

DR. BRR GOVT DEGREE COLLEGE, JADCHERLA

MAHABUBNAGAR, DIST. TEANAGANA

DEPT. OF PHYSICS



Student Study Project

“Gas Leakage Detector”

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DEPARTMENT OF PHYSICS
STUDENT STUDY PROJECT
TITLE : GAS LEAKAGE DETECTOR

Dr. BRR GOVERNMENT DEGREE COLLEGE - JADCHERLA
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C E R T I F I C A T E

This is to certify that the project work entitled "GAS LEAKAGE DETECTOR", Dr. BRR Government College Campus, Jadcherla, Mahabubnagar District, and Telangana." Is a bonafide work done by the students of III MPCs (EM). **Bandaru Mallesh, J.Madhu Kumar, Nayini Srikanth, Senapathi Karthikeya, T. Tarun Teja** my supervision for the award of Project Work in Physics, Department of Physics, Dr. BRR Government Degree College, Jadcherla and the work hasn't been submitted Physics other College / University either in part nor in full, for the award of any degree



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CERTIFICATE

This is to certify that the project work entitled "**GAS LEAKAGE DETECTOR**", Dr. BRR Government Degree College, Jadcherla, Mahabubnagar District, Telangana." is a bonafide work done by the students of III MPCs (EM). **Bandaru Mallesh, J. Madhu Kumar, Nayini Srikanth, Senapathi Karthikeya, T. Tarun Teja** under my supervision for the award of Project Work in Physics, Department of Physics, Dr. BRR Government College, Jadcherla and the work hasn't been submitted to any other College/University either in part nor in full, for the award of any degree

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Assistant Professor
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DECLARATION

We hereby declare that the project work entitled with "GAS LEAKAGE DETECTOR" is a genuine work done by us under the supervision of **B.Uday Kumar**, for the Department of Physics, Dr. BRR Government College, and it has not been under the submission to any other Institute / University either in part nor in full, for the award of any degree.

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INTRODUCTION:

A gas leakage detector is an electronic device designed to detect the presence of gas leaks in an area. Gas leaks can be extremely dangerous, as they can lead to fires, explosions. A gas leakage detector is therefore an important safety device that can help to prevent these accidents.

Gas leakage detectors use sensors to detect the presence of gas in the air. There are different types of sensors used in gas detectors, including infrared sensors, electrochemical sensors, and catalytic sensors. These sensors are sensitive to specific gases, such as methane, propane, or carbon monoxide, and can detect even small amounts of gas.

When a gas leakage detector detects the presence of gas, it typically sounds an alarm to alert the occupants of the building. Some detectors may also have visual indicators or may send alerts to a remote monitoring system or a smartphone app.

Gas leakage detectors can be used in a variety of settings, including homes, businesses, and industrial facilities. They are often required by building codes and regulations, particularly in areas where gas appliances are used. It is important to regularly maintain and test gas leakage detectors to ensure they are functioning properly and providing adequate protection.

REVIEW OF LITERATURE:

Gas detectors are devices that are used to detect the presence of gas in a particular area or environment. They are commonly used in industries where hazardous gases are present, such as mining, oil and gas exploration, and chemical production.

The literature on gas detectors covers a wide range of topics, including the types of gases that can be detected, the principles of gas detection, the different types of gas detectors available, and the applications of gas detectors in various industries.

One of the key areas of research in gas detection is the development of new technologies and sensors that can detect a wider range of gases and provide more accurate measurements. For example, researchers have developed portable gas detectors that use advanced electrochemical sensors to detect and measure gases such as hydrogen sulfide, carbon monoxide, and methane.

Another area of research is the integration of gas detection systems with other safety systems, such as fire suppression systems and emergency response systems. This integration can help to improve the overall safety of a facility and reduce the risk of accidents or incidents.

In addition to the development of new technologies and systems, there is also a focus on the evaluation and testing of existing gas detectors. This includes laboratory testing, field testing, and validation studies to ensure that gas detectors are accurate, reliable, and effective in real-world situations.

Overall, the literature on gas detectors highlights the importance of these devices in ensuring the safety of workers and the public in industries where hazardous gases are present. Ongoing research and development in this field are likely to lead to further advances in gas detection technology and improved safety outcomes for workers and the wider community.

OBJECTIVES:

The main objectives of gas leakage detectors are to detect the presence of gas leaks and alert people to potential danger. Some specific objectives of gas leakage detectors may include:

Early detection of gas leaks: The primary objective of gas leakage detectors is to detect gas leaks as early as possible. Early detection can help to prevent accidents and minimize the risk of harm to people and the environment.

Protection of human health: Gas leaks can be harmful to human health, particularly if the gas is toxic or flammable. The objective of gas leakage detectors is to protect human health by detecting gas leaks and alerting people to potential danger.

Protection of property: Gas leaks can also be a fire hazard and can damage property. Gas leakage detectors can help to protect property by detecting gas leaks and alerting people to potential danger.

Compliance with regulations: Many industries are subject to regulations that require

MATERIALS & METHODOLOGY:

Gas leakage detectors are devices used to detect the presence of potentially harmful gases in the air. The materials and methodology used in the construction of gas leakage detectors can vary depending on the specific type of gas being detected, the sensitivity of the device, and its intended application.

Here is a general overview of the materials and methodology commonly used in gas leakage detectors:

MATERIALS:



SWITCH

SWITCH : The gas leakage detector need switch to turn ON and OFF when user wanted.



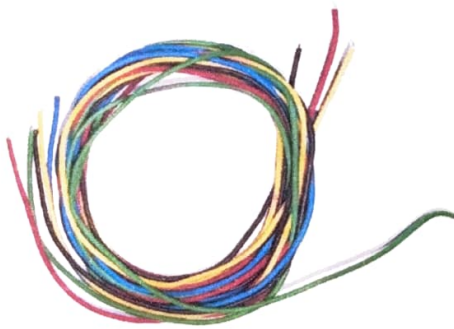
BATTERY

POWER SOURCE : The gas leakage detector typically requires a power source, either through a battery or an AC power adapter.



RESISTORS

RESISTERS : A resistor is a two-terminal electrical component that provides electrical resistance. In electronic circuits, resistors are predominantly used to lower the flow of current, divide voltages, block transmission signals, and bias active elements.



WIRES

WIRES : Wires are an essential component of electrical projects because they are used to connect various components of the circuit together. Electrical wires are made of a conductive material, usually copper or aluminum, that allows electricity to flow through them.



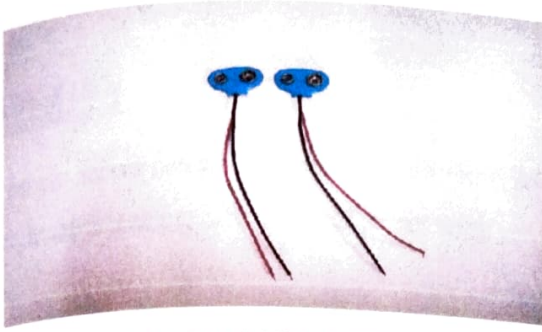
MQ2 SENSOR

MQ2 SENSOR: This is the most important component of a gas leakage detector. Gas sensors are designed to detect the presence of specific gases in the air.



BUZZER

BUZZER: A buzzer is commonly used as an alarm to alert people of the presence of a potentially harmful gas in the air. When the gas sensor detects a gas concentration above a certain level, the microcontroller triggers the buzzer to emit a loud, audible alarm.

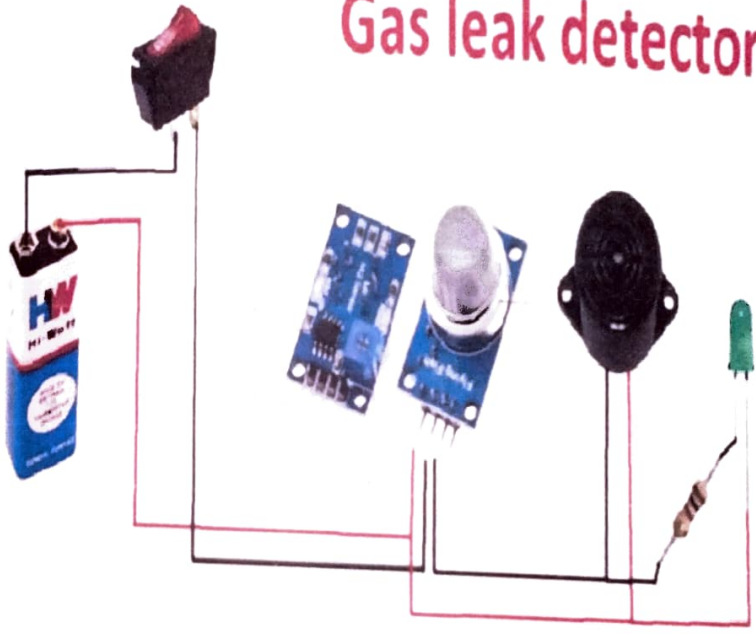


BATTERY CONNECTOR

BATTERY CONNECTOR : The battery connector is used to connect to a battery as a power source.

Circuit diagram :

circuit diagram of Gas leak detector



METHODOLOGY:

Gas detection The gas sensor detects the presence of the target gas in the air. This can be done through various methods depending on the type of sensor used.

Signal processing The microcontroller receives the signal from the gas sensor and processes it to determine the gas concentration. The microcontroller may also have a calibration function to ensure accurate readings.

Alarm triggering If the gas concentration reaches a dangerous level, the microcontroller triggers an alarm. This can be in the form of an audible alarm, a visual alarm, or both.

Maintenance Gas leakage detectors may require periodic maintenance to ensure they are functioning properly. This can include replacing the gas sensor, testing the alarm function, and replacing the power source as needed.

This is also done by many of the industrial companies and using it we have gathered information and make this project as home purpose.

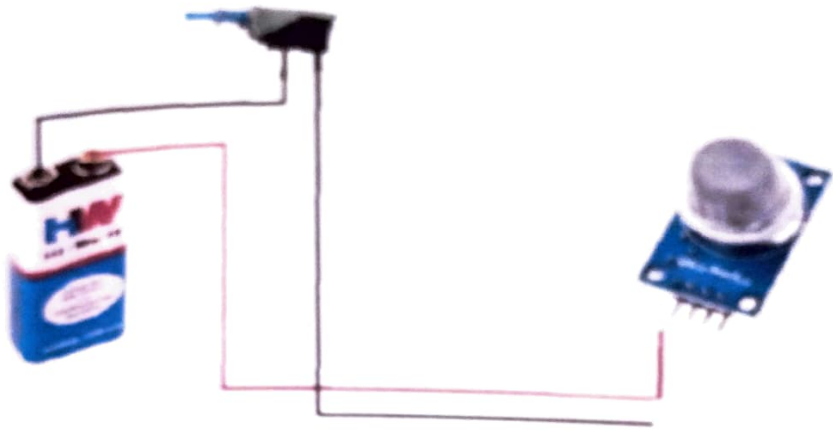
GAS LEAKAGE DETECTOR CONNECTIVITY:

STEP-1:



Here we used 9V HW Hi-Watt battery to provide portable power for the system.

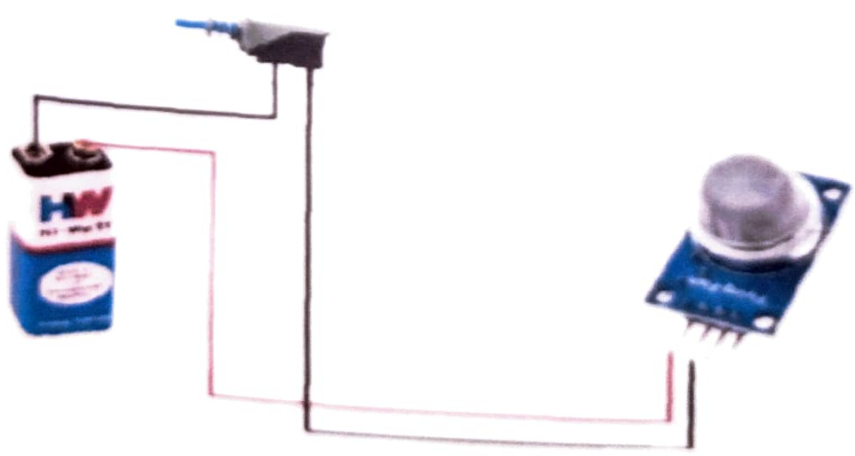
step-2



The battery negative terminal is connected to switch positive terminal and the positive terminal to MQ2 sensor VCC terminal

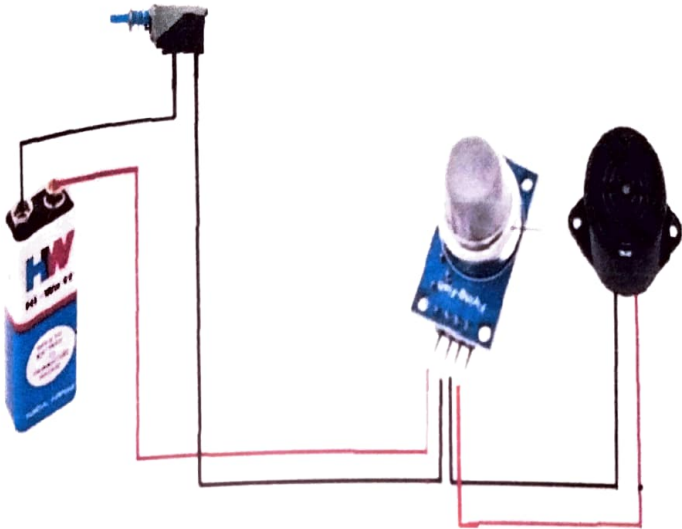
Here VCC means "voltage common collector" VCC terminal acts as a power input to MQ2 sensor device

Step-3:



Switch positive terminal is connected to the MQ2 sensor GND terminal and GND terminal acts as a ground and it limits the voltage.

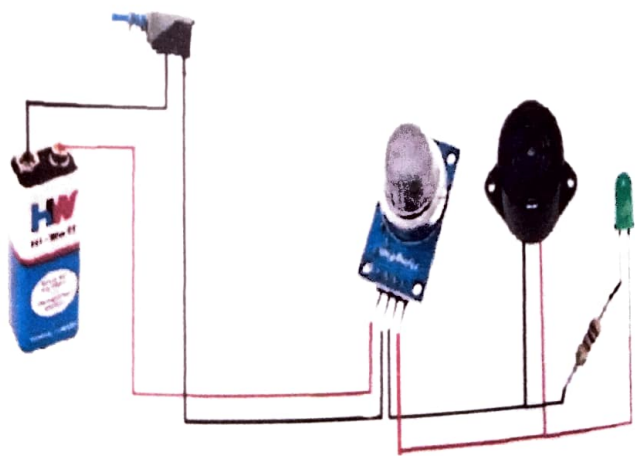
Step-4:



MQ2 sensor AO is connected to buzzer positive terminal and DO is connected to Buzzer negative terminal.

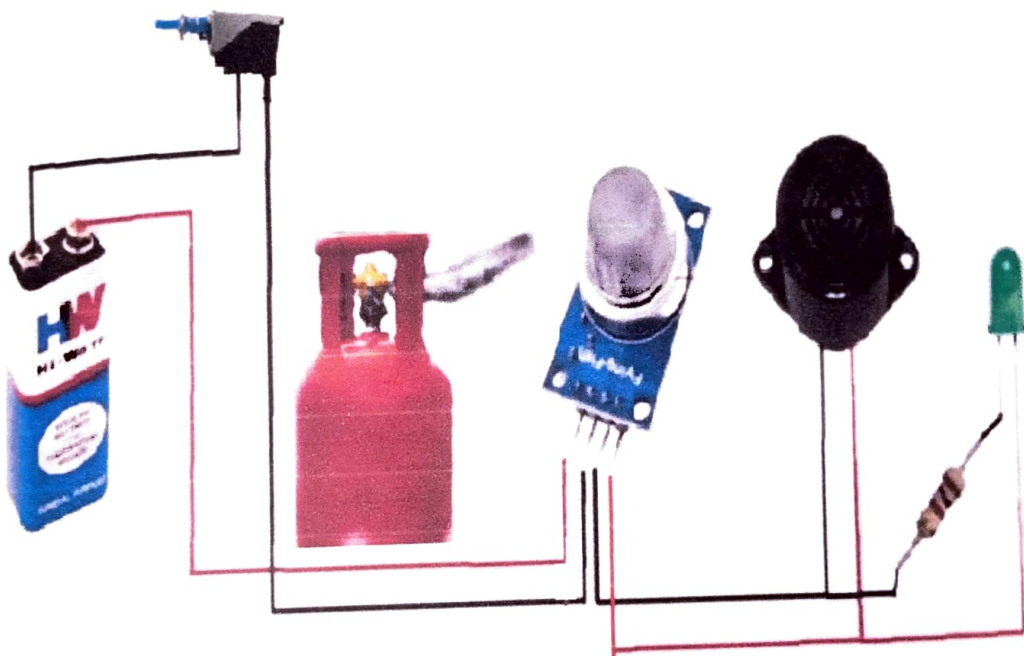
Here, AO means "Analog Output" & DO means "Digital Output". It poses the alert to buzzer when it detects the gas in the air.

Step-5:



Buzzer negative terminal is connected to resistor one terminal and another terminal is connected to signal indicator(light) positive terminal. Buzzer positive terminal is connected to signal indicator negative terminal .

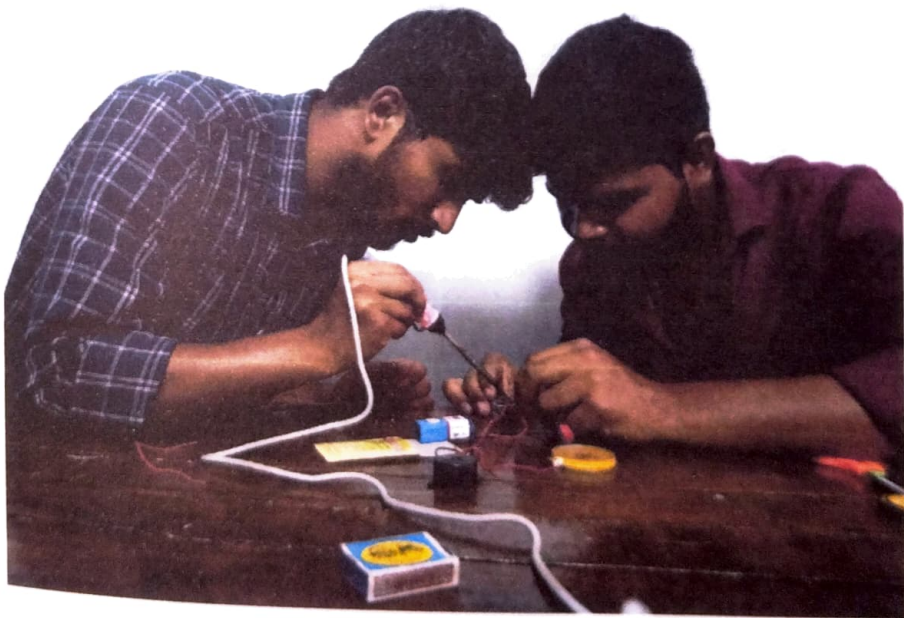
Step-6:

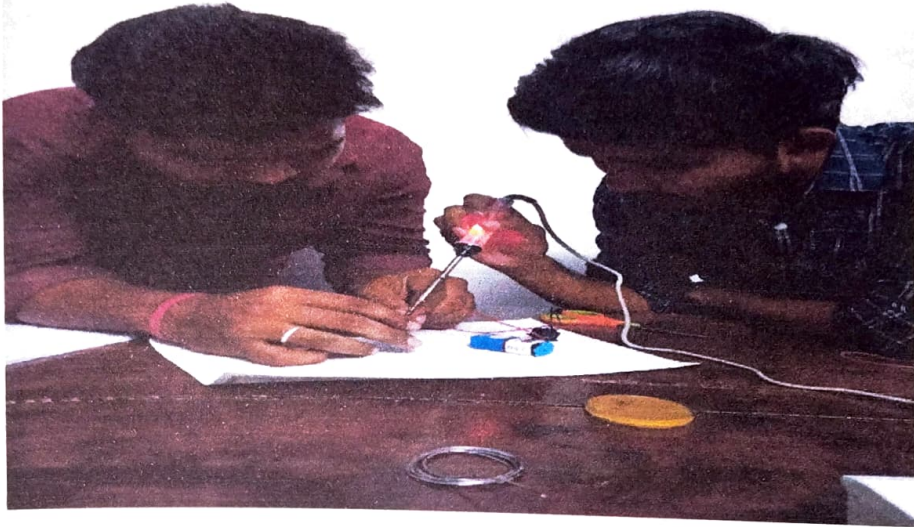


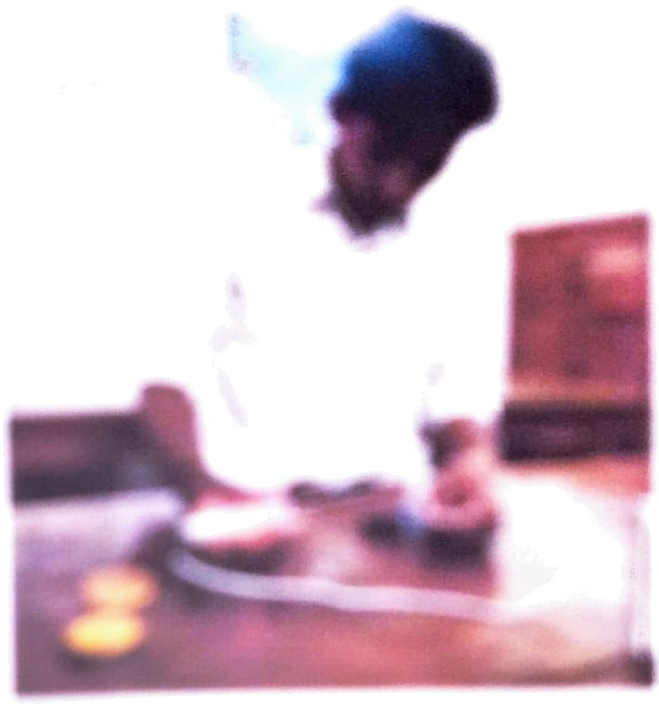
After connecting all materials, we should have to check whether it is working or not. This is why we used butane for the purpose of checking the project.

Firstly , we look some of the butane gas and MQ2 gas sensor detected gas and gives signal to the buzzer and the buzzer will alert through alarm. MQ2 sensor also gives alert by red light.

MAKING PROCESS:







CONCLUSION:

Gas leakage detectors are essential safety devices designed to detect the presence of gas in a specific area and alert users to the potential danger of gas leaks. These detectors play a crucial role in preventing accidents, fires, and explosions caused by gas leaks.

The selection of gas detection technology, calibration of the detector, installation, testing, and maintenance are all critical steps in the development of a gas leakage detector. The detector's alert and response system should also provide guidance on how to respond to a gas leak, including evacuation procedures and emergency response protocols.

Gas leakage detectors can be made from a variety of materials, depending on the specific design and application of the detector. Plastic, metal, glass, adhesives, and sealants are some of the common materials used in the manufacturing of gas leakage detectors.

Overall, the reliable and accurate operation of gas leakage detectors depends on the careful selection of technology, calibration, installation, testing, and maintenance. The use of high-quality materials and integration with an alert and response system can help to ensure that the detector provides accurate and timely alerts, preventing accidents and protecting people and property from the dangers of gas leaks.

We have checked all the connections which are given to the gas leakage detector and every connection as good .

We have leaked gas in front of sensor and it is working.

FUTURE SCOPE :

The future scope of gas leakage detectors is promising, with ongoing advancements in technology and innovation aimed at improving the accuracy, reliability, and safety of these devices. Some potential areas of development and improvement for gas leakage detectors include:

- 1. Integration with smart home technology:** Gas leakage detectors can be integrated with smart home technology to provide real-time alerts and remote monitoring capabilities. This would enable users to receive alerts on their smartphones and take immediate action to address a gas leak, even when they are away from home.
- 2. Enhanced sensitivity and selectivity:** Gas leakage detectors are becoming increasingly sensitive and selective, allowing for detection of even trace amounts of gas. This could be particularly useful for detecting gases that are difficult to detect using traditional sensing techniques.
- 3. Miniaturization and portability:** Advances in miniaturization and portability could allow for the development of gas leakage detectors that are smaller, lighter, and more easily portable. This could be useful for applications such as industrial safety, where workers need to move around a facility and monitor gas concentrations in different areas.
- 4. Development of wireless sensors:** Wireless gas leakage detectors could be useful for monitoring gas concentrations in hard-to-reach areas or areas where wired sensors are impractical. These sensors could transmit data wirelessly to a central monitoring system, allowing for real-time monitoring and analysis.

References:

1. <https://www.sciencing.com>

2. The Solitaire Mystery by Jostein Gaarder