



COW URINE POWER GENERATED SYSTEM

Pratyush Bisen¹, Rajnarayan Choudhary², Samir Khule³

^{1,2}Student, Bhavan's B. P. Vidya Mandir, Ashti (Khurd), Nagpur (India)

³Post Graduate Teacher in Physics,
Bhavan's B. P. Vidya Mandir, Ashti (Khurd), Nagpur (India)

ABSTRACT

The need for new and alternate sources of energy is increasing day by day. In the upcoming days the alternative sources of energy will be applied everywhere. In India most of the population belongs to rural areas where there is a frequent power cut. Hence we worked on cow urine power generated system for tomorrow's future. In this present study we had constructed 10 simple cells by using plastic bottles, two electrodes (Zinc and copper) which were dipped in cow urine which acts as a electrolytic solution. Cow urine contains Uric acid. Copper with the presence of water will get reacted with Uric acid. When zinc and copper plates come in contact with uric acid, electrons started to move to generate electricity. The output of each cell containing 150 ml cow urine was 0.87 V. We had connected them in series to form a battery of potential difference of 8.6 V. Current of the battery was found to be 63 mA. Power generated ($V \times I$) was 0.54 W. We had tested our battery for about 70 hours with and without load.

Keywords: Alternate Sources of Energy, Cow Urine, Series Combination of Cells, Power, Uric Acid.

I. INTRODUCTION

Electricity is the sole of today's society and economy. Our work, leisure, and our economic, social and physical welfare all depends on the sufficient and continuous supply of electricity. Hunger for electrical energy is increasing day by day. The maximum source of electrical energy in thermal power stations is coal. But the problem of this fossil-fuel is environmental pollution such as Greenhouse gases, which leads to a global warming and it is very expensive also. Again fossil fuels are limited source of energy. Hence the need for new and alternate sources of electrical energy is increasing day by day for tomorrow's future. Research is going on to develop alternative sources of energy for electricity generation.[1-2-3-4] In the upcoming days the alternative sources of energy will be applied everywhere.

India is a agricultural country. Peoples living in rural areas are directly dependent on farm, farm related activities and domestic animals like cow, bullock etc for their survival. A large amount of cow urine is available in the rural areas. All this motivates us to work on cow urine power generated system for tomorrow's future. This system is very cheap. easily accessible and pollution free. Here in this work we are showing small scale and simple model of generating electricity by using cow urine as a electrolytic solution and copper and zinc plates as the electrodes, which can be directly implemented at rural areas to make them self dependent.

II. DESCRIPTION OF COW URINE

Generally cow urine contains water - 95%, urea - 2.5% & Minerals, Hormones, Salts & Enzymes - 2.5%. [5]. Hence cow urine contains uric acid, salts and minerals which acts as a electrolytic solution. Uric acid is a heterocyclic compound of carbon, nitrogen, oxygen, and hydrogen with the formula $C_5H_4N_4O_3$. It forms ions and salts known as urates and acid urates, such as ammonium acid urate. Chemical bond of uric acid is shown in figure1.

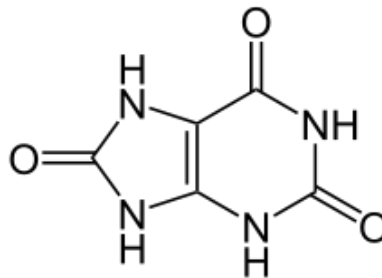


Figure 1: Chemical bond of uric acid

Uric acid is a diprotic acid with $pK_{a1}=5.4$ and $pK_{a2}=10.3$. [6] Thus in strong alkali at high pH, it forms the dually charged full urate ion, but at biological pH or in the presence of carbonic acid or carbonate ions, it forms the singly charged hydrogen or acid urate ion, as its pK_{a1} is lower than the pK_{a1} of carbonic acid. Hence pH of cow urine is more useful for production of electricity. pH of our cow urine sample was around 7 to 9.

III. EXPERIMENTAL

The flow chart of cow urine power generated system is as shown in figure2

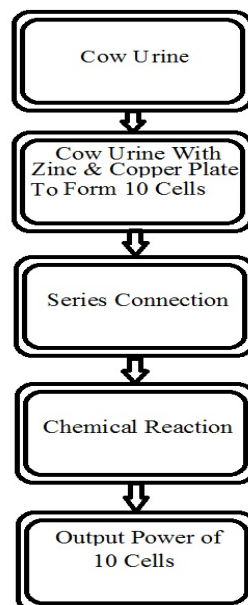


Figure 2: Flowchart of cow urine power generated system

In this present study we had taken fresh cow urine. 10 small containers were prepared by using plastic bottles. In each container we had kept 150 ml of fresh cow urine dipped with two electrodes of zinc and copper. So 10

separate cells were constructed. We have connected them in series to form a battery to get more potential difference.

IV. BASICS OF ELECTRICITY GENERATION

Here in the system an anode is a positive electrode and cathode is a negative electrode. The motion of electron is always from cathode to anode and hence current flows from anode to cathode i.e. opposite to the flow of electron. Our source of electricity generation is cow urine (uric acid) which acts as a electrolytic solution. When zinc and copper plates come in contact with uric acid, electrons started to move to generate electricity. Copper will be reacted with uric acid in the presence of water and salts. Uric acid will be oxidized by copper to produced copper urates. This salt solution made ionic bond and will be attracted towards zinc plate. Hence when copper and zinc plates come in contact with uric acid, electrons started to move to generate electricity.

V. RESULT AND DISCUSSION

The potential difference of each cell measured by multimeter was around 0.87 V. After connected them in series, total output of the battery was found to be 8.6 V. Current of the battery was 63 mA. Hence at the beginning, without connecting load, the total calculated power was about 0.53 W. Figure 3(a) shows the schematic of cow urine power generated system, showing potential difference of 8.6 V .Figure 3(b) shows actual practical set up of cow urine power generated system and potential difference of 8.6 V is measured by using multimeter without load and Figure 3(c) shows glowing LED using cow urine power generated system.

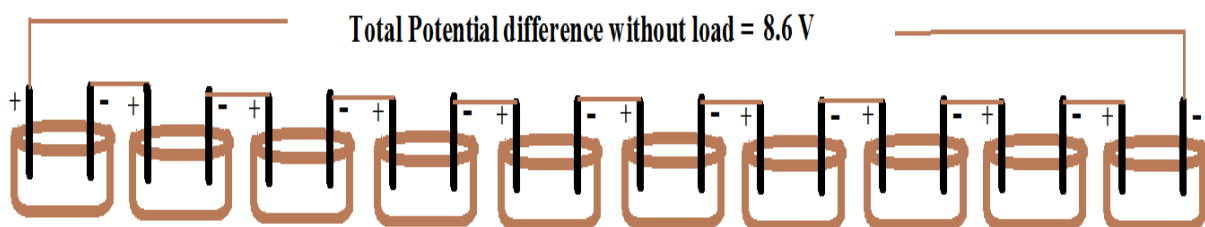


Figure 3(a): Schematic of cow urine power battery



Figure 3(b) shows actual practical set up of cow urine power generated system



Figure 3 (c) shows glowing LED

We tested our battery for about 70 hours without and with load. We noted the values of V and I after every time interval of 10 hours to calculate the power ($P = V \times I$). Figure 4 shows the graphical presentation of power variation with respect to time without and with load.

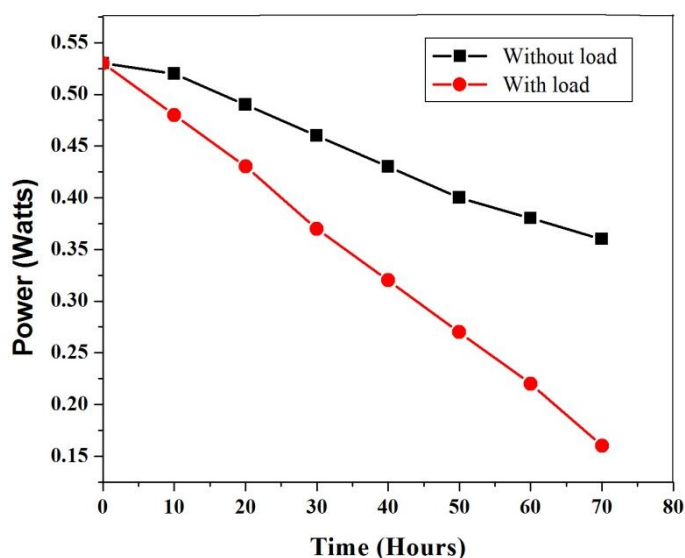


Figure 4: Variation of power with time without and with load

It is found that power of cow urine power generated system started decreasing with respect to time but at a slower rate when load is not connected. But when load is connected in the form of LED, power is found to decreasing at faster rate from 0.53 W to 0.16 W during 70 hours. There is a continuous flow of electrons through cow urine along with electrode decays takes place to decrease the current. But this power is enough to glow the LED for almost 3 days. It gives sufficient light when it is used with reflector at night. Hence after every 3 days we should have to replace the old cow urine with fresh one to regenerate new power.

VI. CONCLUSION

In this work we have developed small cow urine power generated system successfully. The performance of the system was satisfactory. We got the maximum power of 0.53 W. We can generate more power by using large

amount of cow urine to fulfill the demand of future. This system is very cheap and easy to install so that any common man can use it. Our main aim is to make aware about such type of alternate sources of energy to the people, society and government. Same experiments can be performed to generate electric power by using elephant and human urine also.



V. ACKNOWLEDGEMENT

We thank to Smt. Vandan Bisen, Principal, Bhavans B P Vidya Mandir, Ashti, for providing facilities and to give moral support during the work.

REFERENCES

- [1] L. A. Leropoulos, P. Ledezma, A. Stinchcombe, G. Papaharalabos, C. Melhuish and J. Greenman, Waste to real energy: the first MFC powered mobile phone, PCCP, 15, 2013, 15312-15316.
- [2] B. M. Mali, C. C. Gavimath, V.R. Hooli, A. B. Patil, D. P. Gaddi, C.R. Ternikar and B.E. Ravishankera, Generation of bioelectricity using waste water, International Journal of Advanced Biotechnology and Research 3(1), 2012, 537-540.
- [3] R. Yadav, N. Verma, R. Makwana, Urine powered batteries and its utilization with experimental study, Innovare Journal of Enginnering and Technology, 2(4), 2014, 1-4.
- [4] A. Bilcan , O. Le Corre , A. Delebarre, Thermal efficiency and environmental performances of a biogas-diesel stationary engine. Environmental Technology, 24 (9), 2003, 1165-1173.
- [5] A A Hassan, G O Kashka, M K Sabahelkhier Cow Urine (TEI ORKEY) Uses by Ghulfun Tribe (ANCHO) in Noba Mountains, State of Southern Kordofan, As Therapy and Food Additive , ARPN Journal of Science and Technology, 3(11), 2013, 1057-1059.
- [6] M. Francis H, Uric Acid. Bibilo life (BiblioBazaar), 2008.

ABOUT THE AUTHOR

	<p>Mast. Pratyush Bisen: He is studying in class XI (Science stream) in Bhavan's B. P. Vidya Mandir, Ashti, P.O. Walni, Dist: Nagpur, Maharashtra. He is very sincere and hardworking student. Recently he has worked on a cow urine power generated system and bicycle based equipment for agriculture point of view, under the guidance of Mr. Samir Khule, PGT Physics, Bhavan's B. P. Vidya Mandir, Ashti, P.O. Walni, Dist: Nagpur, Maharashtra.</p>
	<p>Mast. Rajnarayan Choudhary He is studying in class X, Bhavan's B. P. Vidya Mandir, Ashti, P.O. Walni, Dist: Nagpur, Maharashtra. He is very handy with the practical work. Recently he has worked on cow urine power generated system. Now He is working on "How magnetic field was used to suspend idol of sun god in air at konark-sun temple in ancient time- A Review," under the guidance of Mr. Samir Khule.</p>



Mr. Samir M. Khule:

He is PGT in Physics at Bhavan's B. P. Vidya Mandir, Ashti, P.O. Walni, Dist: Nagpur, Maharashtra. He always motivates the students to think and prepare innovative science models. Students got many prizes at District, State and National level under his guidance. Recently he has worked on cow urine power generated system. He is doing research on **Nanostructured Multiferroic oxides**.(RMnO₃, R= Tb, Gd, Bi, Ca). He synthesized various oxides having different morphology (rod, tube, plates) at nanoscale by using various methods. He has 5 international publications in reputed journals with impact factor and 8 publications in conferences/seminars, on him name.