



TECHNOLOGICAL DEVELOPMENT IN TOXIC GASES & SUBSTANCE: INDUSTRIES ON MINING AND OIL & GAS

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INTRODUCTION:

Safety is the state of being “Safe” or the preventive steps taken to avoid accident or Incident before occurring in the workplace. Safety can also refer to the control of recognized hazards to achieve an acceptable level of risk. Safety is the condition of a “steady state” or place doing what it is supposed to do. For any organization, place, or function large or small, safety is a normative concept. It complies with situation- specific definitions of what is expected and acceptable. There are five major types in safety as Normative, Substantive, Perceived Security. Safety is generally interpreted as real and significant impact on risk of death, Injury, or damage to property. In response to perceived risks many interventions may be Proposed with engineering responses and regulation being two of the most common. Probably the most common individual response to perceived safety issues is insurance, which compensates for or provide restitution in the case of damage or loss. Several Standards organizations exist that safety standards. These may be voluntary organizations or government agencies. These agencies first define the safety standards, which they Publish in the form of codes. are also entitled independent third parties such as Testing and certification agencies to inspect and ensure compliance to the standards they defined. For instance, the American Society of Mechanical Engineers formulated a certain number of safety standards in it.

Toxic gases are gases that are harmful to living things. They can easily Build-up in confined working spaces when the production process

Uses noxious gases. It may also result in the biological chemical breakdown of a substance that is being stored in a tank.

Certain factory – related activities, such as welding can also result

In the build – up of toxic gases in a confined space. The chemical Industry is a vast and complex industry that produces a wide range

of chemicals and chemical based products. Chemicals are utilized in many different products, including polymers, fertilizers, textiles

and electronics. The chemical industry includes a broad range of companies that produce chemicals, chemical products and chemical raw materials. Coal mining is the process of extracting coal from the ground or from a mine. Coal is valued for its energy content and since the 1880s has been widely used to generate electricity. Steel and cement industries use coal as a fuel for

extraction of iron from iron ore and for cement production. In the United Kingdom and south Africa, a coal mine and its Structures are a colliery, a coal mine is called a “pit”, and The - above ground structures are a ‘Pit head’. In Australia, “Colliery” generally refers to an underground coal mine.

The major problems faced in chemical industry, mining and oil industry are **Lack of Inventory visibility.**

The chemical industry typically deals with a large number of raw materials and finished goods.

CONTEXT:

A gas detector is a device that detects the presence of gases in an area, often as part of a safety system. A gas detector can sound an alarm to operators in the area where the leak is occurring, giving them the opportunity to leave. This type of device is important because there are



many gases that can be harmful to organic life, such as humans or animals. Gas detectors can be used to detect combustible, flammable and toxic gases, and oxygen depletion. Gas leak detection is the process of identifying potential

hazardous gas leak by sensors. More recently, infrared imaging sensors have come into use. All these sensors are used for a wide range of applications and can be found in industrial plants. Gas detectors measure the level of different gases within the air, and are used to prevent anyone from being exposed to toxic that could

poison or kill. Gas detectors work by using a scaling system. When a harmful gas is detected and the amount exceeds the scale's maximum level, this will trigger the alarm. Gas detectors utilize a sensor to gauge the grouping of specific gases in the air.

There are 7 types of industrial gas detectors are

- Pellistor/ Catalytic bead industrial Gas detector,**
- Point/Non –Dispersive infrared Industrial gas sensors,**
- Open path Infrared Industrial gas sensors,**
- Tuneable/ Enhanced Laser Diode Industrial Gas sensors,**
- Electrochemical Industrial Gas detectors,**
- Ultrasonic Gas leak Detectors,**
- Micro-Electromechanical- Based industrial Gas detectors.**

Most industrial gas detectors allow for fixed Or portable detection to meet a wide range of user needs.

A Drone refers to any aerial vehicle that receives remote command from a pilot or relies on software for autonomous flight. Many drones display features like cameras for collecting visual data and for stabilizing their flight patterns. It sometimes referred to as unmanned aerial vehicles, carry out tasks that range

from the mundane to the ultra – dangerous. These robot-like aircrafts can be found rescuing victims as well as dropping off groceries at your doorstep and almost everywhere in between.

Originally developed for the military and aerospace industries, Drones have found their way into the main stream because of the enhanced levels of safety and efficiency they bring. Different drones can capable of varying height and distances.

Because drones can be controlled remotely and can be flown at varying distances and heights, they make perfect candidates to take on some of the toughest jobs in the world. Many parts

are involved behind the scenes to support the seamless operation of drones, so it is important to become familiar with the unmanned or remote technology that makes up a drone's system. Drones rely on a combination of hardware and software components to achieve successful take-off, flight, and landing. Drones are often equipped with rotors or fixed wings, sensors, navigation systems and gyroscopes are operated by ground control stations. Therefore,

using the technology of drone and the gas detector we can detect the gas leakage and we can reduce the leakage of harmful toxic gases in the **Mining industry, Chemical Industry and Oil and Gas industries.**

PROBLEMS:

Chemical industry is associated with potential hazards that effects to the employee and environment. The major problem faced in the chemical industry is the lack of Inventory Visibility. It describes the capacity to precisely trace along the whole supply chain, from the initial order to the last delivery. The chemical

industry typically deals with a large number of raw materials and finished goods, and the movement of these materials can be complex and difficult to track. With accurate inventory visibility, chemical companies can better manage their inventory levels, reduce stock outs and overstocks, improve customer service, and

optimize their production schedules. The major problems faced in the oil and gas industries are **OIL SPILL AND LEAKAGE OF TOXIC**



GASES.

Spills and leaks can be classified in a several ways: Natural leaks, Daily human leaks, Transportation leaks, and Unchecked leaks. Industrial accidents have increased the importance of dealing with the risk of toxic exposure, fire and explosion. Despite the

measures taken in the chemical industry to prevent accidents, the accidents occur often due to human error or process faults during repairs. Although several studies have been conducted on the accidents in the process industry, no research has modelled the risk caused by the leakage of toxic substances in the gas pressure reduction station. This results based on two scenario of gas leak and fire in both hot and cold seasons, indicate that the gas leak scenario in both hot and cold seasons. The major problems faced in

mining is release of harmful toxic gases. The air we breathe on the surface is a mixture of several gases including Oxygen, Nitrogen, Argon, Carbon dioxide, and other gases in amounts .The air in mines can be contaminated by the presence of other gases Such as Carbon Monoxide, Hydrogen Sulphide, Methane and excess

of Carbon dioxide. A dangerous mine atmosphere is one that is toxic or explosive and there are several damps that create this kind of atmosphere. They are **Fire Damp, Black Damp, White Damp, Stink Damp.**

EXAMPLES:

VISAKHAPATNAM GAS LEAK

The Visakhapatnam gas leak, also referred to as Vizag gas leak,

It was an industrial accident that occurred at the **LG Polymers** Chemical plant in the R. R. Venkata Puram Village of the Gopalapatnam neighbourhood, located at the outskirts of Visakhapatnam, Andhra Pradesh, India, during the early Morning of 7 may 2020. The resulting vapour cloud spread over a radius of around 3.0km affecting the nearby areas and villages. As per the national Disaster Response Force,

the death toll was 11, and more than 1,000 people became sick after being exposed to the gas. Preliminary investigations

concluded that the accident was likely the result of insufficient maintenance of units storing the styrene monomer, and operations errors. The government of Andhra Pradesh announced a rupee of 1crore for each family of the decreased, as well as funds for the injured. A budget of rupees 30 crore was allocated for the compensation of all those affected. The plant was re-opened on 7 May 2020 following the nationwide lockdown implemented as a response to the Covid-19 Pandemic. It is believed that

a computer glitch in the factory cooling system allowed temperatures in the storage tanks to exceed safe levels, causing to vaporize. When maintenance activity was in progress, the gas leaked and spread to nearby villages.

EXAMPLES :

KORBA GAS LEAK

Three workers were killed after a gas leak in an underground Coal mine of South Eastern Coalfields Limited in Chhattisgarh's Korba district. The accident took place on Sunday evening in Bag Dewa coal mines of SECL which is a subsidiary of coal India. A worker accidentally went inside a non- functional Tunnel of the mine where the oxygen level was low and a poisonous gas was emanating. In a bid to rescue him, two other workers went inside the tunnel and all three of them fell unconscious. After being alerted, a rescue team pulled out the three workers and took them to a local hospital where all of them were declared dead.

A case was registered, he said, adding that a probe was underway in the mishap. Chhattisgarh's chief minister designate Bhupesh Bagel expressed condolences over the death of the three workers and announced a compensation of Rs 75,000 to the kin of each of the were decreased.



HEALTH PROBLEMS:

When you breathe the harmful gas, the poison replaces the oxygen in your blood stream. Your heart, brain, and body then become starved of oxygen. Symptoms vary from person to person

Those are at high risk for severe damage include lung or heart disease. Symptoms of inhaling the dangerous harmful gases are results in **Breathing problems, Chest Pain, Coma, Confusion, Headache, Low blood Pressure, Vomiting, Unconsciousness.**

Animals can also inhale the toxic gases, Often the pets will get sick before humans. Toxic gases also cause a threat to human health due to the hazardous properties of the gas. Many toxic gases are also corrosive, which can create acute or fatal injuries if the gases are inhaled or make contact the skin. Toxic gases can affect people through these exposure routes are Inhalation and contact with skin or Eyes. Inhalation means that Breathing in a gas that has been accidentally released from the Cylinder, due to a broken valve, dropping of the cylinder or Other inhaled gases can be lethal. Contact with Skin or Eyes means

that if gases come into contact with the eyes or skin, the toxic substances can make their way into the blood stream. Some

serious health problems related to acute toxic gas exposure includes are Airflow obstruction, Acute upper airway inflammation, Delayed pulmonary edema. Chemical Manufacturing can contribute to air pollution through the release of various pollutants into it.

METHODS:

These gas detectors are usually battery operated. They transmit warnings via audible and visible signals, such as alarms and flashing lights, when dangerous levels of gas vapours are detected. Fixed type gas detectors

may be used for detection of one or more gas types. Fixed detectors are generally mounted

near the process area of a plant or control room, or an area to be protected. Generally, industrial sensors are installed on fixed type mild steel structures and a cable connects the detectors to a data system for continuous monitoring. A tripping interlock can be activated for an emergency situation. All gas detectors must be calibrated on a schedule. A typical calibration schedules for a fixed system may be quarterly or even annually with most units. Almost every portable gas detector requires a specific calibration gas in the United States, the (OSHA)

Occupational Safety and health Administration may set Minimum standards for periodic calibration. Everyone goes through different struggles when operating a drone for first time. No matter your drone model, stay safe, get airborne and learn some basic of drone flying techniques.

There are four main drone controls are Roll, Pitch, Yaw And Throttle. Check the weather conditions and Site safety Checks before operating the drone.

PURPOSE:

Gas detectors measure the level of different gases within the air, and are used to prevent anyone from being exposed to toxic gases that could poison or that leads to cause a death. As you may be aware, these kinds of detectors can be portable or stationary. Portable gas detectors are used by firefighters and industrial workers' while stationary devices are fixed to the walls or ceiling of homes. Both types of alarm work in the same way. When

a harmful gas is detected, the alarm will trigger noises or light that can be heard and seen by everyone in the building. Some detectors

are even capable of picking up multiple's gases at once's. Drones now have many functions, ranging from monitoring climate change



to carrying out search operations after natural disasters. But their most well-known as use in military for surveillance and

targeted attacks. They also used as weapons and have been credited with killing suspected militants. The usage of drone is monitoring climate, carry out detailed surveys and preparing metro maps. The benefit of drones is building inspection, Construction industry, Oil and gas refinery inspection, Agriculture, Mapping, Rescue Operations.

The applications and uses of drones are Military Drones, Drones for emergency rescue, Drones, Drones in outer space, and historical conservation, Drones in medicine, Drones for Photography.

SOLUTION:

By using this device, it will be slightly reduce the hazard when finding before it. This device will play a small part in the safety sector. It is used in the chemical industry, oil and gas and mining industries. It will take a main role in every workplace.

In chemical industry any toxic gas it will be helpful to identify the toxic gas level and work place condition to take on the sectors to next stage. If any incident or accident happened means, we can operate without entering the accident zone.

Then, we can identify the reason for the hazard and we can take the preventive steps for it. In mining industry, the workers before going to start the work, we can visually see the work place area and check whether the area is in good condition or not. It will be used in the safety

department by all the ways, it helps to prevent the high risk of gas explosion and affecting the peoples inside and outside the premises. This device will find the toxic gas and verifying the workplace for the safe work. Gas sensor for

the detection and monitoring of harmful substance within the environment such as Carbon monoxide and methane are the essential

elements of the environment. Finally, This ideology will be very helpful in the safety sectors.

CONCLUSION:

Mining has been supplying mankind resource that are essential to modern civilization. But this benefit comes with a heavy cost and that cost is the negative environmental impacts associated with mining. So, in order to continue mining, measures have been put in place to mitigate those negative impacts. Unregulated mining has the potential to release harmful substance into the soil, air and water. Protecting the environment and human health is the prevention method. Water management and treatment. Reduction of acid rock drainage. If no action is taken to remediate the many environmental problems inherent to modern mining, the end cost for governments and communities would be devastating. The past five years have seen the emergence of web mining as a rapidly growing area, due to the efforts of the research community as well as various organizations that are practising it. To sum it up, today we are surrounded by technology.

It has made our life very easier. Technology has gifted us the things that We are using in the daily bases. But at the same time, it brings up a several challenges for us to cop with like pollution. Technology will surely a boon for mankind. It is all the more important for the economic growth of a country. Safety is an important thing in our workplace. So, by using the modern technology of **Gas detector and drone** we can slightly reduce the hazards.