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INTERNATIONAL, INC.

This report lists several known places where oxygen depletion may occur, plus oxygen scientific data.

Thoughts From the September Chat Room October 1, 2007

OXYGEN DEPLETION

PART 1

The oxygen level should be 21% in normal atmospheres. Breathing air contains 21% oxygen. If that is decreased by 1.5% the human body is affected.
Any place where people are involved direct or indirectly a notification should be made known to appropriate personnel that the level of oxygen is below acceptable limits. With oxygen comprising about one-fifth (20.9%) of our atmosphere, it takes almost 5% (50,000 ppm) of some other gas (i.e., carbon monoxide) or combinations of other gases to displace 1% of normal ambient oxygen levels. With technology available for selectively monitoring most common gases, the level of safety is greatly increased and codes often require including another gas monitor that identifies an invading gas or gases that would be displacing oxygen. It follows then that such would identify a problem long before oxygen displacement would be recognized. Electrochemical and infrared are two of the gas specific sensor technologies for monitoring gases that may be displacing oxygen. There are some code requirements that can be met by simply monitoring oxygen levels. Toxalert is not addressing code requirements in this document since they change often and we do not know particular location codes.

Listed are types of places that oxygen depletion can occur and may use or require use of detection devices of varied types for a multitude of gases that pivot around such situations.
(Most applications are well known but the list is not all inclusive)

- Hospitals – MRI Rooms
  Autoclave sterilization equipment areas
  Disinfecting utensils in hospitals and some laundry rooms
- Semi-conductor production
- Pharmaceutical locations/labs – Clean Rooms
  Residual solvents use
  Where cold is required for both storage and/or shipping
- Refining operations
- Meatpacking – All types that use gases in their process.

Cont: Part 1

- Plasma etching operations – use of nitrogen triflouride
- Waste Treatment Plants
- Cryogenic storage that utilize nitrogen or carbon dioxide
- Incubators / tissue culture storage / storage drawers used in cells
- Mechanical refrigeration areas (rooms) – HVAC chiller equipment rooms
- Industrial Refrigeration - Cold storage warehouse
  Produce storage facility
  Food production facility
  Beer warehouse
  Ice Rinks
- Petro-chemical production
- Waste ponds at animal production sites (pig, cow, turkey, chicken)
- Landfills / Brownfield sites - buildings on reused industrial sites or current in-use landfills that require monitoring (possible off gassing)
- Chlorine use areas
- Automatic systems for fire prevention that use chemicals or have them stored.
- NOT LEAST OF ALL = "GREEN BOILERS" = measuring carbon dioxide emissions when only checked annually may not be "green" and may not be efficient.

PART 2

Oxygen – A gaseous chemical element, symbol O, atomic number 8 and atomic weight 15.9994. It is an essential element both in the respiration process in most living cells and in combustion processes. It is the most abundant element in the Earth's crust. About one-fifth (volume) of the air is oxygen. About 49.5% by weight of the Earth's crust, including the oceans and atmosphere, is oxygen. Water is composed of 88.81% oxygen by weight.

Physical Properties

Under ordinary conditions oxygen is a colorless, odorless, and tasteless gas. It condenses to a pale blue liquid, in contrast to nitrogen, which is colorless in the liquid state. Oxygen is one of a small group of slightly paramagnetic gases and it is the most paramagnetic of the group. Liquid oxygen is also slightly paramagnetic.

Chemical Properties

Practically all-chemical elements except the inert gases form compounds with oxygen. Most elements form oxides when heated in an atmosphere containing oxygen gas. Many elements form more than one oxide; for example, sulfur forms sulfur dioxide (SO_2) and sulfur trioxide (SO_3). Among the most abundant binary oxygen compounds are water, H_2O, and silica, SiO_2, the latter being the chief ingredient of sand. Other widely occurring compounds—calcium carbonate (limestone and marble) calcium sulfate (gypsum), aluminum oxide (bauxite) and iron oxides. Hydrogen peroxide, H_2O_2, a compound used extensively for bleaching and oxidation-reduction.