# Lab 11

# The Potentiometer

## Data Tables

DATA TABLE 8-1 (*purpose*: to measure the emf produced by a thermocouple)

Room temperature Multiple of the potentiometer

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Temperature, *T* (℃) | 35 | 45 | 55 | 65 | 75 | 85 |
| Thermal emf,  *E*x (mV) |  |  |  |  |  |  |

Instructor’s Initial:

## Calculations

We consider the thermocouple emf *E*x and the temperature *T* are connected by a linear relation of the form *E*x= *a*+*bT*. Use the data in Data Table 8-1 and least-squares fitting method to find the best estimates for the constants *a* and *b­*.

## Graphing

Use the data in Data Table 8-1 to draw a smooth line described by the data points.

## Questions

* 1. The output of the stable power supply is in the range of 5.7~6.4 V. We call it the working voltage of the potentiometer. Can we measure an emf by a potentiometer which is greater than the working voltage? Why?
  2. In Fig. 8-3, the purpose of the calibration circuit is to get a current of 10.000 mA in the source circuit. Can the calibration circuit be replaced by an ammeter? Why?

## Prelab work (Turn in at start of lab)

1. Can we use a voltmeter to measure the emf of a cell? Why?
2. What is the null balance measuring method in electricity?
3. In Fig. 8-3, consider *E*s=2.000 V. what’s the resistance value of *R* in order to obtain a working current of 5.000 mA in the source circuit? In the measuring circuit, *Rx* is 201.5 Ω when the galvanometer reads zero. What’s the measured emf?