

(How do diodes function in direct current circuits?)

The student should see that a diode functions like an electrical valve. Depending on the nature of the course, the instructor should decide whether to explain this characteristic using a model of the internal electrical conductivity process in the components or just to establish this characteristic.

Notes on Set-Up and Procedure

It is not necessary to measure the current to see that the diode functions as a valve. The filament lamp indicates electrical current in and of itself, and there is no evidence of cutoff current under these experimental conditions.

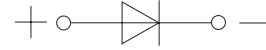
Observations

- (1) The filament lights up at first. It does not light up when the diode is plugged into the circuit with reverse polarity.
- (2) No current flows with reverse polarity (with the arrow pointing towards positive).

Evaluation

1. The diode only lets current flow through in one direction (when the arrow printed on it points towards negative).

2. Diode connected in forward direction:



- Diode connected in reverse direction:



3. Diodes can be used to rectify alternating currents.

Notes

Semiconductor diodes behave the way they do because a barrier layer is formed between the p-conducting and the n-conducting silicone. Floating electrons from the n-area diffuse into the p-area and electron holes from the p-area diffuse into the n-area. The resulting recombination depletes the barrier layer of floating charge carriers. If the diode is plugged in pointing in the forward direction, the barrier layer is neutralized with a flood of floating charge carriers. In the reverse direction, the barrier layer expands, and the diode blocks the flow of current. Even if the diode is plugged in pointing in the reverse direction, there is a minimal flow of current, referred to as reverse current. This current is so small that even the current meter used in this experiment can not measure it.

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Diodes as Electrical Valves



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Room for notes