



iff

Where science
& creativity meet

Liquid and semi-solid applications to
improve patient experience and compliance

SUSPENSIONS

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Suspensions, liquid and semi-solid drug formulations must be formulated with utmost precision. The dosage form is effective for vulnerable populations, like newborns, pediatrics and geriatrics, who need easy-to-administer medicines.

Given the criticality of treating these groups, product stability and efficacy are paramount.

The formulation experts at IFF can help you design an optimal liquid or semi-solid application using our broad portfolio of specialized excipients and deep expertise in suspensions. Our team puts into action our decades of experience and know-how to find answers to your biggest challenges.

Enabling technologies and excipient options, at every turn of your formulation journey

Avicel® cMCC is the 1st choice suspending agent

- Avicel® cMCC provides strong suspending capability
- Avicel® CL-611 can be activated with low shear

GRINDSTED® Xanthan is efficient and robust as a suspending agent and viscosifier

- GRINDSTED® Xanthan provides medium to low suspending capability, is an excellent viscosifier
- Effective at very low use levels, provides good stability
- At extreme low pH, GRINDSTED® Xanthan functions as a synergistic protective colloidal for Avicel® cMCC

TEXTURECEL™ NaCMC is versatile

- TEXTURECEL™ NaCMC provides a clear suspending vehicle, is an excellent viscosifier
- Properties of TEXTURECEL™ NaCMC can be fine-tuned through different viscosities and DS
- At low pH, TEXTURECEL™ NaCMC functions as a synergistic protective colloidal for Avicel® cMCC



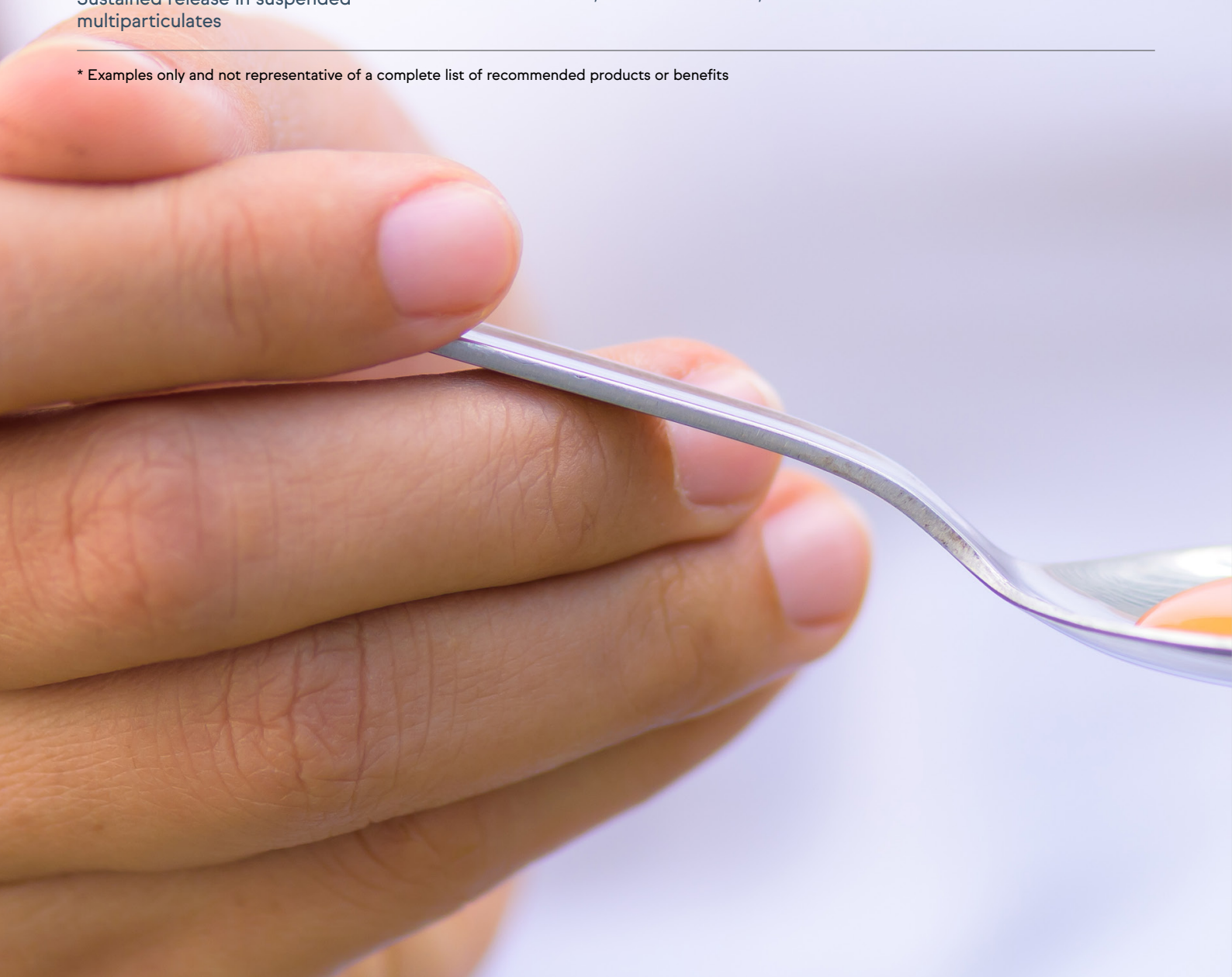
To help design an effective suspension, it's crucial to choose the right excipient. Multiple excipients, such as a suspending agent, protective colloid, and viscosifier, ensure a uniform and stable product with pleasant taste and mouthfeel. IFF offers an unmatched suspensions portfolio:

- **Avicel® RC-591** and **Avicel® CL-611** are highly effective suspending agents for pharmaceutical liquid and semi-solid applications, offering superior suspending capability and stability throughout shelf-life of the product. The wide range of thixotropies, viscosities, gel strengths, and dispersion characteristics of this product line delivers unparalleled functional versatility and physical stability of suspensions.
- **GRINDSTED® Xanthan** is a very effective thickener and suspending agent. It provides desired rheological characteristics and ensures formulation homogeneity at very low use levels. Improved sensory attributes, like appealing mouthfeel, are another reason to include this excipient in liquid dosage forms.
- **METHOCEL™ water-soluble cellulose ethers** are excellent thickeners, suspend solids, lubricate and retain moisture. The protective colloid action and emulsifying properties of **METHOCEL™ cellulose ethers** also benefits many liquid formulations.
- **TEXTURECEL™ sodium carboxymethylcellulose (NaCMC)** controls the rheological (flow) properties in a variety of liquid dosage forms. Whenever viscosity control, suspension stabilization, improved mouthfeel, water absorption or water retention is required, it is an excellent choice.
- **ETHOCEL™ ethylcellulose** is a hydrophobic polymer that can be used as a barrier coating for moisture protection, taste masking or sustained released on suspended particles.
- **Aquacoat® ECD** is an aqueous dispersion of ethylcellulose.
- **Gelcarin®** and **Viscarin®** are carrageenans from natural sources which offer specific gelling, thickening, stabilizing properties and superior mouthfeel.
- **Protanal®** and **Manucol® sodium alginates** have a unique combination of properties. They provide thickening, gelling as well as stabilizing functionalities to liquid and semi-solid dosage forms.

PRODUCT RECOMMENDATIONS*

Benefits	Recommended Products
Stabilization of oral liquid formulation Adjustment of rheological properties, Emulsification, Improving sensory attributes and mouthfeel	Avicel® RC-591, Avicel® CL-611 GRINDSTED® Xanthan 80 PRM Plus, GRINDSTED® Xanthan 200 PRM Plus, GRINDSTED® Xanthan Easy PRM, GRINDSTED® Xanthan Clear 80 PRM TEXTURECEL™ 1,000 PA 07, TEXTURECEL™ 2,000 PA 07, TEXTURECEL™ PRM 2,400 PA 07, TEXTURECEL™ 4,000 PA 07, TEXTURECEL™ 20,000 PA 07 METHOCEL™ E5 PRM, METHOCEL™ E4M PRM, METHOCEL™ K4M PRM METHOCEL™ A4M PRM Protanal® CR8133, Manucol® LKX Gelcarin® and Viscarin® carrageenan
Thickening of ointment base Contributing to film formation Improving sensory attributes	METHOCEL™ A4M PRM, METHOCEL™ K4M PRM, METHOCEL™ E4M PRM
Modified release coating for taste masking Sustained release in suspended multiparticulates	Aquacoat® ECD-30 ETHOCEL™ Std 4, ETHOCEL™ Std 7, ETHOCEL™ Std 10

* Examples only and not representative of a complete list of recommended products or benefits





PRODUCT SELECTION GUIDE - SUSPENSIONS

Application in Suspension			AVICEL® cMCC		GRINDSTED® Xanthan				TEXTURECEL™ NaCMC				
			RC-591	CL-611	Clear 80 PRM	80 PRM Plus	200 PRM Plus	Easy PRM	1,000 PA 07 & GA 07	2000 PA 07 & GA 07	1,000 PA 07 & GA 07	4,000 PA 07 & GA 07	PRM 2400 GA 07
Functionality	Suspending agent	Capability	+++	+++	++	++	++	++	+	+	+	+	+
		Clarity	+	+	+++	++	++	++	+++	+++	+++	+++	+++
	Viscosifier	Viscosity	+	+	+++	+++	+++	+++	+	++	+++	+++	++
		Protective colloid		+	++	++	++	++	+	+	+	+	+
Ease of activation			+	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++
Dosage form	Liquid suspension		+++	+++	++	++	++	++	+	+	+	+	+
	Reconstitutable powder			+++	+++	+++	+++	+++	+	+	+	++	+
	Liquid solution				+++	+++	+++	+++	+++	+++	+++	+++	+++

We want to help you be successful in whatever application you are considering, so please contact us. Our experts are eager to tackle your challenges.







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