Industrial problems in textile sector

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Let us take an OATH

We all will

Take care of mother earth with social responsibility and environmental protection.

This is our contribution to a better future for us and for coming generations
Contents

1) Environmental Problems in Textile Sector
2) Water scarcity problem & contribution of textiles.
3) Chemicals & its adverse effect on mankind & atmosphere.
4) Analysis of Pollution in textile Industry.
5) General steps to reduce Environmental problems
1 Environmental Problems in Textile Sector
Problems Related to Environmental aspects

Environmental Problems Due to textile sector

Environmental Problems Faced by textile Sector
Environmental Impacts due to Textile Sector

1) **Impact from finished product**
   - Direct Impact on Human health & Env.
   - Indirect (Long Term) impact on Human health & Environment
   - Impact on Land fertility due to disposal of chemical residues & garment.

2) **Impact during Production activity**
   - Textiles is third most polluting industry (After Leather & Paper)
   - Labor safety during Chemical handling
   - Accidents during storage
   - Spillage of chemicals at walk way
   - Improper discharge of effluent, sludge & air emissions
   - Global warming
Environmental Problems in Textile Sector

- Lack of knowledge about pollution & its impact on Human health & surrounding atmosphere
- No clear vision for new techniques
- Lack of Transparency
- Voluntary standards to be increased
- Higher Cost of water recycling & renewable energy
- Mind set for use of Green Process / Technology – *Is it costly?*
- Half Knowledge of inputs chemicals & process parameters
- Availability of space & infrastructure for water treatment & waste reduction.
- Unwanted outputs beyond control - NPO (Non Productive Outputs) increases pollution
- Mentality - Pollution is nobody’s baby
Environmental Problems faced by Textile Sector

- Pressure from NGO / Villagers’
- Misleading knowledge about Chemicals.
- Customer’s /Brands pressure for quality & cost.
- Increasing legal pressure - BG’s / Stricter Pollution Norms
- Continuous pressure on 1) Product quality.
  2) Discharge Norms / Volume
- Demands for ISO 9001/14001/18001 & other standards like GOTS/OEKOTEX/Green Label....... 
- Labor Laws/Awareness & lack of Infrastructure & space.
Actions Required at - Textile Sector

Knowledge sharing
- Training by Educational institutes/ NGO’s / Government
- Pollution Support System – Like we have many officials who give punishment for failure but few help by giving correct advise - & bring industry on right path.
- Spread the concept of recycling & green chemistry with its advantages

REQUEST ---

Financial benefits
- Benefit in water cost / testing charges - for those who have implemented water recycling
- Benefit in Power cost – when power/ Energy saving techniques are implemented
- Provide benefit to industries who reduce consumption of power - unit/kg of product.
- Benefit in taxes for equipments used for water recycling/ energy conservation.
2
Water scarcity problem & contribution of textiles
Sustainability Challenges

Global Per Capita Water Availability (2025)

It’s well run before we run out.

Water Consumption

Source: 'Global Water Initiative' (June 2005), GEF International Waters Conference, The Coca-Cola Company
Life has never been better!
But is it really so…?

Global Warming
Loss of biodiversity
Chemical Toxicity
Population Growth

Land, air, water pollution
Persistent Organic Pollutants (POPs)

Radiation
Bioaccumulation
Acid Rain
Non-biodegradable waste

Loss of biodiversity
Global Warming
Chemical Toxicity
Non-biodegradable waste
Population Growth
The Story of a Garment

Purchasing a 250 g Cotton T-Shirt means:

- 1.7 kg fossil fuel is used up
- 4 kg of CO2 is liberated in the atmosphere
- 2600 liters of water is consumed
- 175 gms of chemicals are added
- 0.5 kg solid waste goes into Landfill
The Chemical story starts now ........

Will it end to ZDHC ???
Chemicals are Everywhere ……

- Food additives
- Textiles
- Pesticides
- Pharmaceuticals
- Adhesives
- Polymers
- Cosmetics
- Packaging
- Many more…
Most of these Chemicals are Man Made and utilized to provide easy life

Need to Think & Re-think to Reduce the use of chemicals
Chemicals in Daily use........
Man is consuming Chemicals from Sunrise to sunset...

Tobacco smoke contains a deadly mix of more than 7,000 chemicals. Hundreds are toxic. About 70 can cause cancer. Here are some of the chemicals.
3
Chemicals & its adverse effect on mankind
Chemicals & Adverse effects on Mankind!

The presence of Hazardous chemicals in textiles also started showing impact on human life with immediate effect & probable long term effects.
Do you know what we purchase along with our clothes?
Adverse Impact of Hazardous discharge

Accepted impacts
- Short Strength
- Brain Strokes
- Tension / Depression
- Heart trouble
- Asthma
- Lung cancer
- Reduced Age
- Birth Defects
- Obesity
Side effects of Chemicals Allergenic Reactions
Life Cycle of a Textile Product

- Pretreatment
- Coloration
- Finishing
- Effluent & Waste
- Product Manufacture & Accessories
- Residues in product
- Packaging
- Transport and Storage
- Consumer Use
- Disposal

Use Green Chemicals
Inputs
- Water
- Chemicals
- Dyes
- Yarn/ Fabric
- Accessories
- Packaging
- Transportation

Air

End-Product

Waste water
Sludge

RE USE -- RECYCLE

CHEMICAL BALANCE
Environmental Impacts

- Air pollution
- Water pollution
- Noise pollution
- Soil pollution
- Solid waste
<table>
<thead>
<tr>
<th>Presence of RSLs in Input Chemicals</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AZO DYES</strong></td>
</tr>
<tr>
<td>Direct Dyes, Disperse Dyes, Acid Dyes</td>
</tr>
<tr>
<td><strong>SOLVENTS</strong></td>
</tr>
<tr>
<td>Stain Remover, Scouring Agent, Dry Cleaning Agent, Print Paste, Swelling Agent, Carrier</td>
</tr>
<tr>
<td><strong>BIOCIDES</strong></td>
</tr>
<tr>
<td>Anti-microbial Finishes, Preservatives in print paste, Sizes, etc.</td>
</tr>
<tr>
<td><strong>APEO</strong></td>
</tr>
<tr>
<td>Detergent, Scouring Agent, Wetting Agent, Dispersing Agent, Softeners, Dye-fixing Agent.</td>
</tr>
<tr>
<td><strong>ORGANOTINS</strong></td>
</tr>
<tr>
<td>Anti-microbial Finishing Agent, PU – based Binders and Coatings</td>
</tr>
<tr>
<td><strong>PENTACHLOROPHENOL</strong></td>
</tr>
<tr>
<td>Preservative, Anti-fungal Agent</td>
</tr>
<tr>
<td><strong>PHTHALATES</strong></td>
</tr>
<tr>
<td>Plastisol Prints, PU Coatings, Adhesives</td>
</tr>
<tr>
<td><strong>ISOCYANATES</strong></td>
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<tr>
<td>PU Coatings, Binders, Plastisol Prints</td>
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</table>
Presence of RSLs in Input Chemicals

- **FORMALDEHYDE**
  - Easy Care Agents,
  - Preservative in dyes, Binders,
  - Finishing Formulations,
  - Tanning Agents

- **CHLORINATED AROMATICS**
  - Carriers, Solvents, All
  - Finishing Agent formulations

- **PERFLUORINATED CHEMICALS**
  - Water & Oil Repellant Finishes, Binder Systems.

- **UNREACTED MONOMERS**
  - Binder Systems

- **FLAME RETARDANT**
  - FR Finishing Agent

- **HEAVY METALS**
  - Dyes/Pigments, Tanning Agent, Dye Fixing Agent,
  - Caustic Soda
Example of APEO - Endocrine Disruptors:

- They are naturally-occurring compounds or man-made substances that may **mimic hormones** & thus interfere with their functions in the endocrine system of the body.

- Thus, **they directly affect development**, reproductive, neural & immunity systems in **human beings**.

- e.g.: Nonyl phenol
Nonyl Phenol : an endocrine disruptor

17 β-Oestradiol
(Female sex characteristic
For menstrual cycle)  4-Nonyl Phenol
(part of NPEOs)

**4- NONYL PHENOL IS THUS AN ENDOCRINE DISRUPTOR !!!**
Analysis of Pollution generation in textile Industry.
Sustainability Lenses

- **Water footprint**
  (conservation, re-use, non-hazardous discharge of water)

- **Energy footprint**
  (reduction in energy cost, efficiency improvement)

- **Carbon footprint**
  (reduction in emission of Greenhouse gases)

- **Chemical footprint**
  (use of green chemicals - non-hazardous and non-toxic chemicals)

- **Recycling**
  (water, Energy, waste, garments)

- **Use of renewable sources of energy**
  (replace coal & fuel oil with solar, wind power)

Save in cost, Improve safety & Meet Compliance
Examples of pollution / Non-Productive Outputs (NPOs)

- Process Water
- Salt in Reactive dyeing
- Dyes
- Detergents & washing agents
- Caustic Soda
- Urea
- Leveling agents
- Dispersing agents
- Thickeners
- Chelating agents
Examples of “Hot spots”

Spillage on floor

Improper Storage
Examples of “Hot spots”

Weighing & Mixing of dyes

Left-over/ Spoilt dyes
Examples of “Hot spots”

- Spillages / Leakages
- Unused/ expired chemicals
Examples of "Hot spots"

Water Leakage

Steam Leakage
Apply Chemical Management System

What can I Do?
Know chemicals used in Textiles

Chemicals used in Textile Processing

• Basic chemicals: Alkali, Acids, Salts, Solvents etc.
• Detergents: Cationic, Anionic, Non-ionic and blends
• Dyestuffs, Pigments, Optical Brighteners
• Aid Chemicals (Dyeing): Carriers, Detergents, Complexing Agents, etc.
• Aid chemicals (Printing): Thickeners, Binders etc.
• Finishing agents: Starch & Cellulose derivatives, Synthetic Polymers, Resins etc.

Do you know the hazardous nature of these chemicals?
### Types of Chemical Hazards

<table>
<thead>
<tr>
<th>Physical</th>
<th></th>
<th>Human health</th>
<th></th>
<th>Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Storage precautions</strong></td>
<td></td>
<td><strong>Use proper Personal Protective Equipments</strong></td>
<td></td>
<td><strong>Replacement</strong></td>
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</table>
Effect of Chemicals on Health

HUMAN HEALTH EFFECTS

- Mutagenic
  - Cancer causing
  - Causes problems to reproduction. (Infertility)

- Reprotoxic

- Toxicity
  - (Oral, Dermal & Inhalation)
  - Acute & chronic toxicity
  - Mimics hormones & disturbs normal functioning of the body

- Endocrine Disrupt

- Skin Sensitizers
  - Chemicals allergenic to skin
Effect of Chemicals on Environment

Persistent & Very Persistent

Bio-Accumulative & Very bioaccumulative

Aquatic Toxicity

ENVIRONMENT EFFECTS

Resistant to environmental degradation

Accumulates in animal fat tissues and poses danger to body

Toxic to fish & other aquatic animals

Persistant & Very Persistent
<table>
<thead>
<tr>
<th>Process</th>
<th>Effluent composition</th>
<th>Nature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sizing</td>
<td>Starch, waxes, carboxymethyl cellulose (CMC), polyvinyl alcohol (PVA), wetting agents.</td>
<td>High in BOD, COD</td>
</tr>
<tr>
<td>Desizing</td>
<td>Starch, CMC, PVA, fats, waxes, pectins</td>
<td>High in BOD, COD, SS, dissolved solids (DS)</td>
</tr>
<tr>
<td>Bleaching</td>
<td>Sodium hypochlorite, Cl₂, NaOH, H₂O₂, acids, surfactants, NaSiO₃, sodium phosphate, short cotton fibre.</td>
<td>High alkalinity, high SS</td>
</tr>
<tr>
<td>Mercerizing</td>
<td>Sodium hydroxide, cotton wax</td>
<td>High pH, low BOD, high DS</td>
</tr>
<tr>
<td>Dyeing</td>
<td>Dyestuffs urea, reducing agents, oxidizing agents, acetic acid, detergents, wetting agents.</td>
<td>Strongly coloured, high BOD, DS, low SS, heavy metals</td>
</tr>
<tr>
<td>Printing</td>
<td>Pastes, urea, starches, gums, oils, binders, acids, thickeners, cross-linkers, reducing agents, alkali.</td>
<td>Highly coloured, high BOD, oily appearance, SS slightly alkaline, low BOD</td>
</tr>
</tbody>
</table>
Pollution Prevention Strategies

Regular Effluent Treatment Process

OR

Prevention of Pollution at Source

- REJECT (Banned items)
- REPLACE (Harmful chemicals)
- RECYCLE (Dyes/chemical/fabrics)
- REDUCE (Chemical quantity)

Select Right Chemicals & Use with proper parameters
Actions Required at - Textile Sector

Knowledge sharing
- Training by Educational institutes/ NGO’s / Government agencies
- Pollution Support System – Like we have many officials who give punishment for failure but few help by giving correct advise & bring industry on right path.
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It Simply Means: Give back what you take!

Let us take an oath
We will take care of mother earth with social responsibility and environmental protection.

This is our contribution to a better future for us and for coming generations
Thank you

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