

Task 16: Datasheet Report

Topic: MQ135 Gas Sensor

Introduction

The MQ135 is a versatile gas sensor capable of detecting a wide range of gases, including ammonia, smoke, alcohol, benzene, and carbon monoxide. It operates on the principle of measuring changes in electrical resistance when exposed to different gases. This report will delve into the key features, specifications, and applications of the MQ135 gas sensor, with a focus on its calibration process and the Freundlich Absorption Isotherm.

Key Features

- **Wide Detection Range:** The MQ135 can detect a wide range of gases, making it suitable for various applications.
- **Fast Response:** It offers a quick response time to changes in gas concentration.
- **Stable and Reliable:** The sensor exhibits stable performance and a long lifespan.
- **Simple Circuitry:** It can be easily integrated into various electronic systems.

Specifications

- **Operating Voltage:** 5V DC
- **Heater Voltage:** 5V DC
- **Heater Resistance:** 33Ω
- **Response Time:** 10-30 seconds
- **Sensitivity:** Varies depending on the gas and concentration

Calibration Process

Calibration is essential to ensure accurate gas concentration measurements. The MQ135 typically requires calibration for specific gases. The calibration process involves the following steps:

1. **Prepare a Reference Gas:** Create a reference gas with a known concentration of the target gas.
2. **Measure Sensor Resistance:** Measure the sensor's resistance in clean air and in the presence of the reference gas.
3. **Calculate Sensitivity:** Calculate the sensitivity of the sensor to the target gas using the measured resistances.
4. **Develop a Calibration Curve:** Plot a graph of sensor resistance versus gas concentration to create a calibration curve.

Freundlich Absorption Isotherm

The Freundlich Absorption Isotherm is a mathematical model that describes the adsorption of gas molecules onto the surface of a solid adsorbent. It is often used to model the adsorption behavior of gas sensors. The equation for the Freundlich Isotherm is:

$$x/m = Kp^{(1/n)}$$

Where:

- x/m : Amount of gas adsorbed per unit mass of adsorbent
- K : Freundlich constant
- p : Partial pressure of the gas
- n : Empirical constant

The Freundlich Isotherm can be used to analyze the sensitivity and selectivity of the MQ135 sensor to different gases. By studying the adsorption behavior of various gases on the sensor's surface, it is possible to optimize the sensor's performance for specific applications.

Applications

The MQ135 gas sensor has a wide range of applications, including:

- **Air Quality Monitoring:** Detecting harmful gases in indoor and outdoor environments.
- **Gas Leak Detection:** Identifying gas leaks in homes and industrial settings.
- **Breathalyzers:** Measuring alcohol levels in breath.
- **Industrial Process Control:** Monitoring gas concentrations in industrial processes.

Conclusion

The MQ135 gas sensor is a valuable tool for detecting various gases. Its wide detection range, fast response time, and simple circuitry make it suitable for a variety of applications. By understanding the calibration process and the Freundlich Absorption Isotherm, it is possible to optimize the performance of the MQ135 sensor for specific gas detection tasks.