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Treatment of kitchen wastewater using aerobic biological method and sand-bed filtration.

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INTRODUCTION

- **Water is a very vital natural resource and a primary need of man. Abundant fresh water supplies has been a problem of antiquity.**

- **Globally, access to safe, clean water is limited. Improper sanitation due to water crisis has resulted to water related diseases particularly among children in developing countries (Earkin and Sharman, 2010).**

- **Global, fresh water crisis has been traced to:**

i. increase in industrialization
ii. urbanization
iii. mismanagement and iv. overuse of water resources
(Michael *et al*, 2018;Erickson *et al.*, 2003).

- **The threshold of people living under water stress is increasing. Availability of freshwater supply to meet increasing demand remains unachievable; this can lead to crisis.**

- **Alternative measures of fresh water augmentation to meet increasing demand is necessary.**

- **Kitchen wastewater refers to spent water from kitchen sink without contamination from human urine or excrement.**

- **Depending on the quality, composition and intended reuse, Kitchen wastewater of low pollution strength can be treated, safely recycled and would have high potential for reuse (Bernard *et al* 2003; Casanova et al., 2001).**

- **Significance of wastewater recycling and reuse:**

i. it conserves water when there is limited supply

ii. reuse will help reduce wastewaters entering sewers or septic tanks.

AIM OF STUDY:

- **The aim of the research was to analyse kitchen wastewater for pollution levels, treat the water and determine the feasibility for reuse.**

OBJECTIVES:

The objectives of the study were to:

- **characterise the kitchen wastewater.**
- **treat the raw wastewater using aerobic biological treatment and sand-bed filtration.**
- **analyse the treated effluent and evaluate the possibility for re-use.**

MATERIALS AND METHODS
Description of sample and sampling method

Plate 1: Images of the kitchen wastewater

Table 1:Parameters analysed according to standard methods (APHA 1995; Ademoroti, 1996).

pH
Temperature
Turbidity
Conductivity
Total Dissolved Solids (TDS)
Total Suspended Solids (TSS)
Alkalinity
Hardness
Biochemical Oxygen Demand (BOD)
Chemical Oxygen Demand
Bacterial Count

Plate 2: Aerobic biological treatment

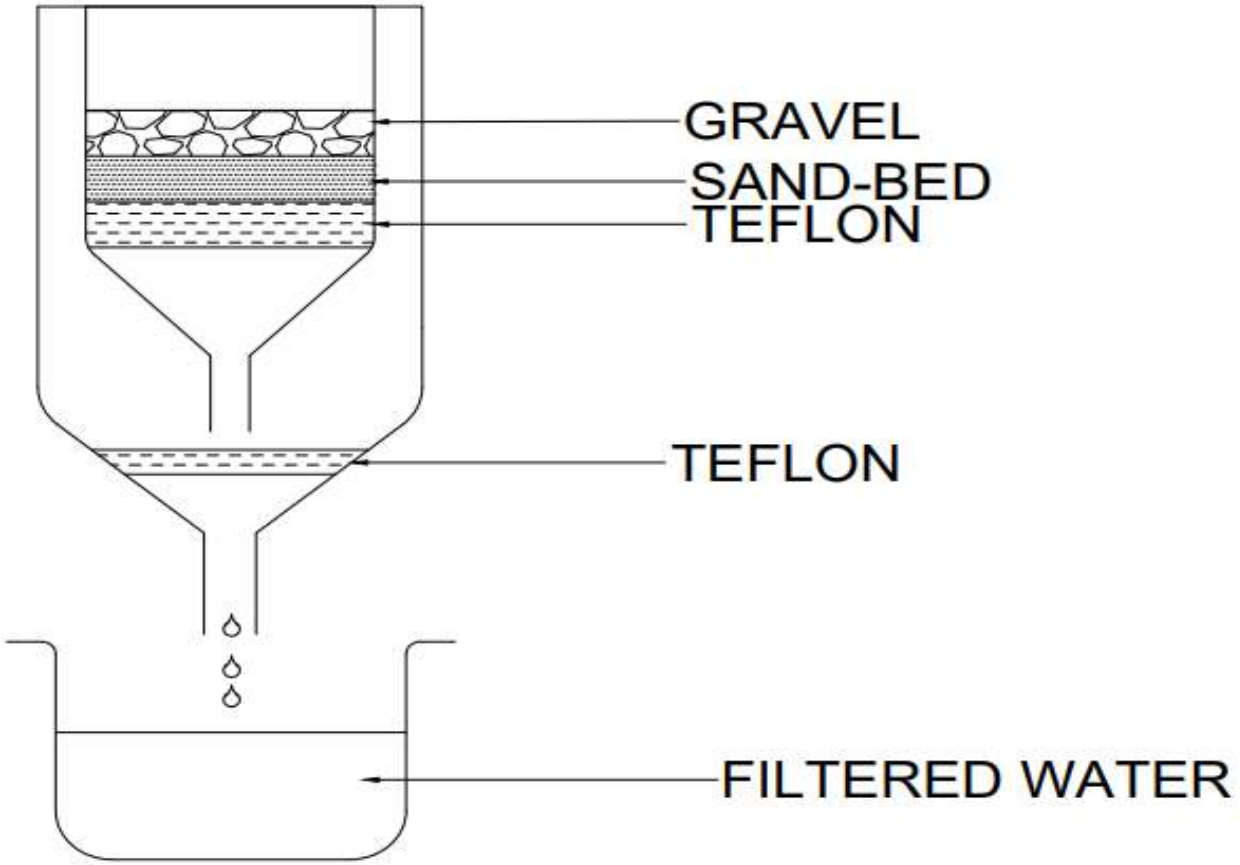

Figure 1: Sand bed filtration

RESULTS

Table2: Summary of results from analysis

Parameters	Units	Raw Kitchen Wastewater	Treated Kitchen Wastewater	FMEnv. and WHO Standard Limits	
		Mean values ±SD	Mean values ± SD	FMEnv. Limit	Maximum permissible
pH		7.4 ± 0.057	7.9 ± 0.000	6.0 – 8.5	6.5 – 8.5
Temperature	°C	29 ± 0.060	31± 1.700	≤ 40°C	25 - 35°C
Turbidity	NTU	6.9 ± 0.127	6.0 ± 0.2333	1	5
Conductivity	µS/cm	365 ± 0.000	311 ± 10.270	NA	900 - 1,200
Total dissolved solids(TDS)	mg/L	141 ± 8.505	121 ± 2.944	10	500 – 1,500
Total Suspended Solids(TSS)	mg/L	5.0 ± 3.536	2.0 ± 0.000	100	NA
Alkalinity	mg/L	6.3 ± 0.000	7.3 ± 0.000	NA	100
Hardness	mg/L	16.0 ± 0.000	15.0 ± 0.000	NA	500
Biochemical oxygen demand(BOD)	mg/L	5.5 ± 0.000	1.82 ± 0.000	250	4.0
Chemical oxygen demand (COD)	mg/L	36.0 ± 0.000	32.0 ± 0.000	NA	30
Bacterial Count	CFU	286 x 10^{-4}	16 x 10^{-4}	NA	NA

SD= Standard deviation
FMEnv. = Federal Ministry of Environment (National Wastewater Discharge Limit)
WHO = World Health Organization Standard guideline for portable water quality)

DISCUSSION

- **Most of the pollution parameters analysed were reduced after the treatment. Therefore, aerobic biological treatment and sand-bed filtration were effective.**

- **Also parameters analysed were within standard limits. This showed that the kitchen wastewater will be fit for reuse.**

FINDINGS

- **Aerobic biological treatment and sand-bed filtration were effective in the treatment of the raw kitchen wastewater.**

- **The treated kitchen wastewater could meet for non-portable re-use applications.**

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THANK YOU.