Desulfurization Powder

**Ferrosorp®DG** is a powdered substance based on iron(III) oxide-hydroxide FeO(OH) and is used to bind hydrogen sulfide inside anaerobic digesters. It provides a cost effective, non corrosive alternative for reducing H₂S levels in biogas produced by digesters. For more information on the non-corrosive characteristics of this powder, please contact our sales group for a copy of our Corrosiveness Study.

**Application**
Ferrosorp®DG should be evenly distributed within the digester and concentrations should be maintained at a constant level. It can be added in its dry form or in a suspension ratio of 2:1 water and powder, by volume. The ferrous sulfide formed by the process is an almost insoluble compound.

**Packaging**
- 40 lb (18 kg) biodegradable bags, 50/pallet       Bulk density: 819 lb/ft³ (820 g/dm³)
- 2,200 lb (1,000 kg) supersacks with bottom funnel for dispensing

**Hydrogen Sulfide, (H₂S): Why remove it?**
- Flammable, colorless gas
- Odor of rotten eggs
- Corrosive to boilers and cogeneration equipment
- Toxic in low concentrations
- Reduces efficiency of siloxane removal media
- Reduce O&M and capital cost of equipment

**What’s the chemistry?**

1. Reduction of ferric (III) hydroxide to dissolved ferric (II) hydroxide
   
   $$2 \text{Fe(OH)}_3 + \text{H}_2\text{S} \rightarrow \text{Fe(OH)}_2 + \text{S} + 2 \text{H}_2\text{O}$$

2. Reaction of ferric (II) hydroxide with hydrogen sulfide under formation of an insoluble, black colored ferrous sulfide
   
   $$\text{Fe(OH)}_2 + \text{H}_2\text{S} \rightarrow \text{FeS} + 2 \text{H}_2\text{O}$$

**Leaders in Biogas Technology**

5451 Chavenelle Road ▪ Dubuque, IA 52002 ▪ Phone: 563.585.0967 ▪ unisonsolutions.com
This dairy operation in Exeter, Maine processes cow manure from 870 dairy cows and off-farm organic waste from a variety of sources. The biogas from the anaerobic digesters is used to fuel a 1 MW internal combustion engine for electricity production and heat recovery. Before treating the waste, the engine was seeing a build up of sulfur on the plate cooler, excessive wear on engine components and an increased frequency of oil changes.

- Inlet H$_2$S level: 600-1500 ppm
- Target H$_2$S level: 50 ppm
- Anaerobic digester capacity: 800,000 gallons
- Daily waste volume: 32,000 gallons
- Retention time: 27 days

For initial seeding of the digester, 15 bags per day for the first several days were added to establish the H$_2$S levels in the digester. Before treatment began, the inlet H$_2$S level was 700 ppm using Sensidyne H$_2$S colorimetric tubes. Within 3 days of treatment the H$_2$S levels were measured at 50 ppm. A daily dose of 4 bags was recommended to maintain an outlet concentration of 50-100 ppm.

The site observed increased intervals between oil changes, decreased sulfur build up and no adverse reaction in the digester. The powder was easy to implement with no large up front costs.

*This is a summary of a paper written by the Department of Biological and Environmental Engineering at Cornell University. Full reports may be viewed at [www.manuremanagement.Cornell.edu](http://www.manuremanagement.Cornell.edu)*

<table>
<thead>
<tr>
<th>Inlet H$_2$S level</th>
<th>ppm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target H$_2$S level</td>
<td>ppm</td>
</tr>
<tr>
<td>Gas flow rate</td>
<td>scfm</td>
</tr>
<tr>
<td>Maximum volume of the anaerobic digester</td>
<td>gallons</td>
</tr>
<tr>
<td>Quantity of material added to the digester each day</td>
<td>gallons</td>
</tr>
<tr>
<td>Retention time in the digester</td>
<td>days</td>
</tr>
<tr>
<td>Treatment that is currently being done to reduce H$_2$S levels</td>
<td></td>
</tr>
</tbody>
</table>

**How much powder would my plant need to reduce hydrogen sulfide?**

Following is the information required to correctly size the desulfurization powder.

Please contact our sales group to discuss your needs.
sales@unisonsolutions.com or 563-585-0967