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THE EFFECTS OF MAGNETIC FIELD ON E. COLI BACTERIA ACCUMULATION AND DISINFECTION IN WATER ADVANCED TREATMENT

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ABSTRACT

As we know there are a lot of effects of magnetism on animals like Arctic navigation by birds and the water circles in vortex flows. It is also known that the people in north part of the Earth have bigger tendency to turn their head to the right and also there is more than 80 % probability that they choose the object on the right side if you give them an opportunity to choose an object between two choices on right side and on the left side. The performed research observes the influence of geographic poles while growing the E. Coli Bacteria in the medium placed at incubator. The growing of bacteria based on 0.5mcfarland standard was conducted in EMB (Eosin Methylene Blue). Another standard based on direct view by its accumulation in medium was observed too. Both of them were induced repeatedly for 6 – 7 times and the results showed that the bacteria while growing in the medium had tendency to accumulate on the right side (East Side) after bringing out of the incubator.

Keywords: ***Disinfection, E. Coli Bacteria, Magnetic Fields, Sheath, KAP***

I. INTRODUCTION OF KAP (KARMANIA AQUA PURIFIER)

One of the systems used in disinfection of bacteria (in this case E. Coli) is a sheathing made in England and Switzerland that covers the pipe while disinfection in both large and small size. We use one of the small one in laboratory to cover around the pipe in circulation system. The accounts of bacteria before accounting is $650x10^4$ and after 2.5 – 3 hour circulation it will decrease to $30x10^4$ by imposing 300 Gs of magnetic field directly on bacteria.

We use our Modified model KAP (at first stage impose 60 – 70 Gs and then impose 300 Gs while we switch the faucet of both sides to maintain hydraulic detention for 1.5 hour). The time required at first stage (imposing the 60 – 70 Gs) while the faucet in the bucket with internal engine for water circulation is closed is 40 minutes and the time required for the second stage (imposing 300 Gs) is 50 minutes. Here is the result of the 2 forms based on 0.5mcfarland standard for accounting. The number of E. Coli Bacteria before imposing Magnetic field was $650x10^4$.

A model (created by modeling software like MATLAB) is a simple presentation of a complex system as we know in the cases of prediction and analyzing of the behavior of pollutants etc. Finally the environmental issues can be converted into the mathematic formula:

$$Q_b = \mathrm{T}\frac{1}{\mu .\mathrm{D}}(\mathrm{M}_{\max} - \mathrm{M}_{\min}) \quad (1)$$

Variables:

- Temperature (*T*)
- Volumetric flow rate (*Q*)
- Viscosity of liquid (μ)
- Differences in the intensity of magnetic field based on Gauss (*M*)
- Diameter of pipe (*D*)

II. EXPERIMENTAL PART

The presented figures depict some parts of the performed experiments.

Figure 1: Process of the Performed Experiments

Figure 2: Process of the Performed Experiments (Continued)

III. RESULTS

Table 1 summarizes the gained results concluding from the performed experiments.

Table 1: The Results of Performed Experiments

Numbers of E. Coli Bacteria crossed from KAP (at first stage impose 60 – 70 Gs and then 300 Gs)	Numbers of E. Coli Bacteria crossed from magnetic sheath (300 Gs)	Time
[DC/mL] $\times 10^4$	[DC/mL] $\times 10^4$	[hr]
< 40	= 550	0.5 hr, 1st
	= 400	0.5 hr, 2nd
	= 300	0.5 hr, 3rd
	= 150	0.5 hr, 4th
	< 30	0.5 hr, 5th

IV.CONCLUSION

The gained results showed that the bacteria growing in medium had tendency to accumulate in right side (East Side) after bringing out of the incubator. The number of E. Coli Bacteria before imposing magnetic field was 650×10^4 DC/mL and the number of E. Coli Bacteria after the procedure was less than 30 DC/mL.

This research has been done in laboratory conditions and small diameter pipe was used. As I have already mentioned in large portions we use large diameter pipe with larger sheathes and much more magnetic intensity is imposed but it is more expensive than smaller diameter pipe. If we impose lower levels of magnetic field by

applying detention and hydraulic pause in the system, we can reach the same results and it will be economically less expensive. In order to prevent from hydraulic hammer impact we should close the faucet gradually.

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