

*Short Communication*

# The ability to use light emitting diode (LED) as emergency, instead of gas lamp or tungsten lamp in home lighting

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An electric circuit was made and connected to an alternative current that was passing through lower transformer. This process would produce a current the value of which was 500 mA and a voltage of 6 volt was used to charge battery. When the voltage source (alternative current) was cut, the circuit started lighting. We measured the charge and discharge in addition to time lapses to compare them with the results of the experiment. The results were presented and discussed to compare them with the spent energy in tungsten lamp or gas lamp.

**Key words:** Electric circuit, light emitting diode (LED) as emergency, instead of gas lamp or tungsten lamp, low energy consumption.

## INTRODUCTION

Light emitting diode (LED) lighting has been around since the 1960s, but is just now beginning to appear in the residential market for space lighting. A LED is a special type of semiconductor diode-like a normal diode, it consists of a chip of semiconducting material impregnated, or doped, with impurities to create a structure called a p-n junction. A LED is a semiconductor diode that emits light when an electrical current is applied in the forward direction of the device, as in a simple LED circuit. The effect is a form of electroluminescence where an incoherent and narrow-spectrum light is emitted from the p-n junction. When the voltage across the LED in this case is fixed for the emitted photons, this form releases, when charge-carriers (electron and hole) are created by an electric current passing through the junction, when electron meets a hole it falls into a lower energy level, and releases energy in the form of a photon. When the voltage across the p-n junction is in the correct direction, a significant current flows and the device is said to be

forward-biased. But if the voltage is of the wrong polarity, the device is said to be reverse biased, very little current flows, and no light is emitted (Jassim, 1999, 2008, 2009; Chih-Hsuan et al., 2008). The wavelength of the light emitted, and, therefore, its color, depends on the bandgap energy of materials forming the p-n junction. A normal diode, typically made of silicon or germanium, emits in a visible far infrared light, but materials, used for a LED have bandgap energies corresponding to near-infrared, visible or near-ultraviolet light. White light can be produced by mixing differently colored light, the most common method is to use red, green, and blue (RGB). Hence the method is called multi-colored white LED, (sometimes referred to as RGB led) (Hilmi, 2007; Hirotsaki et al., 2005). The rising cost of energy also makes the use of LEDs in commercial crop culture imminent. With their energy efficiency, LEDs have opened new perspectives for optimizing the energy conversion and the nutrient supply both on and off Earth.

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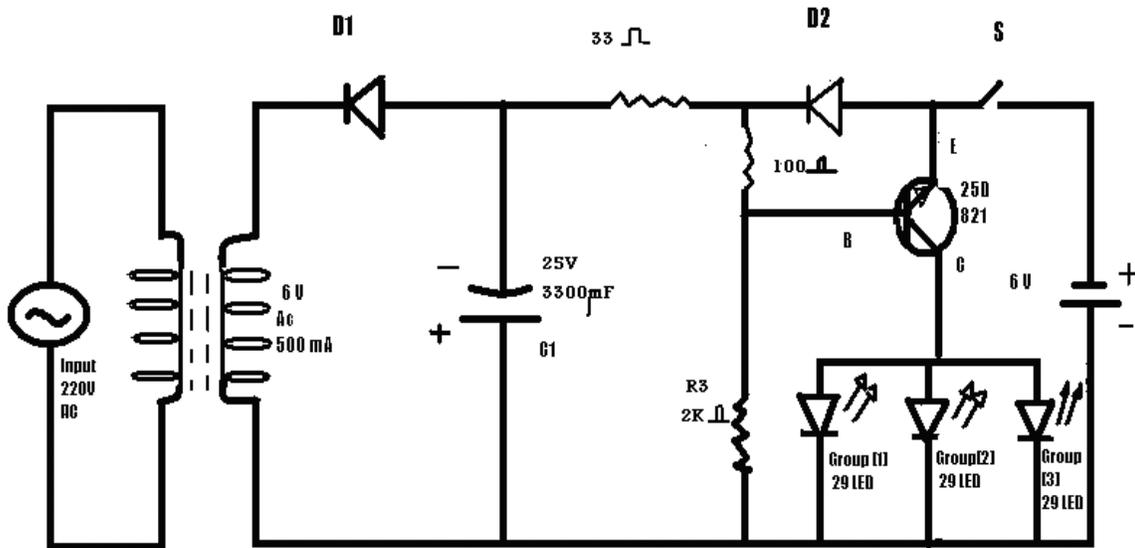


Figure 1. Electric circuit illustrate who we use lighting emitting Diode [LED] as emergency or instead of gas lamp or in home lighting.

**EXPERIMENT**

**Step 1: Making an electric circuit**

We made an electric circuit as illustrated in Figure 1. This circuit was connected with an alternative current of 220 voltage that passed through the lower transformer producing a current of 500 mA and 6 volt that passed through diode D1 and at the same time charged the capacity C1 and this capacity regulates the half –wave rectifier to get good direct current (D.C). After that it passed through diode D2. At this time diode D2 is in forward bias to charge the battery through resistance R1. This will result in inducing voltage on diode D2 and would be in the emitte-base of the transistor in off situation. In this case the light emitting diode (LED) would give light, when the source voltage was cut the transistor T1 was changed to ON situation after providing the transistor T1 with current base through resistance R3, then the transistor would go to ON situation and light emitting diode (LED) would be in light situation (Figure 1). When the source voltage came again the transistor changed to Off situation and the group of LED changed through R1 and diode D2 and so on. This time we wanted to indicate that if we remove the battery and the electric circuit that was connected direct to alternative current through transformer, the current would be available all the time and emergency situation would be cancelled.

**Step 2: Charging battery**

As can be seen in Figure 2 the time needed to charge battery was 6 h, after that we see saturation. The time constant of the circuit was equal to the multiplication of C1 by R1, therefore, we must put a suitable value for C1 and R1 in accordance with entering time signal to charge the capacity.

**Step3: Discharge statement**

In this situation lighting extended to three groups of LED, each group contained 29 leds. Here, by lighting is meant the process of discharge of current coming from the battery charged of 6 volte.

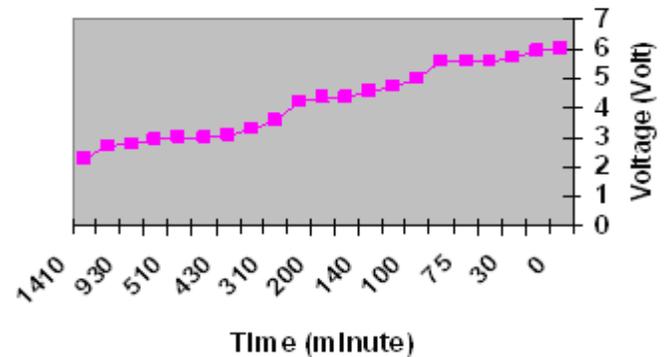


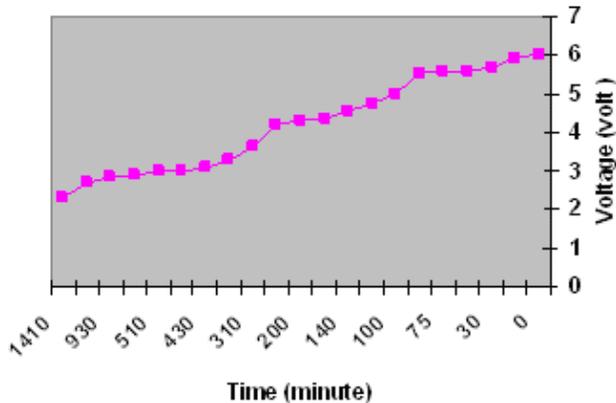
Figure 2. Charge battery.

The results (Figures 3 and 4) showed that we got a twenty three - hour discharge (lighting) which represented the amount of the battery energy spent by the three LED groups.

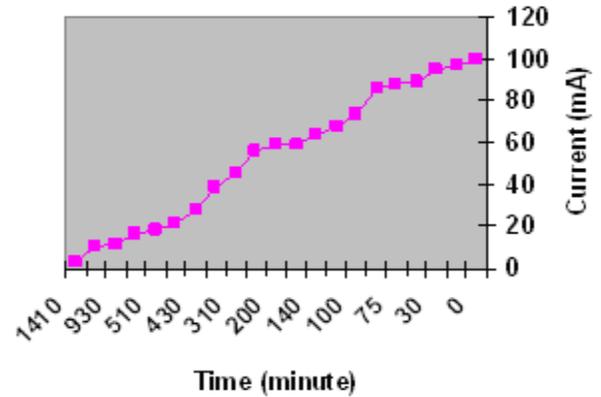
**DISCUSSION**

The experiment results, as shown in Figures 1, 2, 3 and 4, explain the possibility of using LED to produce light at home or in the street etc. The energy-saving capacity of LED lights means that they are better for the environment than traditional forms of lighting, and they keep energy bills lower. LEDs last for a long time, typically far longer than fluorescent bulbs. LED lamps have many advantages over traditional lighting methods, these include:

1. Low energy consumption (Figures 3 and 4) the energy



**Figure 3.** The relationship between the voltage and time (discharge), the decreasing it means LED lighting.



**Figure 4.** The relationship between the current and the time, the decreasing it means LED lighting.

consumption proximity was 3 watt.

2. LEDs can have a relatively long useful life than incandescent or fluorescent lighting; as we see in Figures 3 and 4 the discharge of battery proximity was 24 h. This electronic circuit is scientifically successful because it needs a long time to unload electric charge.

3. Range of color –LEDs can be manufactured to produce all colors of the spectrum without infrared or ultraviolet radiation. The solid package of the LED can be designed to focus its light. Incandescent and fluorescent sources often require an external reflector to collect light and direct it in a usable manner.

4. Durable-LED bulbs are resistant to thermal and vibrational shocks and turn on instantly from -40 to 185°C, making them ideal for applications subject to frequent on-off cycling.

5. No mercury is used in the manufacturing of LEDs.

## Conclusion

The results of this study proves that it is possible to use LED for generating light needed in any place. It is also found that in future other resources, other than electricity energy, can be used to produce light by resorting to LED, simply because it consumes very little amount of power to produce light. White LED is well known as a promising device for solid state lighting. It has the advantages of long life, good endurance of heavy impact, no mercury containing and potentially high efficiency. We measured the charge and discharge in addition to time lapses to compare them with the results of the experiment. The results were presented and discussed to compare them with the spent energy in tungsten lamp or gas lamp. However, light output from LED lamp is usually less than 3W, which is very small if compared with traditional light sources and the time of discharge is 23 h. In this article, we will present a new electronic circuit design LED

module, with the normal size for lighting purpose. Because of the low power requirement for LEDs, using solar panels becomes more practical and less expensive than running an electric line or using a generator for lighting in remote or off-grid areas. LED light bulbs are also ideal for use with small portable generators which home owners use for backup power in emergencies. More than one – fifth of US electricity is used to power artificial lighting. Light-emitting diodes based on group III/nitride semiconductors are bringing about a revolution in energy-efficient lighting since the development of incandescent light bulbs in the late 1800s, various methods of producing white light more efficiently have been investigated. Of these, white-light sources based on light-emitting diodes (LEDs) look set to have a considerable impact on issues such as energy consumption, environment and even the health of individuals (Siddha et al., 2009).

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