VI NA INDUSTRIAL GASES

Gas Grade Recommendations

Analytical Method/ Detector	Carrier and Support Gases	Type of Analysis Impurity Considerations
Gas Chromatography		
TCD (Thermal Conductivity Detector)	N_2	Universal Detector Atmospheric contaminants can oxidize the detector filament giving rise to negative peaks and reduced sensitivity.
	He	
	H_2	
	Ar	
FID (Flame Ionization Detector)	He	Organic Compounds Hydrocarbons in carrier and fuel gases can give rise to baseline noise and reduced detector sensitivity. Oxygen and water cause column deterioration and affect retention time on critical separations.
Carriers	N_2	
	Ar	
Combustion Gases	H_2	
	40% H_2 in He	
	40% H_2 in N_2	
	Air	
ECD (Electron Capture Detector)	He	Halogenated Compounds Detector response and column life are reduced by oxygen and water. Hydrocarbons and halocarbons can produce baseline noise, negative peaks and plumbing contamination.
	N_2	
	5% CH_4 in Ar-ECD (P-5)	
	10% CH_4 in Ar-ECD (P-10)	
HID (Helium Ionization Detector)	He	Universal Detector Atmospheric impurities can cause baseline noise signal polarity and reduced detector stability and sensitivity.
	He Purge	
FPD (Flame Photometric Detector)	He	Sulfur or Phosphorous Compounds Organics can yield baseline noise and carbon dioxide can suppress detector response.
	N_2	
	H_2	
	Air	
PID (Photo Ionization Detector)	He	Selective Detector Dependent on UV Source Organics can yield baseline noise and carbon dioxide can suppress detector response.
	N_2	
GC/MS (Mass Spectrometer)	He	All Compounds Organics can yield baseline noise and carbon dioxide can suppress detector response.
	N_2	
	Ar	
DID (Discharge Ionization Detector)	He	Universal Detector Atmospheric impurities can cause baseline noise signal polarity and reduced detector stability and sensitivity.
	He Purge	
USD (Ultrasonic Detector)	Ar	Universal Detector Atmospheric impurities can cause baseline noise signal polarity and reduced detector stability and sensitivity.
	He	

AIR PRODUCTS

VI NA INDUSTRIAL GASES

Gas Grade Recommendations

Analytical Method/ Detector	Carrier and Support Gases			Type of Analysis Impurity Considerations
Optical Spectometry – Adsorption				
NDR(Non-dispersive Infrared)	Air			Polyatomic and Heteroatomic Compounds
	N_2			
IR (Dispersive Infrared) -FTIR (Fourier Transform Infrared) -FG/GFC (Correlation)	Ar			Polyatomic and Heteroatomic Compounds During matrix isolation, oxygen can oxidize a sample. Moisture interfers with IR spectra. Impurities coinciding with quantified peaks can cause inaccuracies.
	N_2			
AA (Atomic Absorption) Combustion Gases	C_2H_2			Elemental Analysis Impurites can cause the flame to discolor or burn unevenly. Furnace atmospheres require low oxygen and moisture levels to maintain instrument sensitivity.
	n-C_4H_{10}			
	H_2			
	N_2O			
	Air			
	Ar (Flameless)			
	N_2			
NMR (Nuclear Magnetic Resonance)	LHe			Analysis of Molecular Structure
	LN_2			

Legend

AA – Atomic Absorption
UH – Ultra High Purity
RS – Research/Chromatographic
Z – Zero
UZ – Ultra Zero
IS – Instrument
OF – Oxygen Free
TG – Trace Analytical
EC – Electron Capture Detector

Gas Grade Recommendations

Analytical Method/ Detector	Carrier and Support Gases			Type of Analysis Impurity Considerations
Optical Spectrometry – Emission				
Atomic Emission				Elemental Analysis
- ICP (Inductive Coupled Plasma)	Ar			
	LAr			
	N_2			
	H_2			
Arc or Spark Emission	Ar			Elemental Analysis
	H_2			
	5% Ar in H_2			
Chemiluminescence	Air			NO-NO_2-NOX Hydrides and O_3
	N_2			
	O_2			
Fluorescence UV	Air			SO_2-H_2S-Organic Compounds
	N_2			
XRF (Fluorescence X)	10% CH_4 in Ar			Elemental Analysis
	1.3% n-C_4H_{10} in He			
	0.95% i-C_4H_{10} in He			
	LN_2			
Mass Spectrometry				
MS (Under Vacuum)				All Compounds
	N_2			
	He			

Legend

UH – Ultra High Purity

RS – Research

IC – Inductive Coupled Plasma

CE – Continuous Emissions Monitoring (See Pure Gas Section for correct definition)

TG – Trace Analytical

Z – Zero

VC – Volatile Organic Compound Free

UZ – Ultra Zero

Gas Grade Recommendations

Analytical Method/ Detector	Carrier and Support Gases	Type of Analysis Impurity Considerations
Others		
Nuclear Counter	10% CH_4 in Ar	Measurement of Radioactivity
	1.3% n-C_4H_{10} in He	
	0.95% i-C_4H_{10} in He	
Hydrometer	Air	Moisture in All Gas
	N_2	
Paramagnetic Analyzer	N_2	Oxygen in All Gas
	O_2 in N_2	
Carbon and Sulfur in Steel	Ar He N_2 O_2	Analysis of Carbon, Sulfur and Gases (N_2-H_2-O_2) in Steel

Instrumentation Mixture Summary

Product Description	Mixture Application
40% H_2 in He (FID Fuel) (THC < 0.5 ppm)	Fuel Gas for GC-FID
40% H_2 in He UHP (FID Fuel) (THC < 0.1 ppm)	Fuel Gas for GC-FID
40% H_2 in N_2 (FID Fuel) (THC < 0.5 ppm)	Fuel Gas for GC-FID
40% H_2 in N_2 UH (FID Fuel) (THC < 0.1 ppm)	Fuel Gas for GC-FID
5% CH_4 in Argon-ECD (P-5)	Make-up Gas for GC-ECD
10% CH_4 in Argon-ECD (P-10)	Make-up Gas for GC-ECD
10% CH_4 in Ar (P-10)	XRF (Fluorescence X)
1.3% n-C_4H_{10} in He	XRF (Fluorescence X)
0.95% i-C_4H_{10} in He	XRF (Fluorescence X)
5% CH_4 in Ar (P-5)	Carrier Gas for Proportional Counters
10% CH_4 in Ar (P-10)	Carrier Gas for Proportional Counters
1.3% n-C_4H_{10} in He	Quench Gas
0.95% i-C_4H_{10} in He	Carrier Gas for Geiger-Muller
5% Ar in H_2	Spark Emission