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Modelling and control of chemical process in dying industry using solenoid flow control

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ABSTRACT

Neutralizing pH value of Dying water is the important craft in the control process in the clarifying process of Dying water, which is the important factor to influence output and the quality of waste water from dying industry. On the one hand, it is an important content to control the neutralized pH value within a required range, which has the vital significance for acquiring high PH value of water. On the other hand, it is a complicated physical chemistry process, which has the characteristics of strong non linearity, time-varying, large time-delay, and multi-input. Therefore, there has not a very good solution to control the neutralized pH value. In this process we maintain PH value by adding Acid with Dying water. The flow of Acid and Dying waste water is controlled through solenoid flow control. This method is able to maintain PH quickly and accurate.

INTRODUCTION

Clarifying process is a core link in the course of Dying production, it has the characteristics of strong non-linearity, multi-constraint, strong coupled, time-varying, large time-delay, and multi-input. The technology is complicated, which results in great difficulty in the course of modeling and optimization control. With the existing technological process and equipment, it is a key problem how to utilize directional information and adjust processing parameters in real time on site to keep the optimum state of production, improving the quality of the purified juice. It is a complicated physical-chemistry process to neutralize the juice, and the pH value needs the manual regulation in the actual production process, so its control effect is insufficiently stable, i.e. sometimes pH excessively is high and sometimes [1-3].

It excessively is low, and the result is not good. The retention time of juice in the clarifiers has a great effect on the juice and its components. If the juice is refractory or contains a large proportion of suspended matter it may be logical to hold the juice in the clarifier for a longer period of time. However excessive capacity clarifiers that hold juice for long periods result in higher levels of inversion.[4-7].

LITERATURE SURVEY

The existing system of our project is, manually operate the ph level and tank level.If suppose the mixture of the chemical exceed the hole dyeing water recycle is wasted.So we proposed our project,cationic dyeing impurity water recycling in automatically.In this method, errors are rectified.

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EXISTING BLOCK DIAGRAM

PH compensation process is too slow**.**We cannot possible to control juice and Acid flow level using solenoid value. Only manual on –off is possible so very slow and not accurate

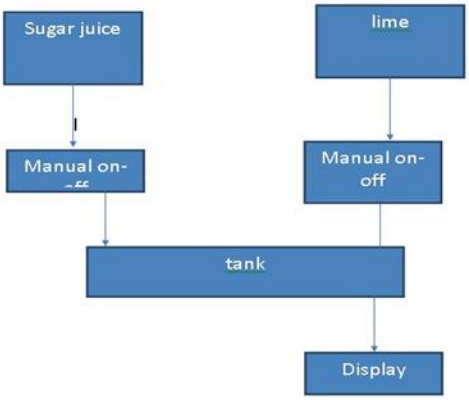


Fig:1 Block Diagram

PROPOSED BLOCK DIAGRAM

PH compensation process is too Fast.It is easily possible to control the flow level of Acid and Dying water by PWM controlIt is easily possible to control. the flow level of Acid and Dying water by control frequency of solenoid value.[8,9].

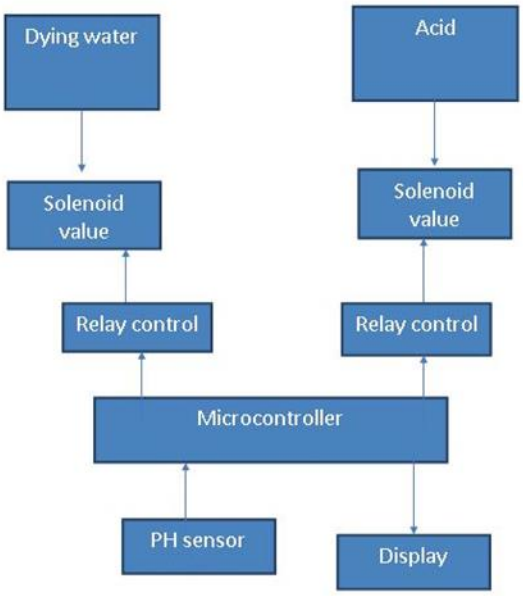


Fig: 2 Proposed Block diagram

DYEING

Perhaps the most studied step in textile processing regarding the treatment of the effluent is the dyeing step.Dyeing causes an easy to recognise pollution: colour. Verysmall amounts of dye are already visible in water, decreasing the transparency of the water. In the environment this

leads to Inhibition of the sunlight penetration and therefore of the photosynthesis. In addition, many dyes and their degradation products are toxic. It is not surprising that dyes cause problems in the environment, as they were developed to resist harsh environmental factors for the lifetime of the coloured textile. Pigments have a very complex structure, with the intention to make them resistant to breakdown by for instance exposure to sunlight, water or soap .The water use in dyeing is high. Water is used not only in the dyeing process, but also for rinsing of the dyed products. Water use is highly dependent on process characteristics like the used equipment, fabric and dyestuff. Apart from dyes, different auxiliary chemicals are used that also end up in the wastewater . Typical pollutants generated in the dyeing step are colour and different auxiliaries, such as organic acids, fixing agents,defoamers, oxidising/reducing agents, and diluents. Quite a large amount of dyes leaves the process in an unfixed state, the exact amounts and kind of pollution depends on the used dyes and the used process [24]. Dyeing contributes to most of the metals and almost all of the salts and colour present in the overall textile effluent. For some dyeing processes, about 75% of the salts end up in the wastewater.

PH

Textile effluent usually has a high pH .However,the wastewater pH varies widely. Extremities such as 2 or 12 are common. An effect of the pH that is related to textile waste water is the variation of colour intensity with pH .Acids and alkalis are used in the dyeing process, depending on the dye class involved. Additionally, large quantities of are used in bleaching, desizing, scouring and mercerising

REVERSE OSMOSIS

The process of Reverse Osmosis is based on the ability of certain specific poly me ric me mb ranes. Usually cellulose acetate or nylon to pass pure water at fairly h igh pressure through then membrance. Since water is a necessity of life, it is important to drink water free fro m contaminants. To treat water and make it worth drinking, different processes are used and one of best treatment methods is Reverse Osmosis.

Fig:3 Reverse Osmosis plant

Reverse osmosis is comparatively newer method of treating water and purifying it but has emerged to be one of the best. You can contact a professional company to fix an RO system in your home so that you have access to clean and fresh water. You and your family can thus be safe and free of diseasesrelated to water contamination

MATERIALS AND METHODS

Instrumentation Color and pH were measured using HAANA instrument and ATMEGA8 model 310, respectively.

Chemicals

The color was added to water samples using potassium chloroplatinate and cobaltous chloride;

methylene blue (MB) and eriochrome black T (EBT). Alum and ferric chloride were used as coagulant and lime and NaOH as softener agents. The chemicals used were supplied from Merck Co., of analytical grade.tests procedure This study was performed using jar apparatus. It was tried to simulate the conditions of water treatment plant in the laboratory. Color was added to water samples using potassium chloroplatinate and cobaltous chloride; methylene blue (MB) and eriochrome black T (EBT). For providing turbidity, screened clay was solved in water and allowed to be settled for 24 h. The water in top was added to the samples to produce turbidity. The sample water was taken from the drinking water of Kerman located in southeastern Iran. Except to color and turbidity that were added to the tested water, other features were similar to those of Kerman drinking water. At the first stage, water and coagulant were mixed at 110 rpm for 90 s. Then, NaOH (as softener and in order to increase pH) was added and slowly agitated for 5 min at 30 rpm to provide the conditions of slow mixing required for reactions to take place. At this time, the pH of the processed water was measured and it was agitated for another 30 min at 30 rpm to provide the conditions required for reactions of softening that take place slowly. Finally, the contents of the container were allowed to be settled for 30 min.The sample of settled water was passed from Whatman paper filter and was placed in a dark place; color analysis was performed (Coro and Laha, 2000). At the second stage, lime was used as softener agent at 0.1 to 12 g/L dose and initial color 70, 100 and 150 Pt-Co. All testing methods were based on "standard methods for examination of water and wastewater"

HARDWARE

- Power supply
- Microcontroller
- Lcd
- Ph sensor
- Solenoid valve

SOFTWARE

- Platform - AVR STUDIO
- In System Programmer - ProgISP 172
- Compiler – Win AVR

Atmega microcontroller

In our days, there have been many advancement in the field of Electronics and many cutting edge technologies are being developed every day, but still 8 bit microcontrollers have its own role in the digital electronics market dominated by 16-32 64 bit digital devices. Although powerful microcontrollers with higher processing capabilities exist in the market, 8bit microcontrollers still hold its value because of their easy-to-understand-operation, very much high popularity, ability to simplify a digital circuit, low cost compared to features offered, addition of many new features in a single IC and interest of manufacturers and consumers.

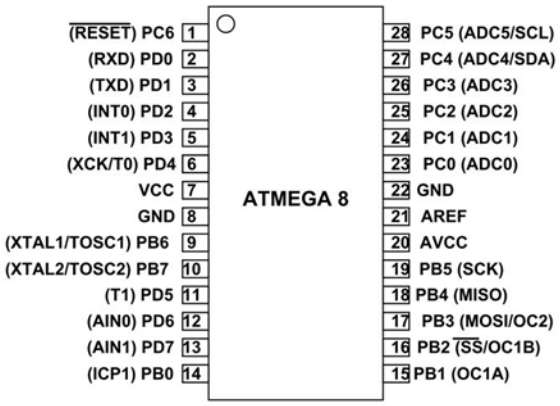


Fig 1: Pin Diagram of Atmega Controller

Today's microcontrollers are much different from what it were in the initial stage, and the number of manufacturers are much more in count than it was a decade or two ago. At present some of the major manufacturers are Microchip (publication: PIC microcontrollers), Atmel (publication: AVR microcontrollers), Hitachi, Phillips, Maxim, NXP, Intel etc. Our interest is upon **ATmega8**. It belongs **to** Atmel's AVR series micro controller family.

PIN DETAILS

Atmega8 has got 28 pins. Two for Power (pin no.7: +5v, pin no.8,22: ground), two for oscillator (pin 12, 13), one for reset (pin 1), three for providing necessary power and reference voltage to its internal ADC, and 20 I/O pins.

SENSORS

Level sensor

Level sensors are used to monitor and regulate levels of free flowing substance.level sensor can also be used to monitor solids such as powdered substances.

Flow sensor

A flow meter works by measuring the amount of a liquid or steam flowing through or around the flow meter sensors.

`Display

Display devices is the output devices.Its presentation of information in text or image form. An output device is a thing that provides a way to show information to the outside. Controlling can be done by interfacing these displays with the controlling devices

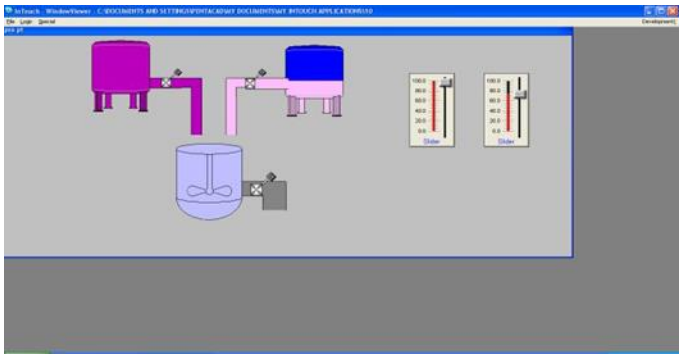
WORKING

Collection of waste water from dyeing industry is depoisted in the waste water storage tank.at this time it has the ph level is abnormal(14 ph).the waste water colour agent is remove by chlorination process and it may also used to reduce the PH level is below 7.after that remove the dust and waste particle and it penetrates into sodium metal bi sulphate agent is used for remove the more amount of toxic content in the chorine water is known as dechlorination. and also it has small amount of chlorine content is cleared by biological process it done by the bacteria agents at here the ph level attain the normal condition.it passed into the feed water tank .and it undergoes the step by step filtration process such that sand filtration and carbon gas filtration it used for removes dust particles filtration.then it feed into four stages of reverse osmosis process. The process of Reverse Osmosis is based on the ability of certain specific poly me ric me mb ranes.

Usually cellulose acetate or nylon to pass pure water at fairly h igh pressure through then membrance. Since water is a necessity of life, it is important to drink water free fro m contaminants. To treat water and make it worth drinking, different processes are used and one of best treatment methods is Reverse Osmosis.

OUTPUT SIMULATION

SCADA is an acronym that stands for Supervisory Control and Data Acquisition. SCADA refers to a system that collects data from various sensors at a factory, plant or in other remote locations and then sends this data to a central computer which then manages and controls the data. SCADA systems are used not only in industrial processes: e.g. steel making, power generation (conventional and nuclear) and distribution, chemistry, but also in some experimental facilities such as nuclear fusion. The size of such plants range from a few 1000 to several 10 thousands input/output (I/O) channels. However, SCADA systems evolve rapidly and are now penetrating the market of plants with a number of I/O channels. A collection of equipment that will provide an operator at remote location with enough information to determine the status of a particular piece of a equipment or entire substation and cause actions to take place regarding the equipment or network.



RESULT

To overcome the difficulty of neutralized pH value stable control for the clarifying process in the Dying refineries, a Neural controller used to control neutralized pH value is designed in this paper. In this method, with model network, is able to guide the controller to learn and train better with partial prior knowledge of the controlled system known. Neural combining the concepts of reinforcement learning is used to optimize and control the neutralized pH value for Dying clarifying section. The research indicates that this method has good control results and abilities for anti-disturbances. This will build a good foundation for implementation in real-time control in the future.

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