Ques:- In what way is Peltier heating different from Joule heating.

Due to the following causes Peltier heating differs from Joule heating:

(i) The Joule effect is a heating effect and the quantity of heat evolved is directly proportional to the square of the current. But in Peltier effect, heat is evolved at one junction and absorbed at the other, and the quantity of heat evolved or absorbed is directly prop-ortional to the current.

(ii) Because, in Joule effect the heat in a conductor is always evolved whatever be the direction of current, so the effect is irreversible. But in Peltier effect, on passing the current in one direction, heat is evolved at a jun-ction and if the current is passing in reversed direction, heat is absorbed at the same junction. Thus Peltier effect is reversible.

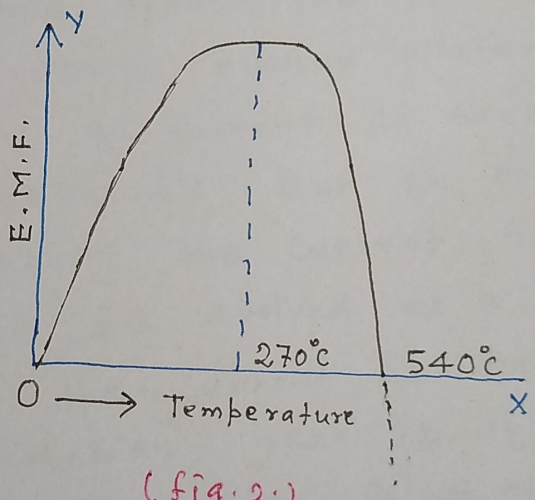
(iii) The heating or cooling due to Peltier effect takes place only at the junctions of two dissimilar metals while heating due to Joule effect occurs throughout the circuit.

The current flowing in the thermocouple is thermo electric current. The e.m.f. due to which thermo electric current flows is called thermo electromotive force.

If one junction is kept in the ice at 0°c and the temperature of the other junction is raised, it is seen that as the temperature increases e.m.f. increases and becomes maximum at T_n (neutral temperature). The temperature of the junction at which maximum current flows in the circuit is known as the neutral temperature of the couple. The neutral temperature T_n is constant for a given pair of metals.

If the temperature is increased beyond the neutral temperature, the thermo e.m.f. decreases and becomes zero at T_i (Temperature of inversion). Beyond the temperature of inversion, the emf again increases but in the reverse direction. The temperature of hot junction beyond which the direction of the current (or thermo emf) is reversed, is called temperature of inversion. The relation between E and t is

$E = at + bt^2$, a and b are constant.



(fig. 2.)

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