

**MINE GASES
QUESTIONS AND ANSWERS**

- MG Q-1 Where is Methane most likely to be found in a mine?
MG A-1 Near the roof, as it is lighter than air.
- MG Q-2 What percent of carbon monoxide can cause death in less than one hour?
MG A-2 0.4 percent or more.
- MG Q-3 How do oxides of nitrogen cause death?
MG A-3 Causes fluid to accumulate in lungs resulting in asphyxia.
- MG Q-4 What are the sources of Hydrogen in a mine?
MG A-4 Charging batteries, mine fires, and explosions.
- MG Q-5 Hydrogen is always present after what type of explosion?
MG A-5 Coal dust explosions.
- MG Q-6 Write down the chemical symbols of methane and hydrogen sulfide.
MG A-6 CH₄ and H₂S.
- MG Q-7 What percentage of the earth's atmosphere is oxygen?
MG A-7 20.94 percent oxygen.
- MG Q-8 What percent of the earth's atmosphere is nitrogen?
MG A-8 78.09 percent nitrogen.
- MG Q-9 Once two or more gases mix uniformly will they separate or come apart?
MG A-9 No.
- MG Q-10 When is the oxygen (O₂) level in air considered to be dangerous?
MG A-10 When oxygen (O₂) level falls below 16%.
- MG Q-11 What is the chemical symbol of carbon dioxide?
MG A-11 CO₂
- MG Q-12 What element in the air is essential for life?
MG A-12 Oxygen.

- MG Q-13 How does the body receive oxygen?
MG A-13 By breathing, oxygen is absorbed by the blood and carried to the cells of the body.
- MG Q-14 What is meant by the term "black damp"?
MG A-14 An atmosphere deficient in oxygen.
- MG Q-15 How can methane gas be detected in a coal mine?
MG A-15 Chemical analysis, flame safety lamp and methane detectors.
- MG Q-16 What is the explosive range of methane?
MG A-16 Five to fifteen percent.
- MG Q-17 A flame safety lamp will go out when the oxygen percentage is below what?
MG A-17 16 percent.
- MG Q-18 The explosive range of carbon monoxide is what?
MG A-18 12.5-74 percent.
- MG Q-19 What distinctive odor does hydrogen sulfide gas smell like?
MG A-19 Smells like rotten eggs.
- MG Q-20 What are the properties of hydrogen sulfide?
MG A-20 Poisonous and colorless with an odor like rotten eggs.
- MG Q-21 What is a flammable mixture of methane and air which can either burn or explode when ignited called?
MG A-21 Firedamp.
- MG Q-22 A sealed area of a coal mine after a period of time will be found to have the absence of what?
MG A-22 Oxygen.
- MG Q-23 What is the specific gravity of carbon dioxide?
MG A-23 1.529
- MG Q-24 How are oxides of Nitrogen formed?
MG A-24 From the use of explosives in mines

MG Q-25	How are results from analysis of oxides of Nitrogen reported?
MG A-25	In terms of nitrogen dioxide.
MG Q-26	What is the ignition temperature of methane?
MG A-26	1100-1380° F
MG Q-27	What is the ignition temperature of Carbon monoxide?
MG A-27	1100° F.
MG Q-28	Is hydrogen explosive?
MG A-28	Yes.
MG Q-29	What is the specific gravity of hydrogen?
MG A-29	It is the lightest of all gases with a specific gravity of 0.0695.
MG Q-30	What is the explosive range of hydrogen?
MG A-30	4.1 to 74 percent.
MGQ-31	How is hydrogen detected?
MG A-31	By chemical analysis.
MG Q-32	What is the principal poisonous gas produced by explosions?
MG A-32	Carbon monoxide.
MG Q-33	What effect does carbon monoxide have on life?
MG A-33	It is extremely poisonous.
MG Q-34	How does carbon monoxide cause injury to life?
MG A-34	By combining with the hemoglobin of the blood and excluding oxygen.
MG Q-35	What percentage of carbon monoxide will produce slight symptoms in several hours?
MG A-35	200 PPM (.02%).
MG Q-36	What percentage of carbon monoxide will produce discomfort in two or three hours?
MG A-36	400 PPM (.04%).

- MG Q-37 What percentage of carbon monoxide will produce a tendency to stagger in one and one-half (1.5) hours?
MG A-37 1200 PPM (0.12%).
- MG Q-38 What percentage of carbon monoxide will produce symptoms of unconsciousness in thirty (30) minutes?
MG A-38 2000-2500 PPM (.20%-.25%).
- MG Q-39 How much greater affinity does hemoglobin have for carbon monoxide than for oxygen?
MG A-39 About three hundred (300) times.
- MG Q-40 Why are small quantities of carbon monoxide injurious?
MG A-40 Because it is not easily eliminated and it accumulates in the blood.
- MG Q-41 What is the specific gravity of carbon monoxide?
MG A-41 0.967.
- MG Q-42 What is carbon monoxide (CO)?
MGA-42 It is a colorless, odorless, tasteless, combustible, and poisonous gas.
- MG Q-43 How can carbon monoxide be detected?
MG A-43 By carbon monoxide detectors, and by analysis.
- MG Q-44 Workers should not be employed for a period of 8 hours where the carbon monoxide content exceeds what?
MG A-44 50 PPM (0.005%)
- MG Q-45 What percentage of carbon monoxide might produce symptoms of poisoning if breathed indefinitely?
MG A-45 0.01%.
- MG Q-46 What is the source of carbon monoxide?
MG A-46 It is the product of incomplete combustion (combustion with an insufficiency of oxygen).
- MG Q-47 When is carbon monoxide most likely to be found in mines?
MG A-47 When there is a mine fire or after an explosion.

- MG Q-48 What instruments are most often used in detecting methane?
MG A-48 The flame safety lamp and methane detectors.
- MG Q-49 What is the least percentage of methane that can be detected with a flame
safety lamp?
MG A-49 About one percent (1%).
- MG Q-50 What gas is odorless, tasteless, non-toxic, colorless and explosive in the
concentration of 5%-15%?
MG A-50 Methane.
- MG Q-51 What is the source of methane in coal mines?
MG A-51 It is liberated from coal and adjoining strata.
- MG Q-52 What is the specific gravity of methane?
MG A-52 0.555.
- MG Q-53 Where is methane usually found in mines?
MG A-53 Along the roof, to the rises, in the vicinity of working faces, in dead ends
and above falls.
- MG Q-54 Is methane an explosive by itself?
MG A-54 No. Oxygen is required to support combustion.
- MG Q-55 Why can there be no explosion when the percentage of methane is greater
than fifteen percent (15%)?
MG A-55 Because the amount of oxygen present is insufficient for rapid combustion
to occur.
- MG Q-56 What is the percentage of methane required for maximum explosive
violence?
MG A-56 Ten percent (10%).
- MG Q-57 What is the percentage of oxygen below which no explosion of a methane
air-mixture can occur?
MG A-57 Twelve percent (12%).

- MG Q-58 What effect does an atmosphere with a reduced oxygen content have upon the explosibility of methane?
- MG A-58 A greater percentage of methane is necessary to start an explosion in an atmosphere which contains less than the normal percentage of oxygen.
- MG Q-59 What effect does the presence of methane have upon the explosibility of coal dust?
- MG A-59 The coal dust is more easily ignited and the force of the explosion is greater.
- MG Q-60 What effect does coal dust in the air have upon the explosibility of methane?
- MG A-60 The lower explosive limit is decreased.
- MG Q-61 What dangerous gas is most likely to be encountered above a pillar fall?
- MG A-61 Methane.
- MG Q-62 Where might concentrated accumulations of carbon dioxide ordinarily be found?
- MG A-62 Near the floor, in inadequately ventilated places.
- MG Q-63 What effect does carbon dioxide have upon life?
- MG A-63 Respiration is increased as concentration of carbon dioxide increases.
- MG Q-64 How is carbon dioxide detected?
- MG A-64 Usually by chemical analysis.
- MG Q-65 What is carbon dioxide (CO₂)?
- MG A-65 Carbon dioxide is a colorless and odorless gas formed by the chemical combination of carbon and oxygen.
- MG Q-66 How is carbon dioxide formed in a mine?
- MG A-66 By combustion, by breathing of miners and animals, by decay of vegetable and animal matter, by the oxidation of coal and by chemical action of acid water on carbonates.
- MG Q-67 What is a product of complete combustion?
- MG A-67 Carbon dioxide.

- MG Q-68 Is carbon dioxide combustible?
MG A-68 No.
- MG Q-69 How does the body receive oxygen?
MG A-69 Through breathing, the oxygen is taken up by the hemoglobin of the blood and carried to all parts of the body.
- MG Q-70 What supports the chemical reaction that produces fires and explosions?
MG A-70 Oxygen.
- MG Q-71 What percent oxygen can a person most easily work in?
MG A-71 20.9%
- MG Q-72 What percent oxygen will a person breathe faster and deeper while at work?
MG A-72 17 percent.
- MG Q-73 What is nitrogen?
MG A-73 It is a tasteless, odorless and colorless gas which will neither support life nor combustion.
- MG Q-74 Is nitrogen combustible?
MG A-74 No.
- MG Q-75 What effect does nitrogen have towards propagating an explosion?
MG A-75 None.
- MG Q-76 What effect does nitrogen have upon life?
MG A-76 It has no effect, except when it depletes oxygen to the extent that there is a deficiency of oxygen.
- MG Q-77 Does nitrogen have an ignition temperature?
MG A-77 No, nitrogen will not explode.
- MG Q-78 How is sulfur dioxide formed in a mine?
MG A-78 By burning coal containing pyrites.
- MG Q-79 What is the specific gravity of sulfur dioxide?
MG A-79 2.263.

- MG Q-80 What is the particular danger of sulfur dioxide?
MG A-80 It is extremely poisonous even in small amounts.
- MG Q-81 How is sulfur dioxide detected?
MG A-81 By the sense of smell and its effect on the air passages.
- MG Q-82 What is the first effect on a person exposed to sulfur dioxide?
MG A-82 It is extremely irritating and suffocating and is intolerable to breathe.
- MG Q-83 Is sulfur dioxide combustible?
MG A-83 No, it is incombustible.
- MG Q-84 What mine gas can be detected by its odor?
MG A-84 Hydrogen sulfide.
- MG Q-85 What is the origin of hydrogen sulfide?
MG A-85 It is liberated by burning explosives containing sulfur such as black powder or dynamite.
- MG Q-86 How can hydrogen sulfide be detected other than by sense of smell?
MG A-86 By the hydrogen sulfide detector or by paper dipped in acetate of lead, which will turn black immediately on exposure to hydrogen sulfide.
- MG Q-87 What is the specific gravity of hydrogen sulfide?
MG A-87 1.191.
- MG Q-88 What is the explosive range of hydrogen sulfide?
MG A-88 4.3% to 45%.
- MG Q-89 Is hydrogen sulfide poisonous?
MG A-89 Yes, it is extremely poisonous even in small amounts.
- MG Q-90 What is the immediate effect of hydrogen sulfide on a person?
MG A-90 It is extremely irritating to the eyes.
- MG Q-91 Is sulfur dioxide soluble in water?
MG A-91 Yes.

MG Q-92	What is noxious gas?
MG A-92	Any gas in the air which is harmful to life when inhaled.
MG Q-93	Which is the heaviest, one cubic foot of methane or one cubic foot of air?
MG A-93	One cubic foot of air.
MG Q-94	What gas is found near the roof and cavities on falls?
MG A-94	Methane (CH ₄).
MG Q-95	What does the presence of CO in a sealed mine area indicate?
MG A-95	A fire.
MG Q-96	What percentage of blood saturation by Carbon monoxide (CO) will cause death?
MG A-96	70% - 80%.
MG Q-97	Why will methane accumulate in an inadequately ventilated place?
MG A-97	It is lighter than air and will rise and stratify if not properly diffused.
MG Q-98	Can there be a mine fire or an explosion without the presence of oxygen?
MG A-98	No.
MG Q-99	What is the principle combustible gas usually found in coal mines?
MG A-99	Methane.
MG Q-100	Define the term diffusion of gases.
MG A-100	Diffusion is a phenomenon by which gases mix by natural forces.
MG Q-101	What is the law of diffusion?
MG A-101	The rate of diffusion varies inversely as the square root of specific gravity.
MG Q-102	What is stratification?
MG A-102	When gases do not diffuse completely, layers of gas stratify horizontally.
MG Q-103	Name the gas which is generated from a storage battery.
MG A-103	Hydrogen (H ₂).
MG Q-104	Name the non-explosive gases found in coal mines.
MG A-104	Carbon Dioxide (CO ₂) and Nitrogen (N ₂).

- MG Q-105 Name the explosive gases found in bituminous coal mines in Pennsylvania.
- MG A-105 Methane (CH₄), Carbon monoxide (CO), and Hydrogen Sulfide
- MG Q-106 Is methane (CH₄) poisonous?
- MG A-106 No.
- MG Q-107 Among methane, carbon monoxide, and hydrogen sulfide, which one has the lowest ignition temperature?
- MG A-107 Hydrogen sulfide (700°F).
- MG Q-108 What type of atmosphere is easy for the detection of a gas - a diffused one or a stratified one?
- MG A-108 A stratified one.
- MG Q-109 What is the effect of black damp on flame safety lamp?
- MG A-109 The flame of a safety lamp is dimmed or extinguished depending on concentration of gases present.
- MG Q-110 What is the color of methane?
- MG A-110 Methane is colorless.
- MG Q-111 What is the most simple and safe test for the presence of black damp?
- MG A-111 A flame safety lamp.
- MG Q-112 Stink damp refers to which gas?
- MG A-112 Hydrogen sulfide.
- MG Q-113 White damp refers to which gas?
- MG A-113 Carbon monoxide.
- MG Q-114 Convert 0.01 percent of carbon monoxide to ppm.
- MG A-114 100 ppm.
- MG Q-115 List the threshold limit value for oxides of nitrogen.
- MG A-115 5 ppm.
- MG Q-116 What is the threshold limit value of nitrogen?
- MG A-116 81%.

MG Q-117 What is TLV?
MG A-117 Threshold Limit Value.

MG Q-118 What is the threshold limit value of hydrogen sulfide?
MG A-118 10 PPM.

MG Q-119 Is hydrogen flammable?
MG A-119 Yes.

MG Q-120 Mine air should not contain less than what percentage of oxygen?
MG A-120 19.5%.