Advances in Fiber Technology for High-Performance Filtration

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(yes, this is the first slide)
Coal-Fired Power Plant

Bag house filtration unit

Courtesy: Tennessee Valley Authority
soot
hot air
H₂O
SOₓ
NOₓ
Hg
Cl⁻, Br⁻, F⁻, I⁻

bag filters
clean air
to stack
Typical Baghouse Fabric

needlepunched nonwoven – 16 oz./yd²

tightly needled for strength and
to control permeability

optional scrim for dimensional stability

optional expanded PTFE laminate
to limit penetration
## Typical Baghouse Fibers

<table>
<thead>
<tr>
<th>Fiber</th>
<th>Chemical Resistance</th>
<th>Cost/lb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teflon®</td>
<td>good resistance pH 1-14</td>
<td>very high</td>
</tr>
<tr>
<td>P84 ®</td>
<td>poor acid resistance</td>
<td>high</td>
</tr>
<tr>
<td>Kermel ®</td>
<td>poor acid resistance</td>
<td>high</td>
</tr>
<tr>
<td>Nomex ®</td>
<td>poor acid resistance</td>
<td>high</td>
</tr>
<tr>
<td>Glass</td>
<td>v. poor acid resistance</td>
<td>low</td>
</tr>
</tbody>
</table>
Problems:

cost/performance (value)
availability
filtration efficiency
Solution: PPS
(polyphenylene sulfide)

✓ cost
✓ ? availability
? filtration efficiency
Polyphenylene sulfide
PPS Properties

- good tenacity
- low shrinkage
- flame resistance
- thermoplasticity
PPS Wet Heat Resistance

160° C autoclave (6.5 kg/cm³)

% strength retention

days exposed

source: Ticona Engineering Polymers
PPS Chemical Resistance

48% Sulfuric Acid

% strength retention

days exposed

source: Ticona Engineering Polymers
Shaped Cross Sections

4DG™
Shaped Cross Sections
Shaped Cross Sections
Bicomponent Fibers

- PPS sheath
- PET core
Bicomponent Fibers

PPS

PET
Bicomponent Fibers

3 denier  

0.19 denier
Solution: PPS (polyphenylene sulfide)

- cost
- availability
- filtration efficiency
- healthy lungs