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Industrial Wastewater Treatment in Synthetic Textile Fibers (Nylon 6), Iran

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Abstract: Due to increasing population and industrial developments, share of overall water use in the world is rising day by day. The aim of this paper is to study the quality wastewater from synthetic textile fiber industry and its treatment methods together in Iran. Generally, industrials product the synthetic fibers in the textile industry including height contaminants PH, azo dyes, BOD, TDS, toxicity as a result of the industrial activities. At different stages of the synthetic textile fibers, most processing involves polymerization, washing, dyeing, Turkish & Salt and drying. The data were collected from a sample of N=27, which is actually not very large, given that we have. A one-way ANOVA between –groups analysis of variance was conducted. The experimental results show there is not statistically significant different between processes at the $p>0.5$ in PH but BOD, TDS and water consumption is a statistically significant difference between fife processes at $p<0.5$ in kinds of the synthetic textile industries. Synthetic textile fibers industry effluents should be discharged to the environment after various treatments. The synthetic textile wastewater has higher than various pollutant parameters to other textile industry (especially un-polymerized monomers, silicate and azo dyes). To treat of the color loud of dyed wastewater as well as recycling monomers and biological degradation is difficult. Currently, recycling and the treatment of dyed wastewater are performed by physical and electrochemical methods. Decreasing TDS, Color and Organic pollution with attention to recycling are our approaches. Nanotechnology also has real commercial potential for the textile industry.

Key words: Synthetic Textile Industry- Nylon 6 · Wastewater Treatment · Nanotechnology

INTRODUCTION

Discharged wastewater by some industries under uncontrolled and unsuitable conditions is causing significant environmental problems. Nylon 6 is becoming the new green darling of designers – but unless the recycling process captures all emissions, treats wastewater and sludge and also recaptures the energy used, the claim is tepid at best. Nylon, unlike polyester, does degrade, but slowly (For nylon fabric, current estimates are 30 - 40 years) [1], giving it plenty of time to release its chemical load into our groundwater. Plotkin, Jeffrey S. 2009 couldn't find any data on the toxicity of nylon as fabric, but the government of Canada has evaluated nylon 6, 6 because it is also used in cosmetics and classified it as a "medium human health priority"; it is also on the Environment Canada Domestic Substance List. The importance of the pollution control and treatment is undoubtedly the key factor in the human future. If a textile mill discharges the wastewater into the local environment without any treatment, it will have a serious impact on natural water bodies and land in the surrounding area. High values of COD and BOD_5, presence of particulate matter and sediments and oil and

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grease in the effluent causes depletion of dissolved oxygen, which has an adverse effect on the aquatic ecological system. Organic pollutants introduced into the natural water resources or wastewater treatment systems studied [2] Physicochemical characterization and heavy metal concentration in the effluent of textile industry studied by Joshi [3] Studies concerning the feasibility of treating dyeing wastewater studied by Charbit [4] Based on the past experience the most textile wastewater treatments are performed in three steps: The first stage in pre-treatment will usually be made up of physical processes by screening and will continue with a chemical process. Because of water quality highly polluted and quantity fluctuations, complex components, textile dyeing wastewater is generally required pretreatment to ensure the treatment effect and stable operation. It's usually mixed the wastewater with air or mechanical mixing equipment in the tank [5] The floatation produces a large number of micro-bubbles in order form the three-phase substances of water, gas and solid. Due to its low density, the mixtures float to the surface so that the oil particles are separated from the water. So, this method can effectively remove the fibers in wastewater [6] Coagulation is one of the most important physiochemical reactions used in water treatment. The precipitation of ions (heavy metals) and colloids (organic and inorganic) are mostly held in solution by electrical charges. By the addition of ions with opposite charges, these colloids can be destabilized; coagulation can be achieved by chemical or electrical methods. The coagulant is added in the form of suitable chemical substances [5, 7] Chemical oxidation are mainly used as a pre-treatment for wastewater resistant to biological treatment or/and toxic to biomass. Chemical operations can oxidize the pigment in the dyeing wastewater as well as bleaching the effluent [6] Electrochemical methods such as electrooxidation (EO) (titanium electrode) and electro coagulation (EC) (with aluminum and iron electrodes) EC is more economical than EO and the toxicity evaluation with the Daphnia magna test shows a significant reduction after EC [7] There are several methods for the treatment of textile effluent: Biochemical, adsorption with activated carbon, etc. From the textile industrial effluent, adsorption and coagulation methods are available to clear the color of the water and make it potable. Though the above methods are technically effective, these methods are time consuming (Bioprocess) and expensive (activated carbon) In recent times, electrochemical methods have been proved to be an alternative process for effective treatment of organic pollutant. Also in particular electrooxidation, electro coagulation and integrated electrochemical are very effective for complete mineralization of textile effluent. Another advanced method is a membrane bioreactor [8, 9] Membrane separation process is a new separation technology, with high separation efficiency, low energy consumption, easy operation and no pollution and so on. [10] Currently, the membrane separation process is often used for treatment of dyeing wastewater mainly based on membrane pressure, such as reverse osmosis, ultra filtration, nanofiltration and microfiltration [11]. Reverse osmosis permits the removal of all mineral salts, hydrolyzed reactive dyes and chemical auxiliaries. Nanofiltration has been applied for the treatment of colored effluents from the textile industry. Nanofiltration treatment as an alternative has been found to be fairly satisfactory. The technique is also favorable in terms of environmental regulating. Ultrafiltration can only be used as a pretreatment for reverse osmosis or in combination with a biological reactor [12] Microfiltration can also be used as a pretreatment for nanofiltration or reverse osmosis [13] Biological treatment or combination treatment system can be considered as the preferred alternative whereby it can offer an effective way of removing dyes from large volumes of wastewater at low cost [6] Biogranulation could be a solution for textile wastewater treatment. Biogranules have a good settling property, enable high biomass retention and can withstand high strength wastewater that is wastewater containing soluble organic pollutant such as organics, nitrogen, phosphorous and toxic substances. The biological process removes dissolved matter in a way similar to the self depuration but in a further and more efficient way than clariflocculation. An aerobic biological treatment that can be divided into two major categories: activated sludge process and bio-film process. Upflow Sludge Blanket Filtration (USBF) is aerobic and acts by using a sludge blanket in the separation of the sedimentation tank [14] innovative processes in wastewater treatment such as aerated submerged fixed film reactor (ASFFR) [15] In the textile industry, there are many types of high concentration organic wastewater, such as wool washing sewage, textile printing and dyeing wastewater etc., which the organic matter content of it is as high as 1000 mg/L or more, the anaerobic wastewater treatment process can achieve good results [6] The present research work is aimed at the standard practice by the DOE in Iran and Malaysia. This practice has done by characterization of wastewater with the help of important pollution indicator parameters like pH, BOD, TDS and water consumption. The study highlights the scope of recovery in the textile industry and wastewater treatment in textile industries.

MATERIALS AND METHODS

For nylon 6, the conventional synthesis route to caprolactam uses toxic hydroxylamine (NH2OH). Every metric ton of caprolactam produces up to 4.5 tons of ammonium sulfate as a byproduct [16] As with many chemicals now in use, there is no data to evaluate ammonium sulfate as to toxicity to humans, though it has been shown to affect development, growth and mortality in amphibians, crustaceans, fish, insects, mollusks and other organisms [17] In addition, waste water generated during production of nylon-6 contains the unreacted monomer, caprolactam. Owing to the polluting and toxic nature of å-caprolactam, "its removal from waste streams is necessary" [18] Like any other industry textile industry also generates all categories of industrial wastes namely liquids, solids and gases. Various useful materials can be recovered from these wastes by the utilization of new processes. The wastage of raw materials can be reduced by improving manufacturing process at each stage, thereby savings in the major inputs. During the process certain kind of wastes such as solid wastes can be recovered by adopting new technologies, whereby these wastes can be converted into useful materials for other applications. Certain polyamides, however, are known to be hydrolytically degradable and reusable. Especially, in the case of nylon 6, the monomeric starting materials are reclaimed from waste polymer and used in the manufacture of man-made fibers [19] there are generally two methods for reclaiming nylon 6 wastes. The first involves reprocessing the waste nylon 6 and the second method involves chemical regeneration through depolymerization [20].

Statistical Method: ASTM's textile standards D1441 - 12 and standard methods for the examination of water and wastewater book for sampling cotton fibers for testing, cotton and fibers used for the specifications and test of the physical, mechanical and chemical properties of textile industry. Chemical analysis waste water performed by 27 samples in from four kinds of synthetic textile factories in Iran [5]. The effluent concentration was tested by four parameters PH, BOD, TDS and water consumption which samples were collected from five industrial processes. A K-W test revealed there is no violation of the assumption of normality between the factors based on the processes. As the Sig. value is greater than 0.05, we can conclude that "parameters" is normally distributed. A one-way ANOVA between –groups analysis of variance was conducted.

Sampling Results: Different fabrics have different impacts, depending on what they're made of: Nylon and polyester made from petrochemicals, these synthetics are non-biodegradable as well, so they are inherently unsustainable on two counts. Making polyester uses large amounts of water for cooling, along with lubricants which can become a source of contamination. Rayon (viscose) is another artificial fiber, made from wood pulp, which on the face of it seems more sustainable [17] Waste water distributes range from 100 to 250 m^3t^{-1} in the synthetic fiber industry [5] PH is one of the factors of the washing wastewater. The current average PH washing Nylon wastewater is 10.4 units. The potential specific pollutants from textile washing are shown in Table 1, 56% washing wastewater makes by TDS.

Nylon accounts for 100% of the synthetic fiber production. Pre-treatment of Nylon includes recovery and screening and dyeing wastewater. The current average TDS concentration in the pre-treatment is 631 mg/L. The main pollutants in dyeing are the residual dyes. The average concentration of BOD is 32 mg/L and PH is 8.4 units. Sulfide mainly comes from the sulfur, which is a kind of cheap and qualified dye. Due to its toxicity, it has been forbidden in developed countries. There are two main sources of hexavalent chromium. Cylinder engraving makes the wastewater containing hexavalent chromium. However, this technology has not been used. Another possible source is the use of potassium dichromate additive in the dying process. Aniline mainly comes from the dyes. The color of the dye comes from the chromophore. Some dyes have a benzene ring, amino, etc., which will be decomposed in the wastewater treatment process [6] the potential specific pollutants from textile dyeing are shown in Table 2.

Total dissolved solids (TDS) in the synthetic fibers mainly come from the washing tanks, which will reach 4890 mg/L in rayon to 1191 mg/L in other synthetic fibers as usual. Wastewater loads from washing process is shown in Table 3.

Finishing raw fabrics is a basic textile industry operation. Water use varies with the type of fiber being produced and can range from 50 to 600 m^3t^{-1}. Water use in weaving mills also depends on the fiber. Synthetic fiber mills use more water than cotton and wool and range from 1000 to 2000 m^3t^{-1} or more. Here also, cooling water is quite high compared to other processes [21]. Wastewater loads from washing complementary process is shown in Table 4.

The suspended solids (SS) in the outflow mainly come from the washing tanks. Wastewater quality from synthetic fibers is shown in Table 5.

Table 1: Wastewater loads in washing process of synthetic fibers (Synthetic fiber) [5]

Process	Fibber	PH	BOD (Mg/L)	TDS (Mg/L)	Wastewater volume (m^3) 1000 Kg CLOTH
Washing	Rayon	8.5	383	333	17-33
	Nylon	10.4	136	188	56-66
	Acrylic	9.7	219	1890	5
	Polyester		50-80		15-21

Table 2: Waste water loads from dyeing process of synthetic fibers (Synthetic fiber) [5]

Process	Fibber	PH	BOD (Mg/L)	TDS (Mg/L)	Wastewater volume(m^3) 1000 Kg CLOTH
Dyeing	Acetate	9.2	2	178	12-5
	Nylon	8.4	32	631	17-13
	Med Acrylics	1.5-3.7	175-300	83-197	17-33
	Polyester	480-2700		17-33	

Table 3: Waste water loads from washing process of synthetic fibers (Synthetic fiber) [5]

Process	Fibber	PH	BOD (Mg/L)	TDS (Mg/L)	Wastewater volume(m^3) 1000 Kg CLOTH
Turkish & Salt	Rayon	6.8	58	4890	4-12
Washing finishing	Acrylic	7.1	67	1191	66-83
	Mod Acrylic				
	Polyester		65		17-24

Table 4: Wastewater loads from washing complementary process of synthetic fibers (Synthetic fiber) [5]

Process	Fibber	Wastewater volume(m^3) 1000 Kg CLOTH
Special complementary process	Rayon	4-12
	Acetate	25-42
	Nylon	23-5
	Acrylic and Mod Acrylic	42-58
	Polyester	8.3-25

Table 5: Wastewater quality in the outflow from synthetic fibers kg per ton^{-1} initial raw materials or kg per 100 m^3 effluents [5]

Industry	BOD	TSS	TS
Nylon	35-55	20-40	20-300
Acrylic	100-150	25-150	25-400
Polyester	120-25	30-160	30-600

The relationship between TS, TSS and TDS tests can be related to the equation: TS = TSS +TDS. TDS for Nylon, Acrylic and Polyester calculated 260, 250 and 460 kg per 100 m^3 effluents, respectively. The main pollutants in washing are Caprolactam and the residual monomers after Reactor for produce chips. In the production process, suspended substance comes from fiber scrap and undissolved raw materials. It will be removed through the grille, grid, etc. The suspended solids (SS) in the outflow mainly come from the secondary sedimentation tank, whose sludge has not been separated completely which will reach 10-100 mgl^{-1} as usual. Rapid assessment (WHO, 1982) calculate BOD5, SS, TDS from synthetic fibers effluent in the outflow of polyester per 100 m^3 waste volume 185 kg/ m^3, 95 kg/ m^3, 150 kg/ m^3. For acrylic fibers per 210 m^3 waste volume 125 kg/ m^3 BOD5, 87 kg/ m^3 SS and 100 kg/ m^3 TDS. For nylon fibers per 125 m^3 waste volume 45 kg/ m^3 BOD5, 30 kg/ m^3 SS, 100 kg/ m^3 TDS. For acetate fibers per 75 m^3 waste volume 45 kg/ m^3 BOD5, 40 kg/ m^3 SS, 100 kg/ m^3 TDS. For rayon fibers per 42 m^3 waste volume 30 kg/ m^3 BOD5, 55 kg/ m^3 SS and 100 kg/ m^3 TDS. The potential specific pollutants from textile operators are shown in Table 6.

The main issue in synthetic textile fibers is remaining colors in dyeing. Certainly, remaining colors of synthetic polymers can be discharged along with wastewater. The dyeing substance that is used in textile industry gives color to the water. Color removing is not provided by biological refining but with chemical refining color it has been observed that removing is happening effectively. However it is strictly stated that there aren't color parameters in discharge standards and limit values

Table 6: Specific pollutants from textile processing operations

Process	Component
Polymerization	Caprolactam, Monomer, Dimmers
Washing	Caprolactam, Monomer, Dimmers
Dyeing	Colour, Metals, Salts, Surfactatnts, Sulphid,a Cidity/alkalinity, Formaldehyde
Finishing	Resins, Waxes, Chlorinated Compounds, Acetate, Spent Solvents, Softeners

Table 7: Remaining colors in effluent of dyeing synthetic fibers [5]

Type of fibbers	Type of Color	Color wasted	Dye concentration in effluent
Synthetic	Reactive-sulphurous	1-10 to 1-5	200-300 to 20-100
Nylon	Acidity	0.5-2.5	5-50
Polestar	Disperse	1-5	10-50
Acrylic	Basic	1-5	10-100

Table 8: Over flow in sedimentation tanks [5]

	Over flow rate (m^3)		
Type of treatment	Average flow m^2/day	Maximum flow m^2/day	Deep of tank meter
After bacteria filter bed	16-24	40-48	3-4
After conventional aeration	16-32	40-48	3.5-5
After extended aeration	8-16	24-32	3.5

Table 9: Textile effluent standards for water pollutants per Mg L^{-1} in Iran (IDOE, 2013)

Pollutant substances	Discharge to surface water	Drainage to leaching pit	Agriculture and irrigation consumption
Arsenic	0.1	0.1	0.1
Free colure	1	1	0.2
Chloride	600	600	600
Phenol	1	Neg.	1
Cr6+	0.5	1	1
Mercury	Neg.	Neg.	Neg.
Ammonium	2.5	1	Ü
Nitrite	10	10	Ü
Nitrate	50	10	Ü
phosphate	6	6	Ü
BOD	30	30	100
SS	0	Ü	Ü
PH	6.5-8.5	9Ü5	6-8.5
Color	75	75	75
Organic	-	-	-

about it in our country. Colored textile wastewater accumulates in water environment and deteoriates the aesthetic appearance of the water and decreases the light permeability. Decrease in the light permeability and the amount of decomposed oxygen causes the extinction of living beings and restricts the reuse of the water. Table 7 shows concentration type of color in effluent.

Wastewater filtering refers to the process of removing color or suspended matter and colloids from wastewater. Filtering the wastewater should also reduce the color and make the water more transparent. It is observed that reverse osmosis and nanofiltration membranes can be successfully used in refining textile wastewater. The nanofiltration membrane stoppage is low and the efficiency of removing color reaches almost 95%. Table 8 shows over flow rate sedimentation tanks. The dye concentration can be quantitatively determined from the photographer. The analytical results remaining colors in the effluent of dyeing synthetic fibers are shown in Table 8. It shows to analyze changes in pollutant loading due to dye concentration in effluent.

The Textile Industry Standards for Water Pollutants: As the wastewater is harmful to the environment and people, there are strict requirements for the emission of the wastewater. However, due to the difference in the raw materials, products, dyes, technology and equipment, the standards of the wastewater emission have too many items. For printing and dyeing wastewater, the first consideration is the organic pollutants, color and heavy metal ions (IDOE, 2013) Table 9 shows the typical concentration range of various constituents in textile wastewater in Iran Department of Environment (IDOE). Effluent that is discharged to the environment should meet this standard. There are several sources includes as point sources which discharge to this point. Water pollution can be classified as acceptor sources. The acceptor's resources comprise of discharge from identifiable points, surface water, leaching pit and agriculture or irrigation consumption points. Depending on the concentrations, wastewater is classified as strong, medium and weak.

RESULT AND DISCUSSION

The results obtained from the studies on synthetic textile fibers industry wastewater are summarized below:

There is not statistically significant different between processes at the $p>0.5$ in PH between the four process: F (3, 17) =.700, p=.565 Despite reaching statistical no significant, the actual difference in mean scores between the groups was quite high. The effect size, calculated using eta squared, was 0.1 terms would be considered a large effect size. A 0.1 effect size corresponds to the difference between the heights amount PH in fife processes. PH has a mean of 9.5571 and (SD = .78) in washing process, a mean 402 and (SD = 942.97) in dyeing; a mean 6.65 and (SD = .21) in Turkish & Salt; a mean 7.57 and (SD = .35) in washing finishing; is not significant. Similarly, Post–hoc comparisons using the Tukey HSD test indicated the following differences were shown for the processes:

Washing > Dyeing > Washing finishing >Turkish & Salt

There is statistically significant different between processes at the $p<0.5$ in BOD between the five process: F (4, 22) =8.12 Mg/L, p=.000 Despite reaching statistical significant, the actual difference in mean scores between the groups was quite high. The effect size, calculated using eta squared, was 0.23 terms would be considered a large effect size. A 0.59 effect size corresponds to the difference between the heights amount BOD in fife processes. BOD has a mean of 198.14 Mg/L and (SD = 136.8 Mg/L) in washing process; a mean 127.25 and (SD = 127.48 Mg/L) in dyeing; a mean 56.5 and (SD = 2.12 Mg/L) in Turkish & Salt; a mean 65.5 and (SD = 1.29 Mg/L) in washing finishing; a mean 808.3 Mg/L and (SD = 501.4 Mg/L) in out flow is significant. Similarly, Post–hoc comparisons using the Tukey HSD test indicated the following differences were shown for the processes:

Outflow >Washing >Dyeing > Washing finishing > Turkish & Salt

There is statistically significant different between processes at the $p<0.5$ in TDS between the five process: F (4, 22) =7.843 Mg/L, p=.000 Despite reaching statistical significant, the actual difference in mean scores between the groups was quite high. The effect size, calculated using eta squared, was 0.88 terms would be considered a large effect size. A 0.58 effect size corresponds to the difference between the heights amount TDS in fife processes. TDS has a mean of 958.85 and (SD = 873 Mg/L) in washing process; a mean 243.5000 Mg/L and (SD = 248.5 Mg/L) in dyeing; a mean 4885 Mg/L and (SD = 7.07107 Mg/L) in Turkish & Salt; a mean 1189 Mg/L and (SD = 1.8 Mg/L) in washing finishing; a mean 1875 Mg/L and (SD = 2062.46 Mg/L) in out flow is significant. Similarly, Post–hoc comparisons using the Tukey HSD test indicated the following differences were shown for the processes:

Turkish & Salt > Washing finishing > Outflow >Washing >Dyeing

There is statistically significant different between processes at the $p<0.5$ in water consumption between the five process: F (4, 22) =10.497 m^3, p=.000 Despite reaching statistical significant, the actual difference in mean scores between the groups was quite high. The effect size, calculated using eta squared, was 0.656 terms would be considered a large effect size. A 0.656 effect size corresponds to the difference between the heights amount water consumption in fife processes. Water consumption with scores a mean of 30.4 and (SD = 22.6 m^3) in washing process; a mean 18.37 m^3 and (SD = 9.8 m^3) in dyeing; a mean 8 m^3 and (SD = 5.65 m^3) in Turkish & Salt; a mean 47.5 m^3 and (SD = 32.06 m^3) in washing finishing; a mean 83.8 m^3 and (SD = 23 m^3) in out flow is significant. Similarly, Post–hoc comparisons using the Tukey HSD test indicated the following differences were shown for the processes:

Outflow > Washing finishing > Washing > Dyeing > Turkish & Salt

The mean BOD and TDS and water consumption values of untreated effluent were 808, 1875 mgl^{-1} and 83.8 m^3, respectively. IDOE showed standard of the BOD values 30 mgl^{-1} for discharging to the surface water and discharge to leaching pit also 100 mgl^{-1} to use agriculture and irrigation, respectively. SS values zero in the three discharge points. From this study, it shows that the qualities of effluents were not complying with IDOE standard at several points has been classified. The pollutant loading is also presented in this study based on the remaining color at effluent. The dye concentration had decreased the water quality index of the acceptor's resources. The higher PH value of effluent is 402.5 due to the increase of ions because of the addition of color, metals, salts, surfactants, sulphid, acidity, alkalinity, formaldehyde during dyeing, but lower pH values due to the increase of hydrogen concentration in the system Turkish & Salt.

CONCLUSION

The degree of difficulty in refining this wastewater is closely linked with relative pollution degree. In the past several decades, many techniques have been developed to find an economic and efficient way to treat the textile dyeing wastewater, including physicochemical, biochemical, combined treatment processes and other technologies. These technologies are usually highly efficient for the textile dyeing wastewater. The textile dyeing wastewater has a large amount of complex components with high concentrations of organic, high-color and changing greatly characteristics. In evaluating the chief components of nylon 6,6 (hexamethlylene diamine and adipic acid), we found a darker situation. Hexamethlylen ediamine is a petroleum derivative, with the usual consequences of petroleum processing. It is considered “mildly toxic”[22, 23] though in one study, ten administrations of 700 mg/kg to mice killed 3 of 20 [24]. That shows significant of the recycling from polymerization step before wastewater treatment. The recycling of wastewater is effected in process baths and rinsing waters, before water is taken for treatment for removal of remaining chemicals and other effluents generated. Wastewater treatment is a mixture of unit processes, some physical, others chemical or biological in their action. A high volume of wastewater is produced from kiering and bleaching which could be treated separately. Some waste streams can be directly reused with little or no treatment. Final rinse water after mercerizing, bleaching and dyeing are only slightly contaminated and can be recycled for further rinsing. Combining water reuse with recovery further improves the economics. In general most of the textile wastewater is in the class of lower or average intensity dirty wastewater. Effluent from textile mills also contains chromium, which has a cumulative effect and higher possibilities for entering into the food chain. Faryal studied remove hazardous metal ions from the contaminated effluent. Due to usage of dyes and chemicals, effluents are dark in color, which increases the turbidity of water body. This in turn hampers the photosynthesis process, causing alteration in the habitat. It has been seen that the color removing is provided by anaerobic refining however it is not provided by aerobic refining [25] Membran process is a new technology which has found a wide using area in refining wastewater. By using this process especially the industries which discharge consenter waste supplies economical advantage and the amount of pollution will diminish in other areas (recycle etc.) Other than membrane, TDS can be removed by ion exchange (IX) demineralization, which uses beds of cationic and anionic resins in a pressure vessel similar to media filtration vessel. If very low TDS was needed then lime softening can also be considered, it would probably bemuch cheaper but messier and of course generates higher TDS effluent. Based on the COD number some pretreatment is needed before tackle the TDS. The high COD could cause fouling or scaling issues. Pilot plant study is needed to confirm the results. To evaluate the treatment of a synthetic textile wastewater containing the blue indigo dye carried out by Conceição, Vinicius *et al*. [26] in a UASB (upflow anaerobic reactor), on a bench scale, followed by pottery clay adsorption. The results showed satisfactory effectiveness in removing color and organic matter (COD) by the UASB, at the order of 69 and 81.2%, respectively. The color removal using ceramic clay as an alternative adsorbent material was 97% for the concentration of 200 gl^{-1} of adsorbent, evidencing that the use of pottery clay as adsorbent material had significant and promising results [26] Muda et al. were developed the granules in a single sequential batch reactor (SBR) system under alternating anaerobic and aerobic condition fed with synthetic textile wastewater. The sequential batch reactor (SBR) system demonstrated good removal of COD and ammonia of 94% and 95%, respectively, at the end of the study. However, only 62% of color removal was observed Muda *et al*. [27] Depending on the most suitable refining technology the parameters which form the basis for discharge quality limits should be determined for the inspection of textile industry wastewater [28-32]. Furthermore it is known that some dying substance contain toxic materials [33-35]. The reutilization of wastewater can present very important savings, namely in reduction of water, energy and chemical consumption.

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