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RESEARCH ARTICLE

UP-FLOW ANAEROBIC SLUDGE BLANKET REACTOR

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Abstract

India is a agricultural country and milk production is a side earning business for the people, there are huge milk product producing dairy industry are developed in India.through waste water of milk industry produces high inclusion of organic content which is more dangerous in environment without treatment,so its more challenge to make up environment clean. In recent years some new advance techniques were developed,like adsoption, treatment with nanoparticles , usin UASB reactors. Amoung all developed techniqesis , UASB (upflow anaerobic sludge blanket) reactor is popular and more effective method for treating the dairy waste water comparing with other methods. UASB reactor method is a anaerobic treatment which out-come in formation of gas (CH_4) which is energy source. So that anaerobic process fallowed by aerobic process is more economical. In UASB reactor the amount of energy gas produced is directly proportional to amount of organic matter removed. About 70-80 % of methane gas, 20-25% CO_2, small amount of N_2, O_2 Produced. This methane gas is used as alternative source of energy . Thus this process become more economical and effective.

INTRODUCTION

Dairy waste effluents consist of proteins, carbohydrates, and fats originating from the milk. The dairy industry produces different products, such as milk, butter, yoghurt, ice-cream, various types of desserts and cheese, thus, the characteristics of these effluents also vary greatly, depending on the type of system and the methods of operation used. So that dairy waste streams contain high concentrations of organic matter; these effluents may cause serious dangerous problems, in terms of organic load on the local municipal sewage treatment systems. The treatment may include physical, chemical and biological treatment methods. But, the biological processes are mostly use due to high chemical costs and the poor soluble COD removability in physical–chemical treatment processes. There is lot of biological treatment available, but among these anaerobic treatment is generally used as this treatment can easily handle varying organic loads and temperature ranges encountered. After that no need of aeration, low amount of excess sludge production and minimum area demand are main advantages of anaerobic treatment processes.

Usually waste water treatment extended from physical treatment to engineered systems of biological treatment. Many efforts have been made for the biological treatment of waste water. It has been performed in many different ways since 1974 Lettinga and Vanvelsen designed a efficient ,inexpensive simple anaerobic process known as UASB (Upflow anaerobic sludge blanket reactor) In this process micro organisms use the organics in waste water as a food supply and convert them into biomass.

In India near about 273 dairy industries processing and supplying 18.33 million liters milk sold per day. But in whole process large amount of waste water generates, so this is main fact to treat waste water by UASB. The upflow anaerobic sludge blanket is recent development in field of anaerobic treatment. By this treatment pollutants in waste water are degrades by microbes producing 75 to 80 % CH_4 by volume , 15 to 25 % CO_2 and small of N_2, H_2

other gases. As we know that methane gas has high calorific value. So by using UASB reactor methane is collected and which is used as alternative source of energy. Thus , this process become economical and effective for high BOD waste. The simple design of UASB reactors ensures a uniform distribution of incoming wastewater around the base of the digester, sufficient cross section to prevent excessive biomass entrapment, and effective separation of gas, biomass and liquid. The main advantage of the UASB process is that no support material is required for retention of the high density anaerobic sludge. However, the absence of carriers necessitates the availability and maintenance of highly settleable biomass, either as flocs or as dense granules (0.5-2.5 mm in size). A three-phase separator, (biogas, liquid and biomass) provided to separate the biogas on the one side , and the bacterial mass, which is returned into the active lower zone of the reactor, on the other side. The UASB is most economical because energy utilization of pump for recirculation of effluent is less and it does not require the expense.

OBJECTIVES:

Appraisal of various parameters with respect to change in time.

- Study of physical, chemical ,bio-chemical characteristics of raw waste water, influent feed into the reactor and effluent coming out of the reactor.
- To evaluate the performance of the Upflow Anaerobic Sludge Blanket (UASB) process with Dairy wastewater as feed at Prabhat Fresh, Shrirampur.
- To evaluate the feasibility of the UASB process as wastewater treatment method in India, with particular focus on Dairy wastewater.
- Measurement of various parameters on twice a-week basis and evaluating the performance of reactor by seasonal means(summer, rainy and winter)
- Drawing of percent removal graph for all the parameters which shows reduction in their values.

For optimum Biogas production efficiency calculate the performance of reactor by varying the micro organism in the UASB reactor.

CHAPTER 2
LITERATURE REVIEW

The extensive literature review was carried out by referring standard journals, reference books and conference proceedings. The major work carried out by different researchers is summarized below.

Nidal Mahmoud et.al[1] studied different potential methods for waste water treatment and sludge stabilization including UASB out of them. He studied the performance of one stage UASB reactor comparing with UASB digester system for low temperature i.e 15^{o} c, was administer at a HRT 6 Hours. He come across that UASB digester provide better separation efficiency and conversion than the one stage reactor. Whatever sludge produced in UASB reactor is much more stabilized. Usually in tropical countries the performance of the UASB is good.

R.Thenmozhi and R.N.Uma[2] also studied the different treatment for waste water. They design the hybrid UASB rector by changing retention time in day for particular organic loading rate. This method effectively removed the BOD, COD and other parameters because of both suspended and attached growth process. there are

some limitation for suspended and combined growth process, so for overcoming that limitation biological waste water treatment has been developed in many different ways. In which hybrid type of reactor is one of them, involving both suspended and attached growth process.

Jules B. van Lier et.al[3] studied the UASB reactor on the basis of thermophilic high- rate system. The sensitivity to temperature undulation will decreases in time. They find out that result by effect of temperature on the conversion rate of volatile fatty acid (VFA) by thermophilic mathanogenic sludge grown under different condition. They do the experiment in transparent bottle at 46, 55 and 64^{o} c for 6 to 8 weeks. Where they know degradation is depend on cultivation temperature. A high sensitivity is expected if the maximum microbial growth rate is the predominant selection test for thermophilic methanogens.

A. James et.al[4] his paper presents a advance methodology for the SMA "specific methanogenic activity" test, which appropriate the best need necessary for an exact performance of the test. Several experiments done on different wastewater sludges and the results were very compatible leading to the conclusion that this method can be applied to any type of anaerobic sludge and can be easily standardized.

L.Florencio et.al[5] evaluated the effect of methanol concentration and inorganic carbon on the competition between acetogens and methanogens for methanol, eight upflow anaerobic sludge blanket reactors were operated continuously with different levels of sodium bicarbonate at variable methanol loadings. The results indicated that methylotrophic methanogens will predominate in a broad pH range (4.2-7.2) if either the methanol concentration in

the effluent or inorganic carbon is low. Continuous steady state methane production resulted in chemical oxygen demand (COD) removals of 99.8-54% at organic loadings ranging from 7.6 to 22g COD. On the other hand, significant acetogenesis occurred if exogenous inorganic carbon was supplied and if the methanol concentration in the effluent was greater than 1000 mg. The observation that acetogenesis only occurred in the presence of high methanol concentrations in the effluent confirms the previously determined 60-times-higher substrate affinity of methanogens. Steady state acetogenesis was only observed when unionized VFA, which inhibited the methanogens, were present at high levels for prolonged periods of time. Additions of moderate levels of $NaHCO_3$ were found to create such conditions since VFA accumulation exceeded the buffering capacity. Continuous acetogenesis from methanol at organic loading rates of 21 g COD resulted in poor COD removal (6.3%). In contrast, high levels of $NaHCO_3$ supplementation favoured methane production since the alkalinity was strong enough to prevent toxic levels of undissociated acids even in periods when VFA accumulated as a result of organic overloading.

L.Florencio et.al[6] conduct their study eight upflow anaerobic sludge blanket reactor were administered continuously with different level of sodium carbonate at different methanol loadings. They find out the effect of methanol concentration and inorganic carbon on emulation between acetogens and methanogens for methanol. The result concluded that methylotrophic methanogens will have greater effect in a broad pH range (4.2-7.2) if either the methanol content in the effluent is low. continuous steady state result in methane production by removing chemical oxygen demand (COD) about 99.8-54% at organic loading from 7.6 to 22g COD. But when the methanol concentration in the effluent was greater than 1000mg and inorganic carbon was supplied significant acetogenesis occurred.

Renato Carrha Leita et.al[7] his paper explain the reasons, types and consequence of operational and seasonal on anaerobic wastewater treatment systems. However, there still remain some obscure technical and scientific aspects that are needed for the progess of the stability and credibility of anaerobic processes.

Abdullah Yasar and Amtul Bari Tabind et.al[8] their paper concentrated on efficiency and process condition for UASB treatment system, and find out the advanced oxidation processes (AOPs) as a option for primary method . the combined effect of AOPs and anaerobic treatment reduce the chances of further growth due to irreparable damage to nucleic acid. Maximum efficiency of UASB can be achieved by maintaining process condition, temperature, sludge age, pH, hydraulic retention time and gas-solid separator.

A.G. Brito et.al[9] studied Granulation studied the UASB reactor for low strength of wastewater. He study the UASB for glucose base wastewater effectively degraded by acidogenic bacteria. In which common granular structure could not observed. during that the pre-acidification of the wastewater enhance the granulation process. In this process glucose was about 90 % removed. At the same time pre-acidification process enhance the granulation process.

Baisali Sarkar et.al[10] studied that in dairy waste water by adsorption, coagulation and membrane separation process organic matter effectively removed and after that process the effluent is used for different process. He basically selected the dairy waste because of our India is agricultural country where milk is majorly produces. In fast few years there are number of membrane are developed with high removal of characteristics have probably reuse of wastewater. In this experiment pretreatment were done by different coagulant as a organic, inorganic and polymeric. Coagulant method was done at various pH by using different dosage of coagulants which is continuously followed by activated charcoal treatment . wastewater then passed through cross flow reverse osmosis membrane system. In which all techniques colour and odour were are permanently removed.

M. M. M. Goncalves et.al.[11] exploited Bioactivation, a process to obtain anaerobic sulphidogenic sludge, in order to development of sulphate reduction and, consequently, sulphide production to reduce metals from wastewater. This procedure, in which the source of carbon/energy as a lactate is gradually superseded , composed of three operational conditions. It was resulted that bioactivation took six months so there was a 100-fold raise in the population of sulphate-reducing bacteria forecasted by the most-probable-number (MPN) when molasses was considered as a new source.

Jose Tavave de Sousa et al[12] all design special type of UASB reactor ,which is ccomposed by two units. In first unit UASB reactor design with nitrification process about 35 lit volume and 15 day of sludge age and second step is denitrification. In nitrification process 71% of organic material removed and in denitrifiction process 90% nitriate removal efficiency observed. So in that Jose study we could be observed that denitrification process is more practicable.

A.A.Azimi and M.Zamanzadeh et al[13] studied UASB reactor for treating waste water in tropical Regions.in tropical regions two distinct phase were carried out with ambient temperature. In this Azimi and Zamanzadesh studied UASB reactor for two different colder temperature. Waste water entering natural temperature to UASB reactor about 22 to 26^0c.

In colder period hydraulic retention time including 2,4,6,8, & 10 hours with different loading rates of 0.95 to 5.70 kg COD/m^3/day. In colder period BOD5,COD and TSS removal efficiency were 54,46,53% respectively and in warmer period it is about 71,63 and 65% respectively.

B. Ramesh Bapu et al[14] studied the corrosion of mild steel reactor cause due to diary effluents and estimate the mechanism for microbilogically causing corrosion in dairy waste water. He find out different microbes like pseudomonas sp, Bacillus sp, Neisseria sp and lactobacillus sp role in effluent. By using reducing weight mesurment and polraization method. Corrosion rate could be find out in dairy, during fermentation corrosion of mild steel happened and which is check by fourier transform infrared spectroscopy (FTIR) and x-ray diffractormeter (XRD).

Erik Ten Brummerler et al[15] developed UASB reactor by raising sludge retention time by natural immobilization and find out high rate anaerobic digestion phenomenon for upflow anaerobic sludge blanket reactor.

Ziv Arbeli et al[16] in their paper studied the high vigour anaerobic deep reservoir for finding out the rate limiting step of the methanogenic fermentation pathway and efficiency by combination of in situ mesuerments and lab experiments. In anaerobic reservoir COD completely removed and BOD about 75% but it is not easy to remove bad smell during winter.

Sergey Kalyuzhnyi et al[17] develop the special type of model i.e integrated mathematical model of sulphate fed granular sludge reactor developed by hydrodynamic block,kinetic block,physico chemical and transfer block for finding out the engineering parameters on the operation performance and sulphate conversion.

S.A. Habeeb et al[18] published their paper of UASB reactor as an attractive technology and different factor like PH, organic loading rate (OLR) hydraulic retention time (HRT), mixing and temperature control the process.

K. Kartikeyan and J. Kadaswami al[19] the paper present on UASB application in tannery, print paper industry and distillery spent wash industry.

Jitendra Kumar Singh et al[20] published paper on single cell protein (SCP). In dairy waste water is a composition of lactose 70% which having high organic load in dairy waste water and mainly responsible for production of SCP. SCP produces biomass and having 70% COD removing efficiency. Biomass rate increases by decreasing in lactose.

P Sankar Ganesh et al[21] present a paper on low strength dairy waste in UASB reactor having chemical oxygen demand COD 1200-2000 mg/l. A reactor accomplished 75-85% treatment efficiency. The reactor quickly recovered after accidentally contamination.

Nadeem Khalil et al[22] studied the possible UASB technology for developing countries with it's future in India based on life cycle cost (LCC). He also studied the general consequence of UASB technology in India. In that institutional and technical aspects with special reference to Tamuna action plan are published.

Hsin-Hsien Chou et al[23] studied UASB reactor for phenol substrate under both methanogens and acidogens activity. Upflow anaerobic sludge blanket reactor under mesophilic condition (25,30,35 and 40^0c) give highest biomass and largest granule size at 30^0c but at 25^0c resulted in the smaller granular size and greatest amount of wash out sludge. That is best rate limiting step for phenol is acidogenesis.

E. P. A. Van langerak et al[24] donethe study of UASB reactor for high calcium content wastewater (600+-1200 mg Ca2). On the basis of amount of anaerobic sludge he were find out the influence of the amount of precipitation and influence of differences in biomass yield. The experiments carried out 180 days at organic loading rate of 14 g COD. The result intake that as compare to acidified UASB reactor is mostly possible.

METHODOLOGY

3.1 In the following flow dig. the sources of dairy wastewater are given .

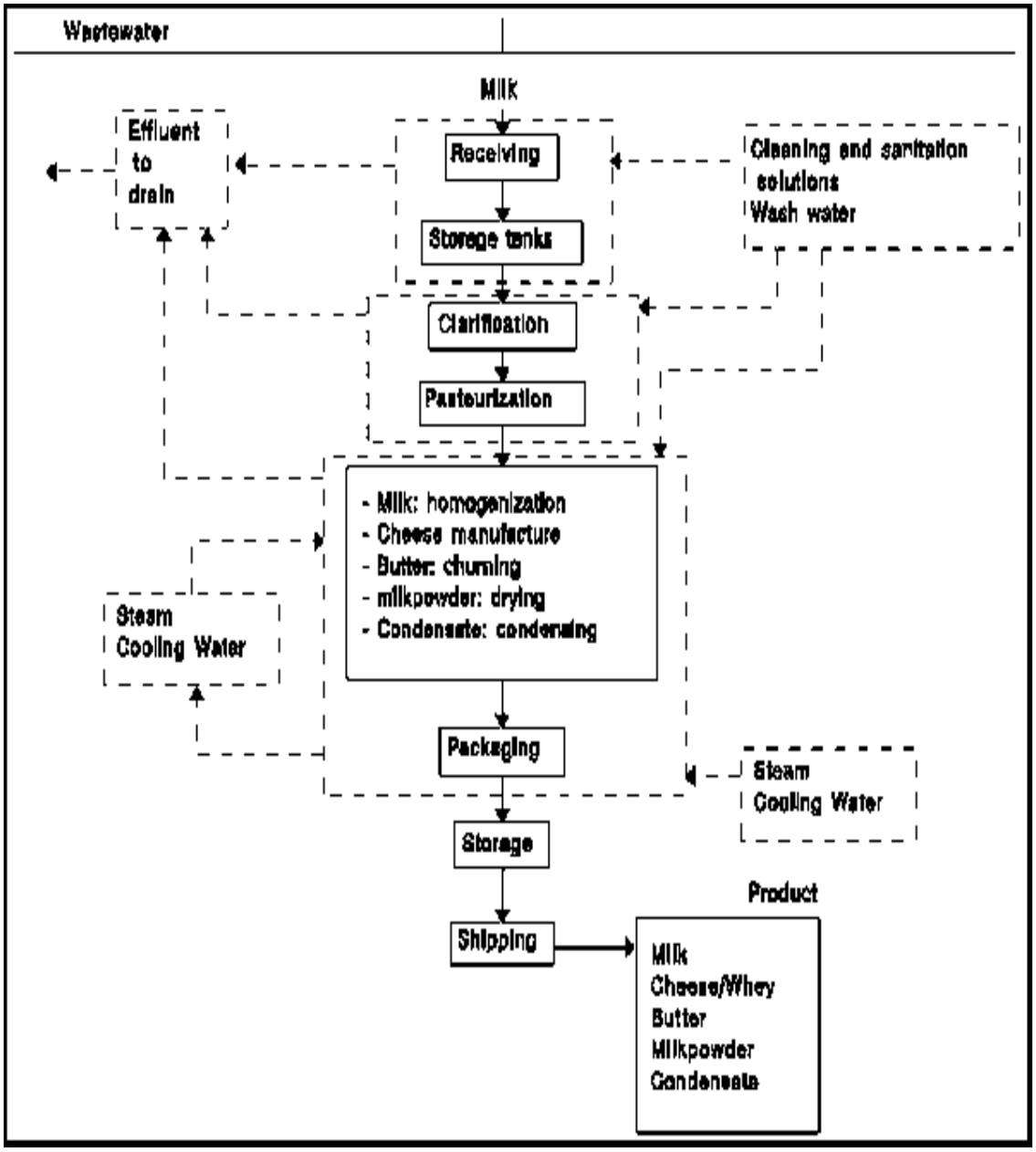


Fig 1: Wastewater generation paths for Milk Processing Plant

3.2 Physical characteristics of waste water

1)Solid
2)temperature
3)odour
4)colour

3.3 Chemical characteristics of waste water

1) chemical oxygen demand (COD)
2) Biochemical oxygen demand (BOD)
3) Hydrogen concentration
4) chloride
5) Alkalinity
6) Acidity

3.4 Composition of typical dairy waste water

Sr no	Parameter	Values
1	pH	7
2	BOD	1235mg/lit
3	COD	2570mg/lit
4	Alkalinity	600
5	Total dissolved solid	1050mg/lit
6	Suspended solid	750mg/lit
7	Total nitrogen	82
8	Chlorides	104
9	Phosphorous	11.5
10	Chlorides	102

Table no 1: Typical dairy waste water characteristics

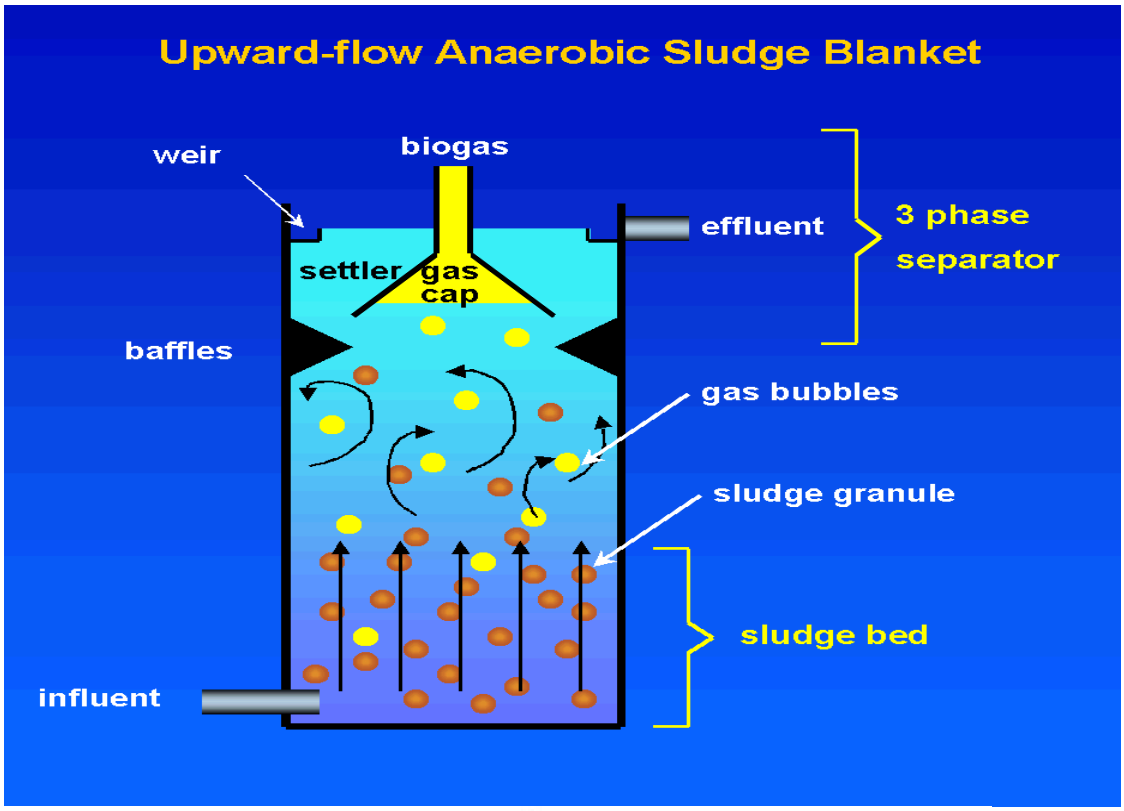
3.5 UASB REACTOR :-

In present study UASB reactor is made up of R.C.C. with five sampling parts, one inlet which further diverged in to 10 channels, ten effluent outlets, two gas outlets and solid liquid separator. The total working volume of UASB is 1054m^3

Photo No:01 UASB reactor at Prabhat Dairy, Shrirampur

3.5.1. Background :-

In 1980 G. lettinga in the Netherlands was firstly developed the UASB
reactor for waste water. The UASB reactor was first developed for high strength industrial wastewater but after some period this technic also employed for domestic sewage treatment. As a outcome, the UASB reactor application implemented in many countries including Brazil, Colombia, Uruguay and Cuba. In starting some UASB result were quite contradictory. Required performance was not achieved and in the addition there are lot of bad odour problem which is disbelief the anaerobic process. However after an precarious starting, the application of anaerobic reactor for the treatment of domestic sewage is today well promoted and has been successfully executed specially in tropical regions for eg Brazil, Colombia, India.



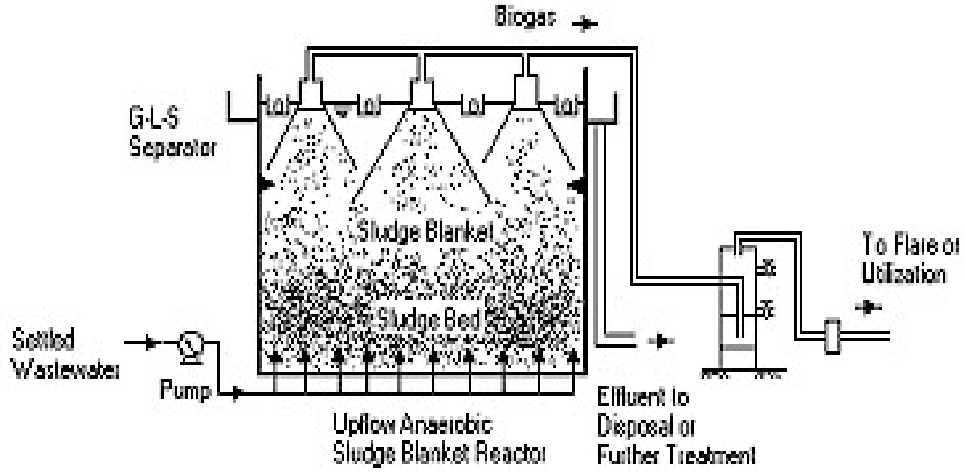


Fig.02 Schematic diagram of UASB reactor

UASB is nothing but three phase gas-solid-liquid separator device (GSL). GSL device installed at top of the tank. It is main part of the UASB reactor with following function.

1) To collect wastewater separator in three phase and to release the biogas formed.
2) During the production of biogas in the GSL setting device avoid the liquid turbulances.
3) To minimizes the flowing the sludge particales from the system.
4) By using sedimentation flocculation method seprate the sludge particals in the sludge blanket reactor.
5) In the digester compartment avoid the sludge bed expansion.

3.5.2 Treatment principal:-

The upflow anaerobic sludge blanket reactor is a compact sludge bed in which waste water flow upward with high-grade microbial activity. In the reactor more dispersed and light solid sludge particles present at the top and very dense, granular particles present at bottom.

The UASB reactor composed by four main units. The sludge bed, the sludge blanket, the gas-solid-liquid separator(i.e. 3-phase separator) and secondary setting compartment above the separator. At the bottom of UASB reactor sludge bed is existed with very dense sludge eccentric settling characteristics. Sludge blanket present above the sludge bed. This sludge blanket composed by solid with low concentration and settling velocities. Sludge particles exist in sludge blanket which are responsible for biogas production and there for it remain in suspention.in both sludge bed and sludge blanket entering wastewater degreded by biologically.

The UASB reactor sludge move upward by the movement of upflow gas bubbles. The natural liquid turbulence generate due to incoming flow and biogas production which both are continuously produce the wastewater. Biomass contact in the reactor.

The 3-phase G-S-L device installed at the top of reactor. Here the gas formed separately from liquid and sludge further return. A setting compartment named as gas free zone is formed above the separator. Whatever sludge has been coming by minimizing sedimentation of solid particles.

The GSL separator i.e. (3 phase separator) are capable for high retention capacity of maximum amount of high activity in the reactor. Higher solid residence time (sludge age) achieved thanthe hydraulic retention time. So this is main fact for production of high biogas by high activity of sludge within reactor.

3.5.3 Precommissiong check-list :

1. The UASB Reactor was completely occupied with water and leakage or seepage to the sides of reactor wall is carried out by using the hydraulic test.

2. After hydraulic test, gas leakage test was carried out of hoods and gas handling system by giving air pressure from bottom sides of the reactor.

3.5.4 Start Up :

About continuous three days on 1st, 2nd and 3rd March, 2015 the UASB reactor was feed with cow dung . Then UASB reactor stand in constant position for approximately 45 days , then raw effluent water Feed at a flow rate of 52 m^3/ day was feed to UASB reactor measured by flow meter.

Thus the calculation of hydraulic retention time (HRT) is calculated as ,

HRT= V / Q

= 1052 / 52

= 20.23 Hrs.

That is hydraulic retention time is found to be 20.23 Hrs.

3.2.5 Design Data:

Characteristics of raw effluent :

On the basis of raw effluent characteristics of dairy waste water the UASB reactor is designed as follow :

Sr no.	**Parameters**	**Values**
1	Flow m^3 / day	1000
2	pH	5-11
3	BOD mg/ lit	1500-1800
4	COD mg / lit	3500-4000
5	TSS, mg / lit	800

6	Temperature ^{0}C	30-35
7	Oil and grease, mg/ lit	100

Table 2 : Raw effluent parameters (at the inlet of existing screen chamber)

Treated effluent characteristics:

The anaerobically treated effluent Ex.- UASB process are surety to have the characteristics as mentioned below in the table 3

Sr. No.	Parameter	Value
1	BOD reduction	80 – 85%
2	COD reduction	75 – 80%
3	pH	6.5- 7.5
4	Biogas production co-efficient	o.30- 0.45 m^3 / kg COD
5	Total biogas production	1250 m^3 / kg Max
6	BOD, mg/l	200-280
7	COD, mg/l	750-850

Table 3: Treated effluent parameters

The anaerobically treated effluent is further treated by aerobic process followed by Tertiary Process.

3.2.6 Instrumentation:

1. pH meter- This is automated control dynamic pH meter with glass electrode used to measured the pH of the treated effluent.

2. Flow meter- This is the wavetek electronics instrument used to measure incoming flow of the treated effluent. This instrument have automated digital display .

3. TDS- It is a scientific instrument nothing but to measure the total dissolved solid in dairy waste water, MODEL : EQ 680

4. BOD incubator- This is scientific instrument (M)-202 to control the temperature automatic digitally .

5. Hot air oven- This is a scientific instrument (M) -101 provided with digital temperature controller

6. Autoclave- This is also scientific standard instrument (M)- 801

7. Conductivity meter- Range : 0-20 uS/0-200 uS/0-2 mS/0-20 mS/0-200 mS Power : 230 V +/- 10%, 50 Hz.

3.2.7. Methods of testing:

Physical and chemical test of the sample to be carried out by standard method as follow:

1.colour- visual comparison method:

This is a method to interpret colour directly from matching the colour standards. That is this method useful to measure the colour colour of water matching on Hazen scale Which ranges from 1 to 70 units of the scale. But the when the water have colour greater than 70 units at that time this sample firstly diluted and it not contain any sediment particles

2. pH: Potentiometric method with reference electrode:

This is a method used to calculate the ion concentration , pH ,thermodynamic equilibrium constant and also use to find out the end point of titration. Electrode potential (E_{ref}) is half cell which is independent on any other ions in solution.

3. Temperature: Mercury thermometer:

It is a glass tube containing mercury in the bulb attached to the glass tube of narrow diameter. volume of mercury changes with temperature and it indicate the different intermediate reading due to different expansion properties.

4. Total suspended solid : Gravimetric after filtration:

Gravimetric after filtration is a method from analytical chemistry used to measure the mass of solid in the sample. A simple example means it measure the suspended solid in the sample. In which a known volume of sample filtered firstly then collected solid are weighed.

5. Biochemical oxygen demand : Manometric method:

This method used to measure the amount of oxygen consumed. In which sample is kept in sealed container fitted with pressure sensor. A substance that absorb carbon dioxide added in container above the sample level .

oxygen is consumed and carbon dioxide is released. The amount of oxygen consumed display directly by electronic sensor .

6. Total dissolved solid-Gravimetric method:

There are two methods are available for calculating the total dissolved solid are gravimetric and conductivity method. In this method by evaporating the liquid solvent the residues left are measured.

7..Chemical oxygen demand - Dichromate reflux method:

Dichromate reflux method mostly use to determine the COD because it's easy to manipulation. As dairy waste water contain high amount of organic matter which is oxidized by chemical oxidant . amount of organic matter present in the sample is calculated by refluxing the sample with potassium dichromate . organic matter oxidized about 95-100%, after digestion COD is determined by calorimetrically against standard using spectrophotometer. Then the curve of absorbance Vs COD. Optical absorbance is compare with calibration curve to determine COD equivalent.

8.Chloride- Argentometric method :

Argentometric is method from analytical chemistry including silver ion. Argentometric is titration method to determine percentage of chloride in a sample. In this method sample solution is titrated against silver nitrate of given concentration.

$Ag^+ (aq) + Cl^- (aq) \rightarrow AgCl (s)$ ($K = 5.88 \times 10^9$)

9.Sulphates- Gravimetric method :

Alkali sulfate containing sample firstly well dried, weighed and dissolved in the dilute HCL solution. For precipitation of barium sulfate barium chloride is added in sample solution. The precipitate filtered through filter paper and then this filtered ignited to form ash. From the weight of sample and weight of ash we can find out percentage of sulfate.

10. Oil and greases partition- Gravimetric method:

Oil and greases partition- Gravimetric method is not only useful to extract the dissolvd or emulsified oil and greases but also other organic substances.

CHAPTER 4
RESULT AND DISCUSSIONS

SR.NO	PARAMETER	RAW WATER INLET VALUE
01	pH	9.92
02	Suspended solid (SS)	410
03	Total dissolved solid	355.0
04	COD	3198.0
05	3 days BOD at 27^o C	1745.0.
06	Oil and grease	20.2

Table no.04 raw water characteristics

SR.NO	PARAMETER	REACTOR WATER OUTLET VALUES	MPCB STANDARDS
01	pH	07.55	5-9

02	Suspended solid (SS)	77	< 100.0
03	Total dissolved solid	2899.0	<2100.0
04	COD	101.4	<250.0
05	3 days BOD at 27^{o} C	33	<100
06	Oil and grease	06.00	<10.0

Table No.05 Reactor outlet value

TABLE NO.06 INFLUENT WASTE WATER CHARACTERISTICS

SAMPLE NO	**TEMP.**	**Ph**	**TDS**	**TSS**	**BOD**	**COD**	**CI^-**	**SO_4^-**
01	29	10.5	3560	730	1780	3140	180	440
02	27	10.4	3590	740	1750	3150	180	445
03	28	10.8	3580	750	1740	3150	175	450
04	29	10.4	3560	760	1750	3000	190	490
05	27	10.3	3550	770	1770	3180	180	445
06	28	10.5	3570	730	1700	3160	175	470
07	28	10.4	3550	740	1740	3190	175	440
08	27	10.3	3590	760	1730	3200	180	480

All values are in mg/l except pH and temp. # Values are in degree celcius

TABLE NO.07 EFFLUENT WATER CHARACTERISTICS

SAMPLE NO	**TEMP.**	**pH**	**TDS**	**TSS**	**BOD**	**COD**	**CI^-**	**SO_4^-**
01	28	7.67	2950	70	35.5	110.0	165	152
02	28	7.50	2940	90	40.2	103.0	170	148
03	27	7.80	2970	90	38.40	100.0	165	150
04	27	7.48	2950	80	35.80	115.0	178	146
05	29	7.75	2940	70	45.5	110.0	167	148
06	28	7.8	2930	70	48.3	134.0	175	160
07	27	7.30	2950	90	43.6	100.0	170	152
08	28	7.48	2960	80	45.9	120.0	165	148

All values are in mg/l except pH and temp.
Values are in degree celcius

CONCLUSION

Treatability of dairy waste water by using the upflow sludge blanket reactor as anaerobic bioreactor was done successfully. The conclusion of that study is as fallows:

- The UASB reactor can be applicable for the small treatment unit of domestic waste water.
- The characteristics developed in the UASB reactor are maintained at staring and steady state operation.
- The reactor performance remain constant even when the COD loading rate changes over wide range indicate the better performance of the reactor.
- Even when the any variation in the concentration parameter the design efficiency of the UASB reactor does not changes.
- Due to shock loads and week flow variation the effluent efficiency changes but after than also UASB reactor capable for treating the waste water.
- By using UASB reactor there is better collection of the gas (energy gas).

Whatever waste is produce after the UASB treatment is use for agricultural purpose.

REFERENCES

1.Letting G, Van Velsen A F M, Hobma S W , de Zeeuw W J & Klapwijk for biological waste water treatment use a UASB reactor ,especially for anaerobic treatment ty6u8uyetrng, 22 (1980) 699-734
2. Letting G & Pol H L, UASB process design Treatment of Waste Water Treatment , Water sci technol,24 (1991)87-107
3. R.Thenmozhi & R.N.Uma ," studied the UASB reactor for dairu waste" civil environmental Research, ISSN 2222-1719 (Paper) ISSN 2222-2863 (Online) Vol 2, No.2, 2012
4.Nidal Mahmoud, Grietje Zeeman , Huub Gijzen and Gatze Lettinga," study the one-stage UASB reactor & a combined UASB digester system '' Seventh International water technology conference Egypt 28-30 March 2013
5.M.M.M. Gonclaves ,S.G.F.Leite & G.L.Sant," For increasing bacteria by using bioactivation Process ," brazilian Journal of chemical engineering , Vol.22, No.o4.Pp.565-571, October- December 2005
6.Baisali Sankar , P.P. Chakrabarti, A. Vijaykumar, Vijay Kale "Dairy Waste water treatment – find out various method for reuse of water " Desalination 195(2006) 141- 152
7. Jules B. Van Lier, A Jeroen Hulsbeek, A Alfons J.M.Stams B & Gatze Lettinga" study the Temperature Susceptibility of Thermophilic Methanogenic , Develop for reactor start-up & Operation" Bioresource Technology 43 (1993)227- 235
8. A. James , C.A.L Chernicharo & C.M.M Campos " for the assessment of Special Methodology Activity develop the new method " Wat, Res.Vol.24,No.7,Pp.813-825,1990
9. A.G.Brito,A.C. Rodrigues and L.F.Melo" the start-up of UASB reactor granulation form used in the treatment low strength waste water " Biotechnology letters, Vol 19 , No.4, April 1997, pp.363-367
10. L. Florencio, J.A. Field & G.Lettinga " Substrate Competition Between Methanogens & Acetogens in UASB reactor during degredation " War.Res. Vol.29, No .3, Pp.915-922,1995
11. Jose Tavares de Sousa, Keliana Dantas Santos, Israel Nunes Henriqu, Danielle Patricio Brasil4 and Eclesio Cavalcante Santos," the dentrification in UASB reactor by anaerobically " Journal of urban and environmental engineering v.2,n.2,p.63-67
12.P Sankar Ganesh, E V Ramasamy # , S Gajalakshmi ,R Sanjeevi and S A Abbasi, " Studies its application to dairy industry wash water, and find out the method for low strength dairy waste Indian Journal of Biotechnology Vol.6, April 2007,pp 234-238"
13. A.A.Azimi and M.Zamanzadeh," for waste water pretreatment system in tropical small communities find out design of UASB reactor "Int.J.Environ.sci.Tech.Vol 01, No.1, pp 51-57,Spring 2004
14.Jintendra Kumar Singh, Rahul L.Meshram and D. S. Ramteke" for removal of ' COD' from dairy waste water Production of signal cell protein" European Journal of Experimental Biology, 2011,1(3)-209-215
15. B. Ramesh Babu ,S Maruthamuthu, A. Rajasekar, N.Muthukumar and N.Palaniswamy" Microbiologically affected Corrosion in dairy waste water " International Journal, Vol.3, pp 159-166
16.K.Kartikeyan and J.Kadaswami " UASB in a dairy water treatment " Water and waste water methods
17.Erik Ten Brummeler, Look. Hulshoff pol, Jan Dolfing, Gatze and Alexander J.B.Zehnder," Methnogenesis In An UASB At ph 6 on An Acetate-Propionate solution ," Applied and Environmental Microbiology journal , June 1985, P. 1472-1477
18.S.A,Habeeb, AB. Aziz Bin Abdul Latiff, Zulkifli Bin Ahmad "In the UASB reactor for A Review on characteristics of the digestion process," Canadian Journal on Environmental construction and civil engineering Vol.1,No.3, july 2010
19.Ziv Arbeli, Asher Brenner, Aharon Abeliovich " method for high-strength dairy waste water in an anaerobic reactor ,analysis of the mathanogenic fermentation pathway and the rate-limiting step" WATER RESEARCH 40(2006) 3653-3659s
20.Sergey Kalyuzhnyi, Vyacheslav Fedorovich, Piet Len, Look Hulshoff Pol & Gatze Lettinga "to study Population dynamics between sulfate reducing develop the Mathematical Modeling as a tool and mathanogenic bacteria" Bioegradation 9:187-199,1998
21.Nadeem Khalil , Rajiv Sinha, A.K Raghav, A K Mattal" UASB technology for sewage treatment In India :Experience, Economic Evolution and Its Potential in other developing countries ", Twelfth International water technology conference , Iwtc12 2008, Alexandria , Egypt
22. A. Visser, Y. Gao & G. Lettinga, " Effects of pH on mathonogenesis and sulphate reduction in thermophilic (55^0C) UASB Reactors," Bioresource Technology 44 (1993) 113-121.