

Resin Capsules for Soil and Environmental Testing



U.S Patent 5,355,736
Canadian Patent 2,087,153

PST – 1 Capsule
A Technology Providing Simple, Accurate Measure of Elemental Bioavailability . . .

Potassium	Sodium
Sulfur	Manganese
Phosphorus	Iron
NO ₃ -N	Zinc
NH ₄ -N	Copper
Calcium	Lead
Magnesium	Mercury
And others	

Resin Capsule

2 cm (0.75 inches)

Made in the U.S.A.

ENV Capsules
Targets Organic Chemicals
In situ Solid Phase Extraction (ISSPE) Technology
Detect, Monitor, & Quantify . . .

- Chlorinated Industrial Solvents
- Hydrocarbons
 - Gasoline
 - Other Petroleum Compounds
- Pesticides
- Organic-Heavy Metal Complexes
- Soil Humics
- Gases (aliphatics and aromatics)



Benefits

Reduces lab cost dramatically

Eliminates lab testing steps (drying, grinding, weighing and multiple extractions)

Reduces testing costs by 30 to 50 %

Passive *in situ* test for natural conditions
Improves detection by concentrating over time
Sensitive to liquid, dissolved, or gas phases

Simultaneous, “universal” adsorption

All available elements accumulated by a single capsule
Nutrients and contaminant levels revealed

Monitor or quantify simply

No need for elaborate equipment for chemical accumulation
Simple extraction Techniques for sample analysis

Applications

Use in the laboratory

Simple straight-forward protocols
Use on “field fresh” samples

Contaminant testing in soil, vadose zone, water & gas

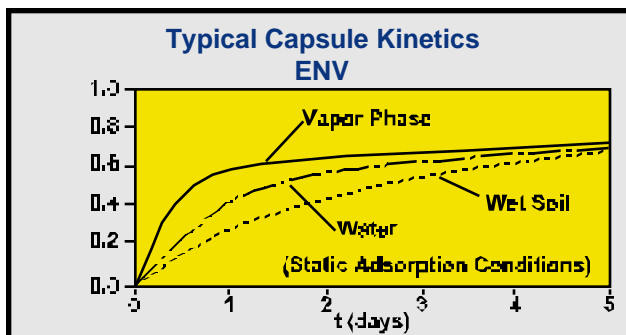
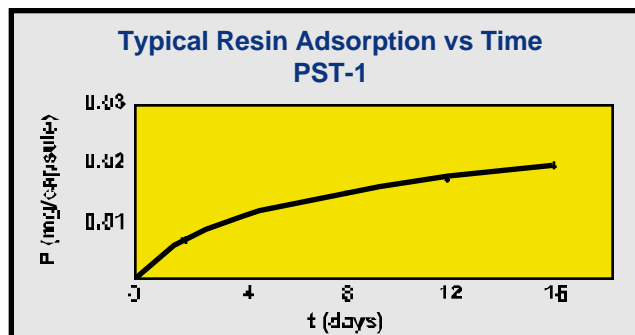
Excellent detection of hydrocarbon vapors in soils
Monitor *in situ* remediation progress
Easily determine types and relative amounts of organics

Use in the field

Continuous *in situ* monitoring

Physical Characteristics and Specifications

Size:	2 cm (0.75 inch); Weight: 10 grams
Shelf Life:	Indefinite. Resin may be rejuvenated if it dries out
Construction:	Spherical ball of resin encapsulated in a mesh plastic fabric
Materials:	Chemically stable in most media
Storage Conditions:	Cool, but not below freezing
Sensitivity:	Mostly in the microgram range



Abbreviated Testing Protocol
Place capsule in soil at root zone Remove after 7 days Remove all foreign residue Transport to lab in inert, sealed container Extract capsule with 50 mL 2 M HCl Analyze for all target elements 7. Correlate test results to data base

Abbreviated Testing Protocol
1. Place capsule in testing medium <i>in situ</i> 2. Remove capsule after prescribed time 3. Remove all foreign residue 4. Transport to lab in inert, sealed container 5. Desorb: solvent or thermal 6. Conduct gas chromatography or other analysis 7. Correlate test results to user data base

Features . . .

Advantages . . .

Benefits . . .

PST-1

1. Simultaneously adsorbs all ions:
2. Measures rate of bioavailability:
3. Sensitive to soil properties:
4. Works in all kinds of soils:
5. Laboratory or *in situ* use:

measures the availability of elements to a plant
 calibrate to specific plant and soil – identify appropriate plantings
 know process rates
 universal test for all regions – easily transfer data base to new sites
 simple protocols for moist or dry soils – observe natural conditions

ENV Series

1. All organics adsorbed simultaneously:
2. *In situ*, direct evaluation:
3. Follow remediation progress:
4. Vapor-phase application:
5. Simple, reproducible protocol:
6. Testing under natural influences:

determine chemicals present – know range to manage
 test wells, flowing water, or moist soil
 repeated, “point” sampling – know what happens at one point
 results reflect vapor transfer conditions – no elaborate equipment
 use for intensive or extensive surveys – compatible methods
 environment influence – permits practical remediation

In Situ Monitoring

1. Non-destructive sampling:
2. Evaluate natural environment:
3. Simple installation:
4. Very easy to use:

repeat sampling at same point – eliminate site variability effects
 respond to varying conditions – see soil as a plant does
 maintain a natural sample point – data not compromised
 quickly changed – minimizes drudgery of collecting samples