

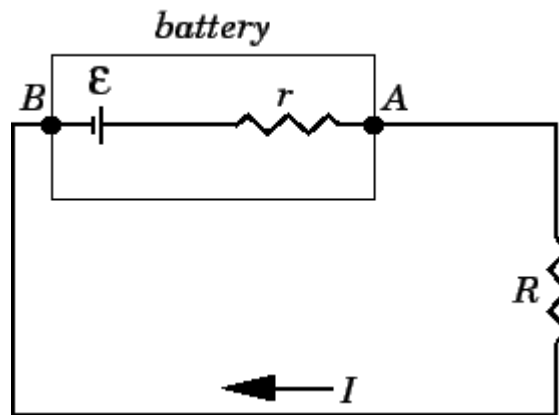
Answer on Question 58879, Physics, Electric Circuits

Question:

The difference between the emf of a battery and the lost volts when discharging is called the terminal potential difference or voltage.

Answer:

Let's consider a source of electromotive force (the battery) connected to a resistance R through which a steady current I flows as shown in the picture bellow:



here, \mathcal{E} is the electromotive force of the battery; A and B is the positive and negative terminals of the battery, respectively, R is the resistance connected to the battery, r is the internal resistance of the battery.

Let's denote the potential difference across the resistance R as V and the potential drop across the battery as V_r . Then, we can write the formula for the electromotive force of the battery:

$$\mathcal{E} = V + V_r.$$

Or

$$V = \mathcal{E} - V_r.$$

We can find V_r from the Ohm's law:

$$V_r = Ir.$$

Let's substitute V_r into the previous formula:

$$V = \mathcal{E} - Ir,$$

here, V is the terminal potential difference of the battery (because we measured it across the terminals A and B), \mathcal{E} is the electromotive force of the battery and Ir is the lost voltage (because some useful energy of the electromotive force of the battery is used in passing the current through the battery).

So, now we can answer the question! The difference between the emf of a battery and the lost volts when discharging is called **the terminal potential difference or voltage** (of the battery).