18ECO133T

Sensors and Transducers

UNIT V

Session 9: SLO – 1

Introduction:

Gas Sensor:

- Gas sensor is a subclass of chemical sensors.

- Gas sensor measures the concentration of gas in its vicinity. Gas sensor interacts with a gas to measure its concentration. Each gas has a unique breakdown voltage i.e. the electric field at which it is ionized. Sensor identifies gases by measuring these voltages. The concentration of the gas can be determined by measuring the current discharge in the device.

Applications of Gas Sensor:

- Process control industries
- Environmental monitoring
- Boiler control
- Fire detection
- Alcohol breath tests
- Detection of harmful gases in mines
- Home safety
- Grading of agro-products like coffee and spices

Operating parameters:

- Operating temperature
- Operating humidity

Disadvantages:

- Bulky
- Consume lots of power
- Require “risky” high voltage to operate.

Gas sensing technologies:

Metal Oxide Based Gas Sensors

Capacitance Based Gas Sensors

Acoustic Wave Based Gas Sensors

Calorimetric Gas Sensors

Optical gas sensors

Electrochemical gas sensors

1. Carbon monoxide gas sensor

Carbon monoxide sensor can be of different types such as:

- Semiconductor sensor
- Electrochemical sensor
- Digital sensor
- Biometric sensor (chem-optical or gel cell sensor)

2. Carbon dioxide (CO_2) gas sensor

- CO_2 absorbs infrared light therefore CO_2 sensor consists of a tube containing an infrared source at one end and an infrared detector at the other end.
- The infrared detector detects the infrared light which is not absorbed by CO_2 between source and detector.

2. Carbon dioxide (CO_2) gas sensor (Contd.)

- Infrared radiation which is not being absorbed by CO_2 produces heat so the temperature will increase.
- The infrared detector measures the temperature.
- A voltage is produced due to the temperature increase in the infrared sensor.
- We can read amplified voltage into the data logger.

3. Hydrogen gas sensor

- Mostly palladium is used to detect hydrogen because palladium selectively absorbs hydrogen gas and forms the chemical palladium hydride.

Types of hydrogen gas sensor:

- Optical fiber hydrogen sensors
- Nanoparticle-based hydrogen microsensors
- Diode based sensor