

IV

Experiment shows that, in the case of metals as lead, iron, gold, etc., if a unit length be taken at 0°C ., each advance of 1° in temperature is accompanied by a certain increase in length, the same (practically, if the change in temperature is not great) for each degree. Thus 1 inch of lead wire at 1°C . increases 0.000028 in. for each increase of 1° in temperature; 0.000028 is called the coefficient of linear expansion of lead.

1. A rod of lead 7 in. long at 0°C Centigrade is heated to $9\frac{1}{2}^{\circ}\text{C}$ Centigrade; find its length at that temperature.
2. A plate of lead 7 in. by 5 in. at 0°C . is heated to 11°C .; find the area of the plate at the new temperature, taking 0.000028 as the coefficient of linear expansion.
3. A cube of gold 1 c.cm. in volume at 0°C . is heated to 9°C .; find the increase in volume if the coefficient of linear expansion of gold is 0.000014.
4. A piece of brass wire is found to be 200.0375 mm. long at 10°C .; find its length at 20°C . if the coefficient of linear expansion of brass is 0.00001875.
5. A piece of silver wire is 300.057 dm. in length at 10°C . and 300.114 dm. in length at 20°C .; find the coefficient of linear expansion of silver.

V

Experiment shows that, if a given volume of a gas at 0°C . be heated, each advance of 1° in temperature is accompanied by an increase in volume equal to $\frac{1}{273}$ of the volume at 0°C ., provided the pressure on the gas is kept the same. Experiment also shows that if the temperature of a gas is kept constant while the pressure is changed, the volume at any two times is inversely proportional to the pressures at those times.

1. A volume of gas of 24 c. ft. at 0°C . is heated to 20°C .; find its volume at this temperature.
2. A certain quantity of gas occupies 30 c. m. at 20°C .; find its volume at 40°C .
3. If 25 c. cm. of a gas at 20°C . becomes 30 c. cm. under a change of temperature, find the new temperature.
4. The volume of a gas at a pressure of 770 mm. is 400 c. cm.; find its volume at a pressure of 760 mm.
5. The volume of a gas at 760 mm. pressure is 450 c. cm. and under a change of pressure its volume becomes 420 c. cm.; find the new pressure.