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**Review Article** 

### Pharmaceutical Significance of Poly (E-Caprolactone) and Eudragit® microparticles

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**Abstract:** Micro-particles with polymers have got widespread application in formulation and development of various pharmaceutical and Life Sciences for taste masking, improving bioavailability, creating enteric coating, developing sustained released formulation, colon targeting therapy and developing pH dependent formulations. The development of various polymer helps to develop effective drug delivery system in pharmaceuticals and Life Sciences formulations. This polymer helps to create comprehensive drug delivery platform by improved protection, improved solubility and sustained release effect. These polymers are industry choice for the targeted drug delivery profiles. The objective of current manuscript to evaluate importance of Poly ( $\varepsilon$ -Caprolactone) and Eudragit® and its application in pharmaceutical and Life Sciences Industry for the development of various type of dosage forms. **Keywords:** Poly ( $\varepsilon$ -Caprolactone), Eudragit, Microparticles

### **INTRODUCTION**

Poly (ɛ-Caprolactone) is a biodegradable, biocompatible and semi-crystalline polymer having a very low glass transition temperature. It is suitable for



The Eudragit® was first developed by Dr. Rohm in 1933 and it is range of various polymers. In the year 1954, first two commercial polymers (Eudragit L & S) were launched for enteric coating. It was very useful to improve the quality of film coating and better than sugar and Shellac which was widely used at that time. The main advantage of Eudragit® was its quick disintegration and help for developing sustained release development of sustained release formulation and targeted drug delivery system. This fiber can be fabricated in to different forms and also useful for the implants and other surgical application [1-5].



formulation which was introduced in 1960. Various forms of Eudragit® were developed including aqueous polymer dispersion which was major breakthrough to make coating easier and safe and also cost efficient. It is available as dry powder, aqueous dispersion and Organic solution. Different polymer grade helps to prepare formulation with various solubility [6-10].

Product	Availability	Dissolution property
EUDRAGIT <sup>®</sup> L 100-55	Powder	Dissolution above pH 5.5
Acryl-EZE <sup>®</sup>	Ready-to-use color matched powder	
(functional polymer:	mixture	
EUDRAGIT <sup>®</sup> L 100-55)		
EUDRAGIT <sup>®</sup> L 30 D-55	Aqueous dispersion	
PlasACRYL <sup>®</sup> HTP 20	Easy-to-use glidant and plasticizer	-
	premix, specifically designed for	

#### **Table-1: Types of EUDRAGIT®**

	EUDRAGIT <sup>®</sup> L 30 D-55	
EUDRAGIT <sup>®</sup> L 100	Powder	Dissolution above pH 6.0
EUDRAGIT <sup>®</sup> L 12,5	Organic solution	-
EUDRAGIT <sup>®</sup> S 100	Powder	Dissolution above pH 7.0
EUDRAGIT <sup>®</sup> S 12,5	Organic solution	
EUDRAGIT <sup>®</sup> FS 100	Powder	
EUDRAGIT <sup>®</sup> FS 30 D	Aqueous dispersion	
PlasACRYL <sup>®</sup> T20	Easy-to-use glidant and plasticizer	-
	premix, specifically designed for	
	EUDRAGIT <sup>®</sup> FS 30 D formulations	

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Source: http://healthcare.evonik.com

# Importance of Poly (ε-Caprolactone) and Eudragit® [11-15]

This polymer is the gold standard and reliable platform for developing solid dosage forms. They help for the formulation flexibility and enable API in solid dosage form and unfold it where and when it delivery it's best result and also enhance quality of the formulation. Specific drug delivery system can be developed by using high performance film coating which helps to meet specific drug delivery requirements. Tailored made release profile is also possible by combination of various polymers. Therapeutic efficacy and patient compliance by developing moisture protection formulation and by creating formulation with taste/ order masking.



Source: Najim A. AL-Awwadi et al. (2004)

Fig-1.0:

There are several advantages of these polymers, which are as follows:

- Help for molecular weight distribution
- It helps to develop batch-to-batch consistency
- Affecting viscosity

- To develop thermoplastic properties
- Helps in stabilization
- Improving binding capacity of pigment
- Improved thermos-stability



Source: Najim A. AL-Awwadi et al.(2004)

## Fig-2.0: Incorporation profile of fludrocortisone (FLU) into micro-particles of poly (ε-caprolactone) and Eudragit® RS as function of the fludrocortisone concentration in the organic phase. QOP:

The main advantage of these polymer is they can dissolve at specific pH hence they enable formulation to act at specific place in intestine and help companies to develop gastrointestinal targeting products.

Enteric coating with polymers having several benefits as under :

- Help to improve drug efficacy/ effectiveness
- Colon delivery system
- Product with pH controlled drug delivery
- Gastro resistance formulation
- Help to protect acid sensitive/ related activities.

### CONCLUSION

Poly ( $\varepsilon$ -Caprolactone) and Eudragit® are easy to use while preparing formulation and useful to improve coating efficiency along with reduction in processing time during drug development and during production. It is important to select specific grade of these polymer while drug development.

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