



WHY INDOOR AIR QUALITY (IAQ) MATTERS



Poor IAQ contributes to short and long-term health issues, which the Covid Pandemic has proven beyond doubt, and can lead to decreased productivity, absenteeism, and even litigation (check OSHA standards).

Typical symptoms associated with poor IAQ include eye, nose and throat irritation, headache, nausea, dizziness, fatigue, even acute and chronic respiratory illnesses such as asthma, pneumonia, COPD, etc.

FACTORS CONTRIBUTING TO POOR INDOOR AIR QUALITY

Gases, inhalable particulates in the air, viruses and bacteria are primary sources that contribute to poor IAQ. These particulates and pathogens can invade indoor air in many ways ... poorly maintained HVAC systems, wood and coal stoves, non-vented gas heaters, smokers, building materials, carpeting, furniture, cleaning solvents, vehicle exhaust emissions, etc. The list is unimaginably long, and at the same time can be amplified by external factors such as poor ventilation, humidity and temperature.

COMMON INDOOR AIR POLLUTANTS

Chemical Element	Pollutant	Major Sources	Potential Health Effects
CO₂	Carbon Dioxide*	Sick Building Syndrome (SBS), Excessive Building Occupancy and Inadequate Ventilation	Fatigue; Eye, Nose and Throat Irritation; Headaches; Chest Discomfort; Respiratory Tract Symptoms
CO	Carbon Monoxide	Non-vented or Malfunctioning Gas Appliances, Wood and Coal Stoves, Tobacco Smoke and Vehicle Exhaust Emissions	Headache, Nausea, Angina, Impaired Vision and Mental Functioning, Fatal at High Concentrations
COPM	Environmental Tobacco Smoke	Cigarettes, Cigars and Pipes	Respiratory Irritation, Bronchitis and Pneumonia in Children; Emphysema, Lung Cancer and Heart Disease
VOC	Organic Chemicals	Aerosol Sprays, Solvents, Glues, Cleaning Agents, Pesticides, Paints, Moth Repellents, Air Fresheners, Dry cleaned Clothing and Treated Water	Eye, Nose and Throat Irritation; Headaches; Loss of Coordination; Damage to Liver, Kidney and Brain; Various Types of Cancer
O₃	Ozone	Ground Level Ozone Entering Indoors; Malfunctioning Air Treatment Systems; and Office Photocopiers and Printers	Eye, Nose and Throat Irritation; Coughing; Chest Discomfort; Reduced Lung Function; Shortness of Breath
NO₂	Nitrogen Oxides	Non-vented or Malfunctioning Gas Appliances and Vehicle Exhaust Emissions	Eye, Nose and Throat Irritation; Increased Respiratory Infections in Children
PM	TSP (total suspended particulates) PM₁₀ (thoracic fraction) PM_{2.5} (respirable fraction) PM₁ (particles ≤1.0 μm)	Cigarettes, Wood and Coal Stoves, Fireplaces, Aerosol Sprays and House Dust	Eye, Nose and Throat Irritation; Increased Susceptibility to Respiratory Infections and Bronchitis; Lung Cancer

CHCO	Formaldehyde	Pressed Wood Products e.g. plywood and MDF; Furnishings; Wallpaper; Durable Press Fabrics	Eye, Nose and Throat Irritation; Headache; Allergic Reactions; Cancer
-	Biological Agents (Bacteria, Viruses, Fungi, Animal Dander, Dust Mites)	Dust; Pets; Bedding; Poorly Maintained Air Conditioners, Humidifiers and Dehumidifiers; Wet or Moist Structures; Furnishings	Allergic Reactions; Asthma; Eye, Nose and Throat Irritation; Humidifier Fever, Influenza and Other Infectious Diseases
-	Asbestos	Damaged or Deteriorating Insulation, Fireproofing and Acoustical Materials	Asbestosis, Lung Cancer, Mesothelioma and Other Cancers
-	Lead	Sanding or Open-Flame Burning of Lead Paint; House Dust	Nerve and Brain Damage, Kidney Damage; Growth Retardation in children
-	Radon	Soil Under Buildings, Some Construction Materials	Lung Cancer

The importance of CO2 to IAQ

In the workplace, at school, wherever people congregate in quantity and continuously come and go like a lobby, classroom, cafeteria, etc., it's important to measure CO2 levels in the indoor air due to the many health problems that can result when CO2 builds up over any prolonged period of time.

Here are the indoor air CO2 measurement levels, reflected in “parts per million,” from acceptable to dangerous:

- 250 - 400 ppm: background (normal) outdoor air level.



- 400 - 1,000 ppm: typical level found in occupied spaces with good air exchange.
- 1,000 - 2,000 ppm: level associated with complaints of drowsiness and poor air.
- 2,000 - 5,000 ppm: level associated with headaches, sleepiness, and stagnant, stale, stuffy air. Poor concentration, loss of attention, increased heart rate and slight nausea may also be present.
- 5,000 ppm: this indicates unusual air conditions where high levels of other gases could also be present. Toxicity or oxygen deprivation could occur. This is the permissible exposure limit for daily workplace exposures.
- 40,000 ppm: this level is immediately harmful due to oxygen deprivation.