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Relationships



Texas A&M University

- Technology Licensor
- Manufacturing Manager'
- Market Development Manager
- Regulatory Manager
- International Regulatory Manager
- Supply Chain Manager
- Intellectual Property Manager
- Licensed Technology
- Development Laboratory
- QA/QC Laboratory
- Toxicology Consulting
- Government Relationships
- Publications & Presentations

Parent Company History

- Founded in 2005, **TxESI** is the first Texas A&M University System equity owned start-up. TAMUS still maintains a 17% equity ownership in **TxESI**.

Texas A&M
University



- **TxESI** is developing of soil remediation strategies for hazardous environmental chemicals such as PFAS, PCBs, mycotoxins, polycyclic aromatic hydrocarbons (PAHs), pesticides, plasticizers, commercial solvents, and toxic metals.
- **TxESI's** new products are Acid Processed Montmorillonites (APMs) which
 - are generally recognized as safe,
 - will bind and inactivate toxic chemicals *in situ*,
 - can remediate soil utilizing a *fix and forget* strategy,
 - can be economically utilized to bind soil toxins using as little as 2% by weight of the contaminated soils.

Value Chain Focus

TxESI is focused on processing raw source material into innovative products.

TxESI Value Chain Capabilities



TxESI Core Focus

EPECC/US Silica
Exclusive
Supply
Agreement

QA / QC Function
Records & Retains

DOD/DOE

FEMA

EPA

Waste Disp.

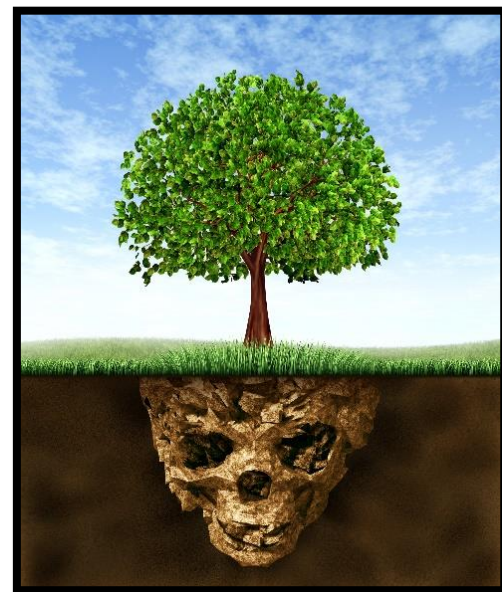
Petrochemical

Agriculture

 = TxESI Strength
 = TxESI Partnership

What is the Problem?

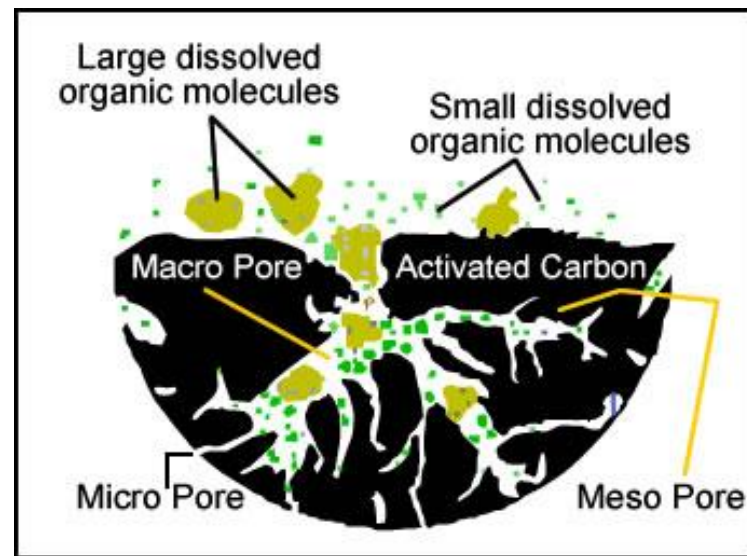
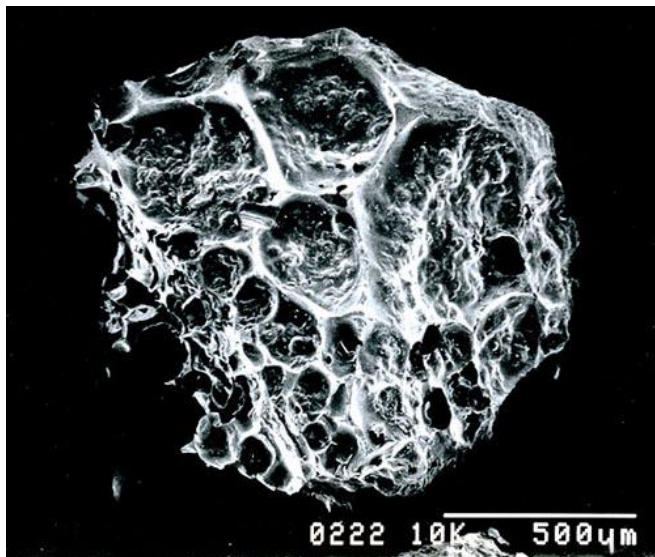
- Soil is contaminated by persistent organic pollutants (POPs)
- POPs cause soil disfunction and affect environmental health.
- POPs in the soil translocate to comestible plants and crops.
- POPs affect invertebrate animals such as earthworms.
- POPs of concern include:
 - polyfluoroalkyl substances (PFAS)
 - polychlorinated biphenyls (PCBs)
 - polycyclic aromatic hydrocarbons (PAHs)
 - pesticides
 - plasticizers
 - commercial solvents
 - toxic metals
 - mycotoxins
 - nano plastics



Competitive Technology

Activated Charcoal Technology

Activated Charcoal is produced by forcing steam through charcoal that creates cracks and pores through the charcoal that allows large amounts of molecules to be indiscriminately adsorbed into the matrix; however, this adsorption is reversible.



Our Technology



- Uniform Particle Size Materials with charged surfaces for binding charged particles.
- Enhanced surface area and pore size with heterogeneous binding sites within the same patented composition.



Montmorillonite – Stacked Platelet Structure

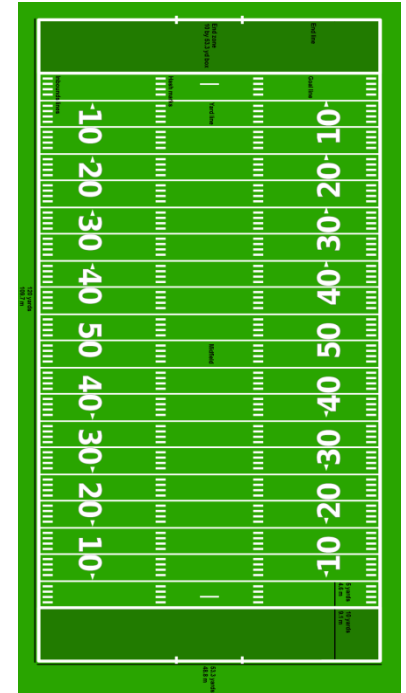
Technology



Selective Binding SURFACE AREA



= 7x



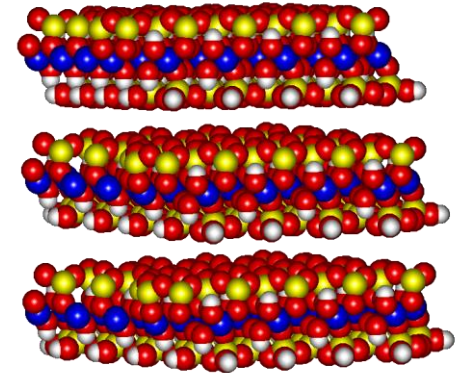
One
Tablespoon

Seven
Football Fields

Unique Composition

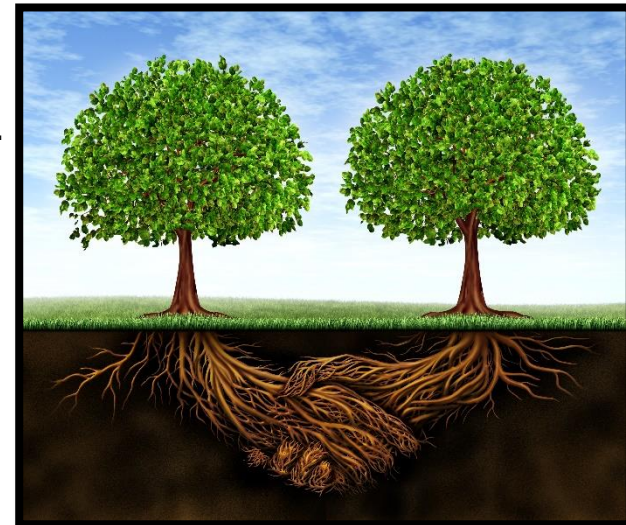
Calcium Silicoaluminate (CAS/USPN)

- Unique Properties
 - Non-Swelling clay having a uniform particle size
 - Exceptional toxicant adsorption properties
 - Negligible dioxin and heavy metal contamination
- Clinical & Regulatory Approvals
 - GRAS (Generally Recognized As Safe) 21CFR 182:2729
 - FDA, WHO and AAFCO approved food and feed additive
 - Listed in U.S. Pharmacopeia and WHO, JEFCA Formulary
 - US FDA Drug Master File
 - Investigational New Drug (IND): Prevention of Cancer Associated with Mycotoxin Exposure (Clinical Site – U.T. Health Science Center San Antonio)
- TxESI Intellectual Property
 - Exclusive supply agreement with EPECC/US Silica
 - Composition, method and process patent applications issued and pending.



**Calcium Silicoaluminate:
Molecular Structure**

Image Courtesy Tim Phillips, PhD

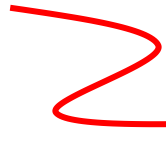


TxESI Product

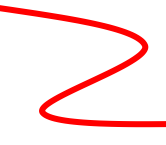
Stacked Platelet Structure Incorporates acid equivalence



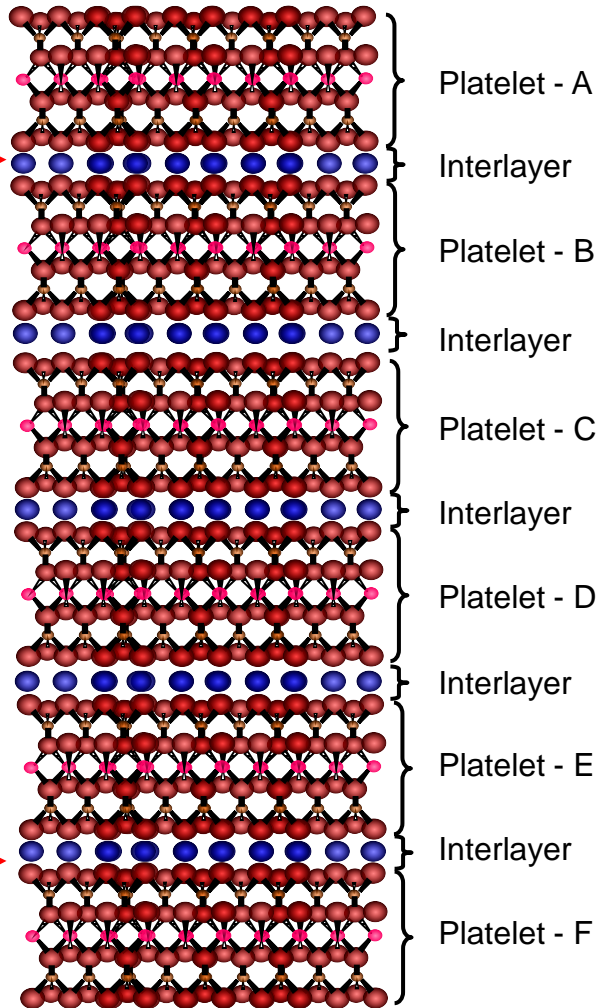
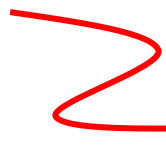
Incorporations of
Acid Equivalence
In the Matrix



Incorporations of
Acid Equivalence
In the Matrix



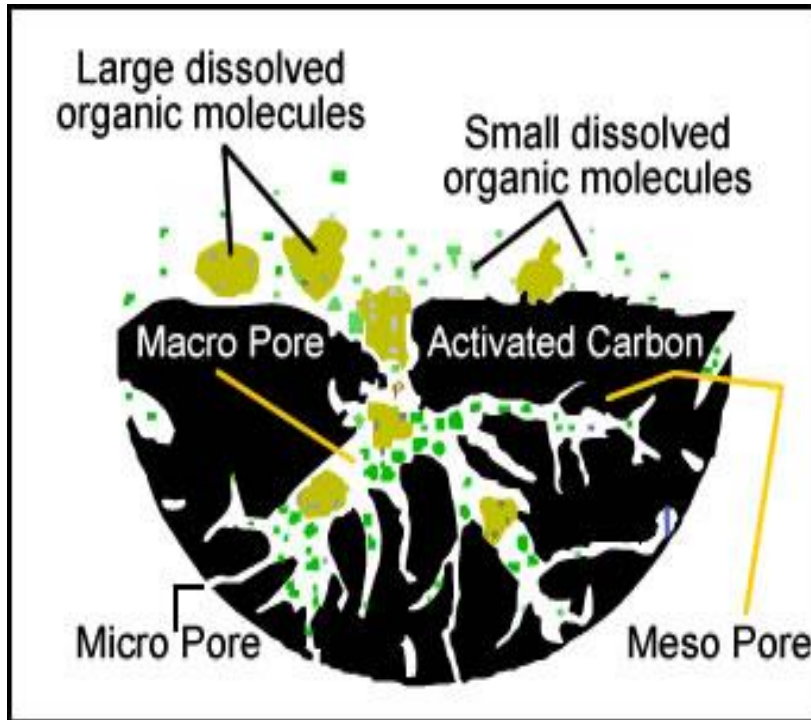
Incorporations of
Acid Equivalence
In the Matrix



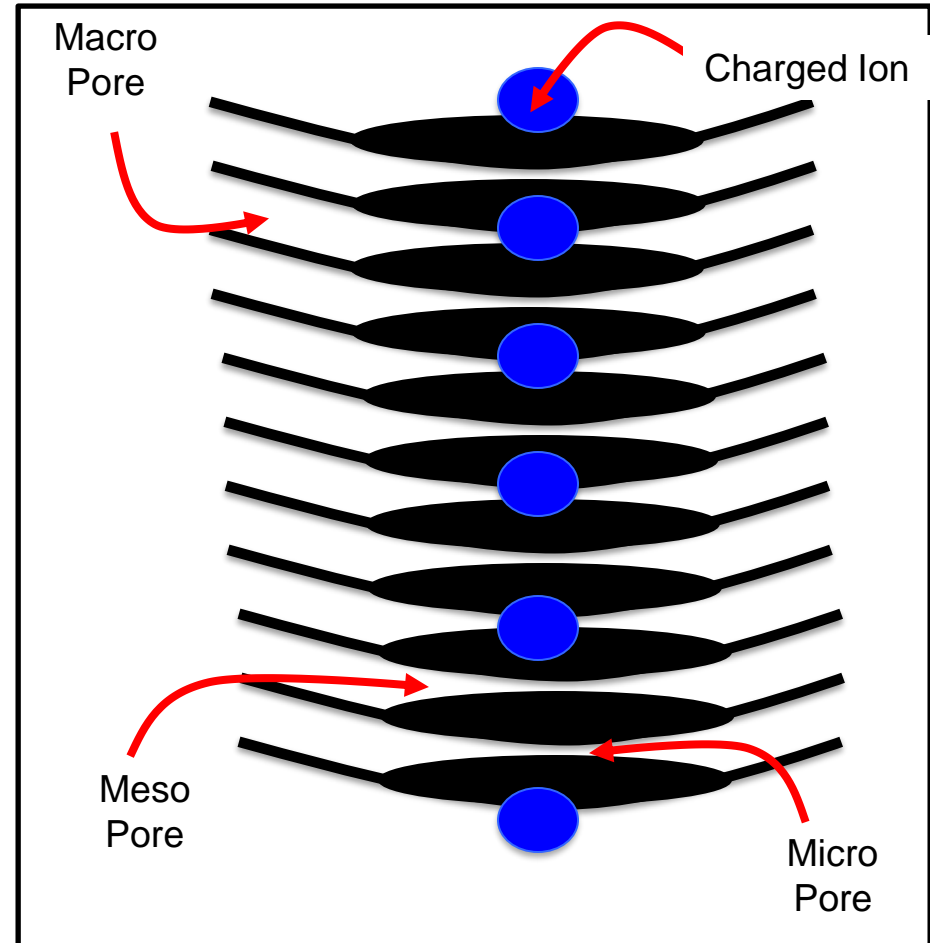
Technology



- Activated Charcoal has only Macro, Meso and Micro pores
- Our Product has Macro, Meso and Micro pores PLUS pH dependent positively charged ions and negatively charged surfaces.

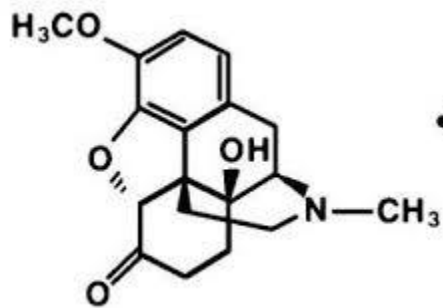
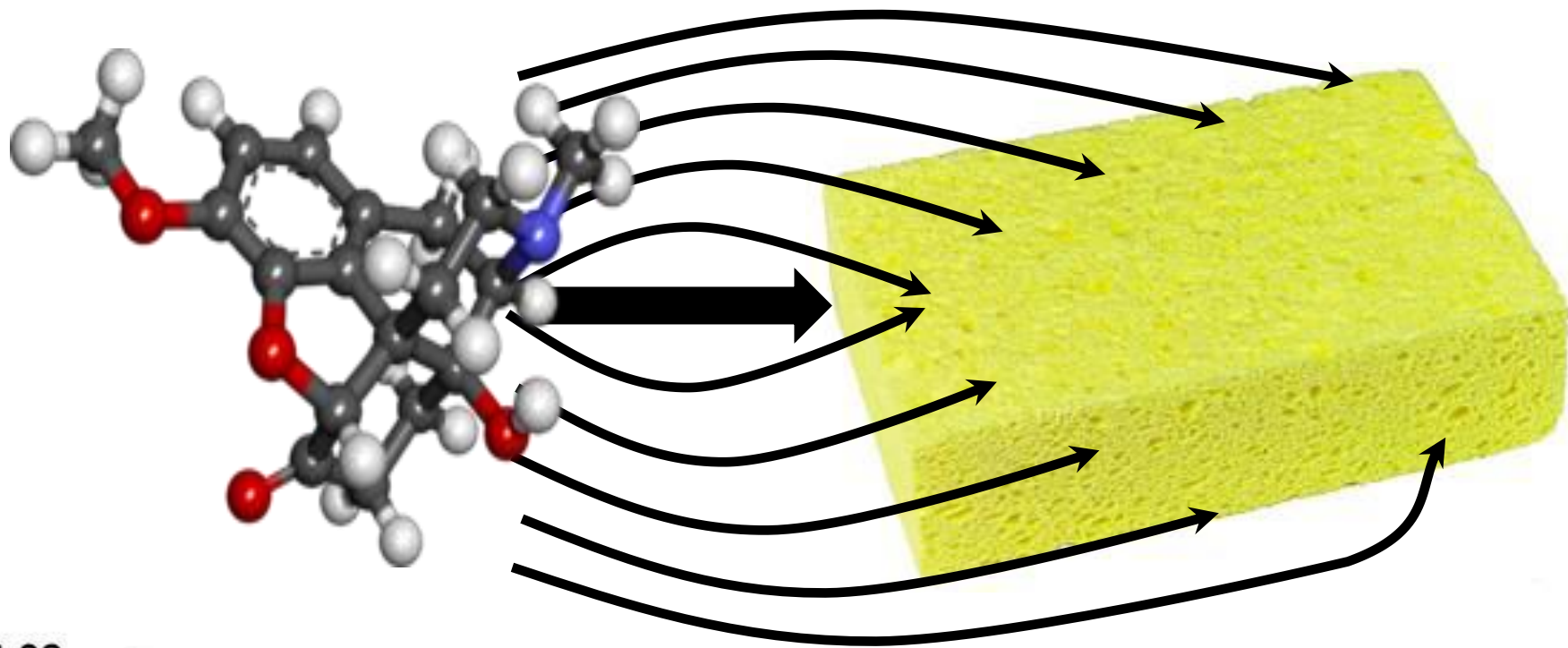


Activated Charcoal – Pores only

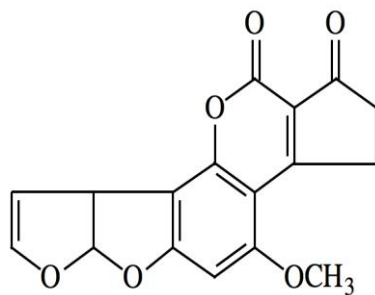


Our Product – Pores PLUS charged ions

Broad-Acting Sorbent for Hazardous Chemicals



•HCl

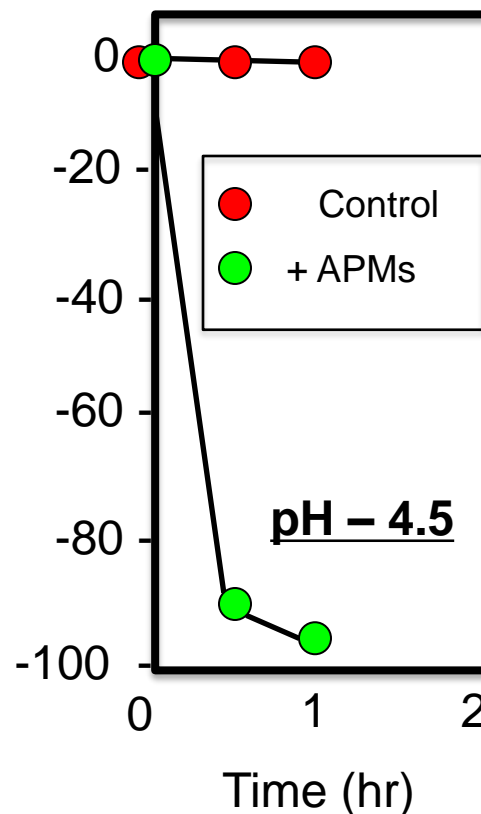
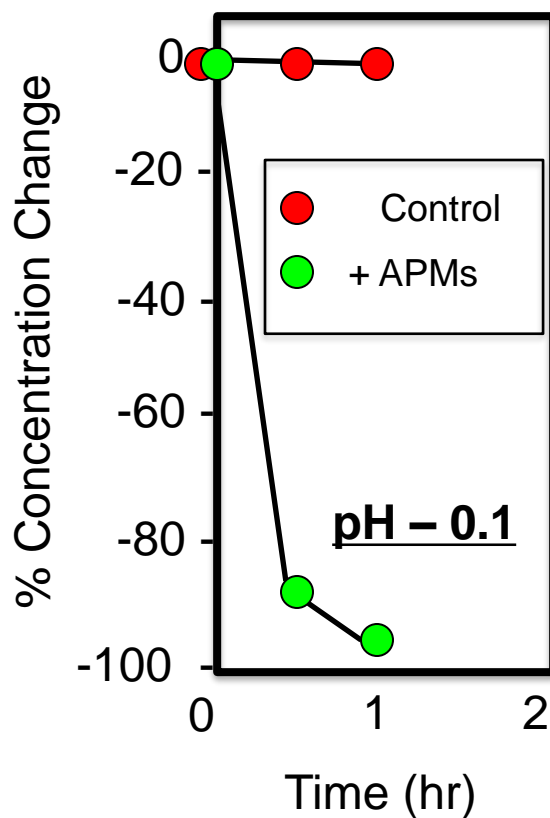
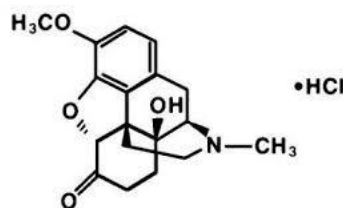


Broad-Acting Sorbent
for PFAS, PCBs, etc.

Hazardous Chemicals

Technology

TxESI's APMs are unique at removing over 95% of hydrocodone bitartrate and metabolites from solutions at stomach pH and gut pH in less than 1 hour.



TxESI's Intellectual Property (IP) Patents and Trade Secrets



- PATENTS - TxESI has three core technologies having issued and pending patents world wide.
 - **TxESI-0001** – PRESERVATIVE AND ADDITIVE FOR FOOD AND FEED
 - **ISSUED:** UNITED STATES, CANADA, CHINA, JAPAN
 - **TxESI-0005** -COMPOSITION FOR THE ENTEROSORPTION AND MANAGEMENT OF TOXINS.
 - **ISSUED:** UNITED STATES, AUSTRALIA, CANADA, KOREA, CHINA, EUROPE
 - **TxESI-0004** – CALCIUM ALUMINOSILLICATE PHARMACEUTICAL
 - **ISSUED:** AUSTRALIA, CANADA, JAPAN, KOREA, CHINA, EUROPE
 - **TxESI-0008** – ENTEROSORBENT TO MITIGATE ACUTE. . . US2021013797 A1
 - **ISSUED:** UNITED STATES, EUROPE
 - **PENDING:** JAPAN, MEXICO
- TRADE SECRETS – TxESI has Trade Secrets on the industrial manufacture of these products.