

KIRCHHOFF'S LAW

Pronounced kirchoff's law

The Kirchhoff's point or junction rule states that the sum of all current coming into a point must be equal to the sum of all current leaving the point.

$$I_1 + I_2 = I_3 + I_4$$

The Kirchhoff's loop or circuit rule states that as one traces out a closed circuit, the algebraic sum of the potential changes encountered is zero. In this sum, a potential rise (moving from a lower pd to a higher pd) is positive and a potential drop (moving from a higher pd to a lower one) is negative.

Current always flows from high potential to a low potential through a resistor. As one traces through a resistor in the direction of the current, the potential change is negative because it is a potential drop.

The positive terminal of a pure cell is always the high potential terminal independent of the direction of the current through the emf source.

FROM YOUTUBE

In Kirchhoff's rule,

- i. You pick a point called a junction
- ii. You look at the current coming to and going away from the junction
- iii. According to Kirchhoff's rule, the sum of current coming into the junction is equal to the sum of current leaving the joint
- iv. According to Kirchhoff's voltage law, the sum of voltages around the loop or around a closed circle must add to zero
- v. When going around a loop, we have to know whether we are going to be using a positive or negative voltage at every point of the loop. Generally, if going in the direction of current, we use negative V and if going opposite to current, we use +V. This is because current moves from positive terminal (or high potential) to negative terminal (low potential).
- vi. Pick a loop which will be a circular path which you follow along the electric circuit
- vii. In your movement around the loop, if you are going from a negative side of a battery to a positive side of a battery, you use +V and vice-versa. This is irrespective of whether it is in the direction of the current or not.
- viii. Find the sum of voltages in each possible loop. After find the sum of voltages
- ix. Next you'll have the sum of voltages. From the junction, you can form an equation for the current coming into and leaving the junction
- x. If you get a negative current, then your direction of current was probably wrong