-masked dosage form.
4. Combining of drugs with different release patterns in the same dosage form.
5. Increasing the drug dose administered in controlled release form as compared to that possible with capsules.
6. Enhancing stability of dosage form as compared to its capsule counterpart.
7. Obviating the need for specialized packaging.

**TYPES OF MUPS:** Two categories of MUPS are possible:

- 1) MUPS comprising of coated pellets.
- 2) MUPS comprising of matrix pellets.

**Coated pellets:** Polymer coated pellets are compacted into tablets either alone or with a blend of excipients. This is the commonly employed among the two types.

**Matrix pellets:** Matrix pellets inherently contain excipients that retard drug release by being contained within the matrix of pellet structure.

### Formulation of MUPS include the following steps:

#### 1) Preparation of pellets:

Pellets may be manufactured by different methods based on their application. The most widely used processes are extrusion and spheronization, solution or suspension layering, and powder layering, globulation (Spray drying & spray congealing), balling.

#### 2) Selection of excipients:

In order to protect the integrity of coated pellets, excipients with protective (cushioning) properties are incorporated into tablet formulations. Inclusion of around 60-70% cushioning granules into the MUPS resulted in hard tablets with low friability and consistent drug release profiles.

#### 3) Compression of MUPS:

It depends on the various factors like, type, thickness and flexibility of coat applied, size, porosity and mechanical crushing strength of pellets, extra granular excipients including cushioning agents with desired compression force and speed.

#### Key Process Variables:

**1) Compression force:** It should be sufficient to form a compact and avoid any damage to the polymer coat and pellet rupture to avoid dose dumping.

**2) Compression speed:** The tableting rate & pressure is adjusted such that the final mixture remains homogeneous on tableting

#### Equipment variables:

Any tablet compression machine with little modification in powder feeding mechanism and specialized force feeder & feed frame can be used for preparing MUPS.

Critical material attributes in formulation and critical process parameters in process are to be balanced to get a desired critical quality attribute like:

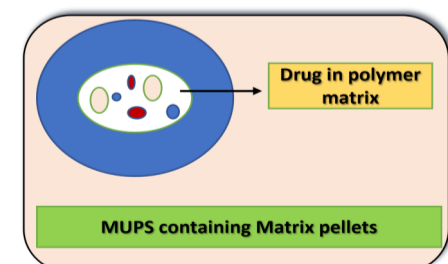
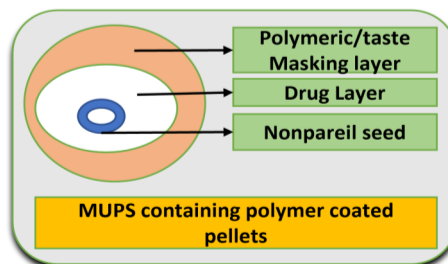
- 1) Selection of polymers, plasticizer, and optimization of process conditions are crucial in the coating process.
- 2) Ratio of pellets and other excipients, incorporation of cushioning agents and compression force along with optimization of processing conditions are crucial in case of compression process.

#### Conclusion:

MUPS offer many advantages in terms of drug delivery and stability of dosage forms. Selection and balancing the key factors make MUPS a potential drug delivery option for a variety of molecules.

#### How PharmSol can help you?

- Development and tech transfer of formulations using pelletization techniques including MUPS formulation.
- Reformulation of approved products for cost-effective approach



Get in touch with our experts, please email [info@pharm-sol.com](mailto:info@pharm-sol.com)

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