***EXPERIMENT # 10***

***“To calibrate the thermocouple by deflection method”***

## THEORY

**Thermo-Couple:**

A **Thermocouple** is a sensor used to measure temperature. **Thermocouples** consist of two wire legs made from different metals. The wires legs are welded together at one end, creating a junction. This junction is where the temperature is measured. When the junction experiences a change in temperature, a voltage is created.

A thermocouple can be any junction between two different metals and may be used to measure temperature. Each metal produces a different electrical potential that varies according to changes in temperature. This rate of change is different for each of the metals in the thermocouple, so a thermocouple produces a voltage that increases with temperature.

**Calibrating a Thermo-Couple:**

A thermocouple can be calibrated by plotting the thermocouple’s voltagetemperature curve.

APPARATUS

1. 2 thermometers

1. 2 Beakers

1. 2 Test Tubes

1. Galvanometer

1. Spirit Lamp

1. Stand

1. Water

1. Wire

1. Heater Rod

## Description Of Apparatus

## Thermometers

A thermometer is **a device used for measuring temperature**. ... A thermometer is an instrument that measures temperature. It can measure the temperature of a solid such as food, a liquid such as water, or a gas such as air. The three most common units of measurement for temperature are Celsius, Fahrenheit, and kelvin.

***2. Beakers***  Beakers are useful as **a reaction container or to hold liquid or solid samples**. They are also used to catch liquids from titrations and filtrates from filtering operations.

***3.Test tubes***

The **test tube** can upport stand centrifuge speed up. Excellent temperature and chemical resistance. Free sample available. CE FDA SGS certification. SINCE 2003. Highlights: Established In 2003, We Have A Team With Strong Professional Skills.

***4. Galvanometer***

An instrument for detecting or measuring a small electric current by movements of a magnetic needle or of a coil in a magnetic field.

**Procedure:**

Following procedure is followed to carry out this experiment:

1. Test tubes are both completely filled with mercury.
2. Test tubes are dipped with eurika and copper wires respectively and joined by ends.
3. These joined wires are now became thermocouples.
4. These test tubes are dropped into two beakers where a heating rod is also dipped in one of the beakers.
5. As the temperature is increased gradually, it gives the voltmeter gives us gradual readings to correspondent temperature respectively.

1. We also find readings mathematically by checking on the temperature difference.

1. At last graph is plotted between △T and V. We will obtain a straight line.

***Circuit Diagram***

Diagram

Description automatically generated

**Readings:**

|  |  |  |  |
| --- | --- | --- | --- |
| Hot Side | Cold side | Voltage in Volts | T=T2-T1 |
| Temperature | Temperature |  |  |
| 25०C | 17० C | 0.1 V | 8 ०C |
| 35० C | 17० C | 0.2 V | 18 ०C |
| 45० C | 17० C | 0.3 V | 28 ०C |
| 55० C | 17० C | 0.4 V | 38 ०C |
| 65० C | 17० C | 0.5 V | 48 ०C |
| 75० C | 17० C | 0.6 V | 58 ०C |
| 85० C | 17० C | 0.8 V | 68 ०C |

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**Precautions:**

Following precautions should be taken:

1. Check apparatus for error.

1. Stay away from hot water or hot rod.

1. Don’t touch eureka wire.