GRAPHENE-ENHANCED PLASTICIZERS

"REDEFINING PERFORMANCE IN CEMENT & POLYMER SYSTEMS"

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THE CASE FOR SMARTER PLASTICIZERS
TODAY'S CHALLENGE?

Traditional plasticizers work

—but they leach, degrade, and limit innovation.

Cement needs more workability with less water.

Plastics need flexibility without compromise on migration or durability.

The market is ready for:

- 🌍 Eco-compatible solutions
- 💪 Longer performance life
- 🚀 Multi-application platforms

PERFORMANCE MEETS REGULATION.
TOMORROW'S ANSWER? GRAPHENE.

IN CEMENT – WORKABILITY UNDER CONTROL

- *Extreme temperature resistance – ideal for cold pours and thermal installations*
- *High slump at lower water ratio – better flow without bleeding*
- *Shrinkage reduction & crack control*
- *Water penetration resistance – makes cement surfaces denser and longer-lasting*
- *Use cases:*
  - ❄️ *Cold country foundations*
  - 🏭 *Industrial floors*
  - 🌊 *High-moisture environments*
  - 🧱 *Repair grouts and smart concretes*

- **Better graphene dispersion = consistent flexibility**
- **Less migration** = safer for packaging & medical-grade materials
- **Improved barrier against oxygen, moisture, solvents**
- **Thermal and UV resistance** built into the polymer system
- **Applicable for:**
  - Food & pharma packaging
  - Medical tubing, IV bags
  - Auto interior plastics, flexible electronics
  - Vacuum pouch, stretch films

GRAPHENE-ENHANCED POLYMERS

IN POLYMERS – BARRIER STRENGTH WITHOUT BULK

PLASTICIZER BLENDS THAT BREATHE STRENGTH. NOT VOLATILITY.

WHY GRAPHENE WORKS AS AN ENHANCER

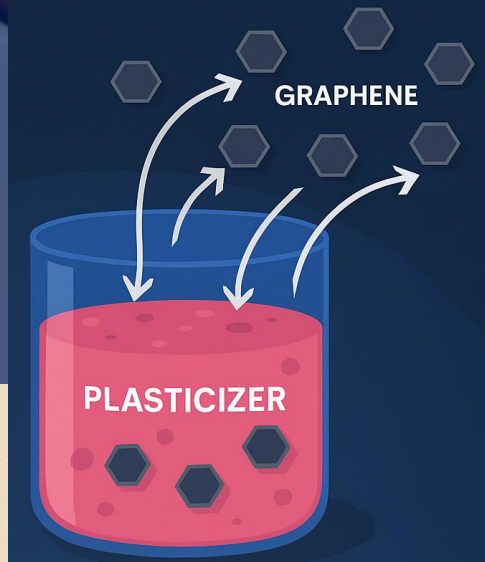
- GRAPHENE BINDS INTERNALLY, **MODULATING VISCOSITY AND FLOW**
- PREVENTS **PHASE SEPARATION AND SURFACE LEACHING**
- ACTS AS **NANO-BARRIER** IN POLYMER AND CEMENT PORES
- SUPPORTS BOTH **IONIC AND NONIONIC DISPERSIONS**

We don't replace the plasticizer. We unlock it.

📊 LAB-BACKED:

- +25–40% STRENGTH
- -20% SHRINKAGE
- +30°C THERMAL STABILITY
- UP TO 3× LONGER EFFECTIVE LIFE OF PLASTICIZERS

Graphene-Enhanced Plasticizer



- Improved Dispersion
- Reduced Migration
- Thermal Stability
- Flexibility Retention

STRATEGIC INSIGHTS & VALUE ANALYSIS

COST STRUCTURE, ENVIRONMENTAL FOOTPRINT, AND REGULATORY POSITIONING

PART 1: CEMENT ECONOMICS – BETTER MIX. LOWER COST.

💰 **Net savings**: ₹1300–₹1800/m³
🛠️ **Reduced repair & curing costs**

Metric	Conventional	Graphene-Enhanced
Superplasticizer cost	₹1,000/ton	₹800/ton
Water content required	160 L/m³	120 L/m³
Cement needed	320 kg/m³	250–270 kg/m³
Overall gain	Better workability, 10–20% lower cement and labor cost	

PART 2: POLYMER ECONOMICS – MARGIN BEYOND MATERIAL

Factor	Conventional Plasticizer	Graphene Enhanced
Additive cost	₹50–₹300/kg	+₹5–₹15
Shelf life	~1 year	Up to 3 years
Market claim	Flexible	Barrier + safe + smart
Customer retention	Moderate	High (medical/food brands)

📦 **Outcome**:

- Premium pricing window unlocked
- Reduction in plasticizer-related complaints
- Alignment with food-safe, pharma-grade regulation

LET'S SCALE TOGETHER

RI GROUP OFFERS:

- ✅ PRE-FORMULATED GRAPHENE BLENDS FOR CEMENT & PLASTIC
- ✅ PILOT SAMPLES, INTEGRATION SOPS, FIELD SUPPORT
- ✅ LICENSING FOR REGIONAL MANUFACTURING & EXPORT

GRAPHENE-ENHANCED PLASTICIZERS

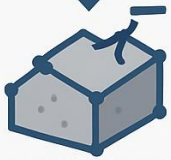
CEMENT

LOWER FLOWABILITY WITH HIGH WATER DEMAID

HIGH WORKABILITY WITH LOWER WATER DEMAND

TRADITIONAL PLASTICIZER

GRAPHENE



HIGH WORKABILITY WITH LOWER WATER DEMAND

POLYMERS

PLASTICIZER MIGRATION AND LEACHING

IMPROVED BARRIER PERFORMANCE

WHY PARTNER WITH RI GROUP?

"WE'RE NOT HERE TO SELL A CHEMICAL. WE'RE HERE TO HELP YOU LEAD THE REVOLUTION."

What We Offer	How You Benefit
Tailored graphene formulations	No change to production sequence
Pilot trial support	Test and scale confidently
Multi-grade graphene	Pre-validated for cement and polymers different grades
Mass-production ready	>5 tons/month available on order

📞 **CONNECT FOR PILOT DEMOS, COMPATIBILITY MAPPING, OR COLLABORATION** 📧

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