

THE ABC'S OF GASES IN THE INDUSTRY

Ammonia: NH_3	n-Butane*: C_4H_{10}
<p>Colorless gas with a pungent suffocating odor</p> <p>STEL: 35 ppm TWA: 50 ppm IDLH: 300 ppm LEL: 15% by volume Ionization Potential: 10.18 eV</p> <ul style="list-style-type: none"> • Fertilizer Plants • Fish & Meat Packing Plants • Industrial Refrigeration and Cold Storage • Semiconductor Industry • Water and Wastewater Treatment Plants • Munitions <p><i>Refer to AP-201 for further information</i></p>	<p>Colorless gas with a gasoline-like odor</p> <p>STEL: 1 ppm TWA: OSHA 5 ppm LEL: 1.6% by volume</p> <ul style="list-style-type: none"> • Aerosol Propellant Filling Docks • Feed stock for Chemical Processes • Storage Tanks and Filling Docks
Benzene: C_6H_6	Carbon Dioxide: CO_2
<p>Colorless liquid with aromatic odor</p> <p>STEL: 2.5 ppm TWA: 0.5 ppm LEL: 1.2%</p> <ul style="list-style-type: none"> • Refineries • Oil & Gas Distribution • Feed Stock for Chemical Production • Solvent Distribution Centers • Gas Stations 	<p>Colorless, odorless gas</p> <p>STEL: 30,000 ppm TWA: OSHA 5000 ppm IDLH: 40,000 ppm</p> <ul style="list-style-type: none"> • Breweries and Wineries • Carbonated Beverage Bottling Plants • Dry Ice Plants, Food Processing Plants, Fruit Storage and Ripening Chambers • Greenhouses, Indoor Air Quality Studies, and Ventilation Control • Mushroom Farms Stack Gas • Oil Well Injection

<p style="text-align: center;">Carbon Monoxide: CO</p> <p>Colorless, odorless gas - most abundant toxic gas</p> <p>STEL: ppm TWA: OSHA 50 ppm LEL: 12.5% IDLH: 1200 ppm</p> <ul style="list-style-type: none"> • Furnaces • Gasoline Generators/Engines • Grain Storage Silos • Lumber Drying Kilns • Mining and Metals • Parking Garages 	<p style="text-align: center;">Chlorine: Cl₂</p> <p>Green-yellow gas with a pungent, irritating odor</p> <p>STEL: 0.3 ppm TWA: OSHA 0.1 ppm IDLH: 5 ppm</p> <ul style="list-style-type: none"> • Mining & Metals Industry • Nuclear Reactors • Pulp & Paper Mills • PVC Plastics Manufacturing • Semiconductor Water Etching Facilities • Swimming Pool Chlorinization Plants • Water Treatment Plants • Chlorine Gas Manufacturing
<p style="text-align: center;">n-Hexane*: C₆H₁₄</p> <p>Colorless liquid with a gasoline-like odor</p> <p>TWA: OSHA 500 ppm LEL: 1.1% IDLH: 1100 ppm</p> <ul style="list-style-type: none"> • Electric Generation • Gas Stations • Peanut Oil Extraction Plants • Solvent Distribution Centers 	<p style="text-align: center;">Hydrogen*: H₂</p> <p>Colorless gas No exposure limits – Simple asphyxiant</p> <ul style="list-style-type: none"> • Battery Charging Stations • Semiconductor Plants for Water Furnaces • Underground Vaults Containing Transformers • Vegetable Oil Hydrogenation Plants
<p style="text-align: center;">Hydrogen Cyanide: HCN</p> <p>Colorless gas with a bitter, almond-like odor</p> <p>TWA: OSHA 10 ppm LEL: 5.6% IDLH: 50 ppm</p> <ul style="list-style-type: none"> • Plating and Mining • Nylon Manufacturing 	<p style="text-align: center;">Hydrogen Sulfide: H₂S</p> <p>Colorless gas with a strong odor of rotten eggs</p> <p>TWA: OSHA 20 ppm LEL: 4.0% IDLH: 100 ppm</p> <ul style="list-style-type: none"> • Leather Tanneries and Paper Mills • Mining and Metals Industry • Oil Fields and Refineries • Sewage Treatment Plants • Sewer Maintenance
<p style="text-align: center;">Methane: CH₄</p> <p>Colorless, odorless gas – odorized with mercaptans Primary component of natural gas No exposure limits – Simple asphyxiant</p> <p>LEL: 5%</p> <ul style="list-style-type: none"> • Oil & Gas Distribution & Refining • Mining Industry 	<p style="text-align: center;">Nitric Oxide: NO</p> <p>Colorless gas</p> <p>TWA: NIOSH/OSHA 25 ppm IDLH: 100 ppm</p> <ul style="list-style-type: none"> • Semiconductor Plants • Mining

Nitrogen Dioxide: NO ₂	Oxygen Deficiency: O ₂
<p>Reddish-brown with a pungent odor</p> <p>STEL: 1 ppm TWA: OSHA 5 ppm IDLH: 20 ppm</p> <ul style="list-style-type: none"> Boilers and Furnaces Diesel Emissions Semiconductor Plants Mining Industry 	<p>Colorless, odorless gas</p> <ul style="list-style-type: none"> Cargo Holds and Storage Tanks Grain Storage Silos With Inerted Atmospheres Liquid Nitrogen Storage LN2 Cooled Laser Facilities LN2 Cooled Telescope Sewer Maintenance Sewer Treatment Facilities Underground Vaults (Utilities)
Propane*: C ₃ H ₈	Sulfur Dioxide: SO ₂
<p>Colorless, odorless gas</p> <p>TWA: OSHA 1000 ppm LEL: 2.1% IDLH: 2100 ppm (LEL)</p> <ul style="list-style-type: none"> Aerosol Propellant Filling Lines Feed stock for various Chemical Processes Propane-powered Forklifts Storage Tanks & Filling Docks 	<p>Colorless gas with a pungent odor</p> <p>STEL: 5 ppm TWA: NIOSH 2 ppm IDLH: 100 ppm</p> <ul style="list-style-type: none"> Circuit Board Etching Diesel Emissions Paper Mills Sulfur Processing Plants (SO₂) Water Treatment
<p align="center">Volatile Organic Compounds (VOCs) Refer to the NIOSH Pocket Guide for specific chemical hazards</p>	
<ul style="list-style-type: none"> Airline Maintenance Facilities (Jet fuel - refer to AP-200) Consultant Engineering Leaking Underground Storage Tanks Petrochemical Manufacturing Aerospace Manufacturing Automotive Manufacturing (paint booths—refer to AP-204) High Tech Electronics Manufacturing Pharmaceutical Manufacturing Chemical Printed Circuit Board Fabrication Transportation (spills from tankers, cars) Printing (lithography and flexography) Fiberglass reinforced plastics (refer to AP-205) Hazardous Waste Facilities 	<ul style="list-style-type: none"> Coating (cans, coils, and fabrics) Forest products Component manufacturing (parts spray-painting, resin components, adhesive components, misc. metalworking) Regulatory agencies (OSHA, EPA, DOT) Military (base closures) Marine Chemists (ships and barges) Emergency Response/HazMat teams (refer to AP-203) Fire Departments: Arson Investigation TSD (Treatment, Storage & Disposal) Municipal/Public Works Federal, State and Municipalities Coke oven off gases (refer to AP-206)

*Denotes Combustible Gas