



PGC1000

Analytical offerings

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Targeted applications

Targeted applications				Targeted applications			
App category	App description	Cycle time /carrier	Train	App category	App description	Cycle time /carrier	Train
H2	Hydrogen - 0.1-100%	75 N2	BCJ	Process control	Demethanizer (tops & bottoms)	60 He	BCT/BCS
O2	Trace oxygen - 3-2000 ppm	330 H2/He	BBP		Deethanizer (tops & bottoms)	60 He	BCT/BCS
	% Level oxygen - 0.2-20%	330 He	BBH		Depropanizer (tops & bottoms)	60 He	BCT/BCS
H2O	Trace Moisture - H2O 0.002-2%	90 He	BCR		Debutanizer (tops & bottoms)	420 H2/He	BBK/BBJ
CO	Carbon monoxide - 0.2-100%	240 H2/He	BBH		Debutamer (tops & bottoms)	420 H2/He	BBK/BBJ
H2S	H2S in fuel gas - 0-300 ppm	150 He	BBR/BCM		Depentanizer (tops only)	420 H2/He	BBK/BBJ
HRVOC	Highly reactive volatile organic compounds	420 He	BBC/BBJ/BBH		C4 Paraffins/Olefins	420 H2/He	BBJ
Permanent gasses	H2/O2/N2/CO	240 H2/He	BBH		Propane/Propylene split	420 H2/He	BBJ
Light hydrocarbons	C3+ w/N2/O2 split	360 He	BBH/BCB				
Hydrocarbons (Gas quality)	Std C6+Btu application	315 H2/He	BBK/BBF	NOTE: The application tables above provide the user with an overview of ABB's Totalflow line of analytical products. Also included are the Totalflow line of predefined solutions/applications which illustrate how the table may be used to combine trains to satisfy a particular analysis requirement.			
	Fast C6+ Btu application (H2 carrier)	90 H2	BCD/BCF				
	Fast C6+ Btu application (He carrier)	180 He	BCC/BCG				
	C6+ Btu application up to 1200 ppm H2S	315 H2/He	BBF/BBM				
	C7+ Btu application	360 H2/He	BBF/BBS				
	C7+ Btu application up to 1200 ppm H2S	540 H2/He	BBF/BCB				
	C9+ Btu application w/HCDP available	360 He	BBK/BBF/BBT				
	C6+ with trace H2S	360 He	BBK/BBF/BBR				
	C6+ with N2/O2 split	330 He	BBK/BBF/BBH				

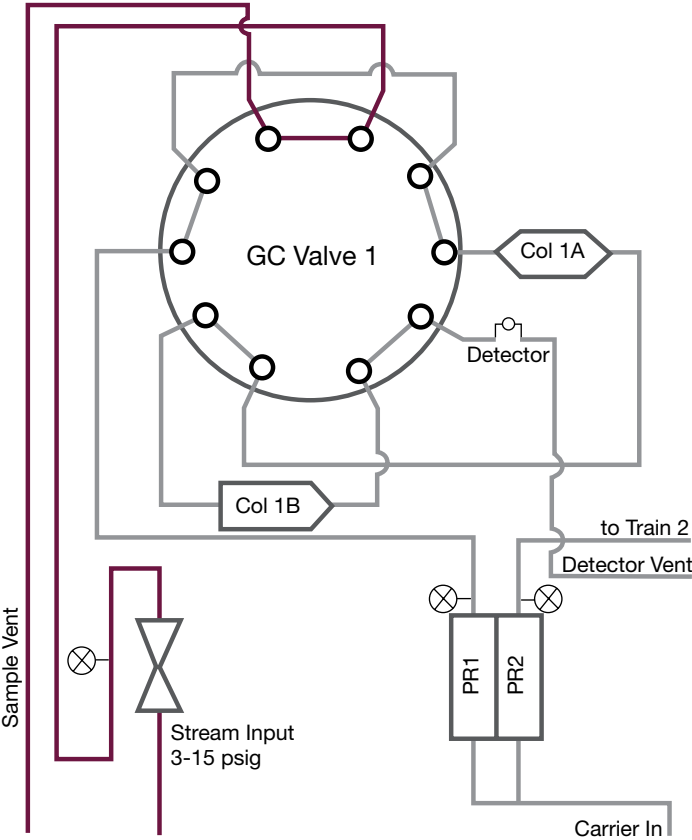
Defined column trains			Defined column trains		
Column train designator	Measured components	Carrier	Column train designator	Measured components	Carrier
BBC	C3+/He/N2/C1/CO2/C2=/C2/C2*	H2/He	BCF	C3+/N2/C1/CO2/C2=/C2	H2
BBF	C3+/N2/C1/CO2/C2=/C2	H2/He	BCG	C3+/N2/C1/CO2/C2=/C2	He
BBG	C3+/N2/C1/CO2/C2=/C2/H2S/H2O	H2/He	BCH	C7+/C3/H2S/IC4/NC4/NeoC5/IC5/NC5/C6's	H2/He
BBH	C1+/He/O2/N2/CO	H2/He	BCJ	H2 15 uL	N2
BBJ	C5+/C3/C3=/IC4/NC4/B-1 & IC4=/TB-2/CB-2/1,3-BD	H2/He	BCK	CO2+/He/O2/N2/CO/C1	H2/He
BBK	C6+/C3/IC4/NC4/NeoC5/IC5/NC5	H2/He	BCM	H2S	H2/He
BBM	C6+/C3/H2S/IC4/NC4/NeoC5/IC5/NC5	H2/He	BCN	C4+/CYC3/PD/MA	H2/He
BBP	O2	H2/He	BCP	H2 30 uL	N2
BBR	H2S	H2/He	BCR	H2O	He
BBS	C7+/C3/IC4/NC4/NeoC5/IC5/NC5/C6's	H2/He	BCS	C3+/N2/C1/CO2/C2=/C2	He
BBT	C9+/C6's/C7's/C8's	He	BCT	C6+/C3/IC4/NC4/NeoC5/IC5/NC5	He
BBW	O2	He			
BBX	C4+/CYC3/PD/MA	H2/He	The guidelines or technical limits allowed for combining trains are as follows: 1. Up to two trains per enclosure 2. Up to two enclosures 3. Limited to a total of four trains per analyzer system The three letter combinations appearing in the far left column headed "Column train designator" correspond to the various sections outlined in the PGC1000 Applications Manual.		
BCB	C3+/H2/N2/C1/CO2/C2=/C2/H2S	H2/He			
BCC	C6+/C3/IC4/NC4/NeoC5/IC5/NC5	He			
BCD	C6+/C3/IC4/NC4/NeoC5/IC5/NC5	H2			

Reference: collection of common terminology and graphs used in the manual

The PGC1000 is easy to operate. There are a few basic symbols (illustrations) and terms in this reference section which need to be understood. Training descriptions are provided following this reference section.

Column train

A column train consists of a valve, detector and a set of chromatograph columns. The column is developed to perform a specific application. The application can be changed by modifying the column set. The illustration below shows the plumbing configuration of the column train.



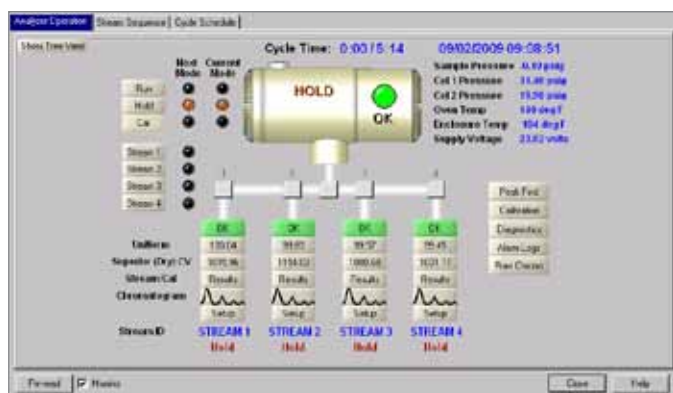
Common symbols

Name of gas	Abbrev.	Symbol	Name of gas	Abbrev.	Symbol
1,3-Butadiene	1,3-B		Heptane	NC7	
Cis-Butene-2	cB-2		Heptane and heavier	C7+	
Trans-Butene-2	tB-2		Isomers of heptane	C7s	
Butene-1	B-1		Isoheptane	IC7	
Isobutylene	Iso-BLe		Octane	NC8	
Methane	C1		Isomers of octane	C8s	
Methane and heavier	C1+		Nonane	NC9	
Ethane	C2		Nonane and heavier	C9+	
Ethane and lighter	C2-		Isomers of nonane	C9s	
Ethylene	C2=		Decane	C10	
Propane	C3		Decane and heavier	C10+	
Propane and heavier	C3+		Isomers of decane	C10s	
Propylene	C3=		Nitrogen	N2	
Propadiene	PD		Nitrogen and heavier	N2+	
CycloPropane	CyC3		Carbon dioxide	CO2	
Butane	NC4		Hydrogen sulfide	H2S	
Butane and heavier	C4+		Air+	Air+	
Isomers of butane	C4s		Acetylene	C2*	
Isobutane	IC4		Methyl acetylene	MA	
Neopentane	Neo		Water vapor	H2O	
Pentane	NC5		Carbon monoxide	CO	
Pentane and lighter	C5-		Oxygen	O2	
Isomers of pentane	C5s		Hydrogen	H2	
Isopentane	IC5		Helium	He	
Hexane	NC6		2,2 Dimethylbutane	2,2-Dmb	
Isohexane	IC6		2,3 Dimethylbutane	2,3-Dmb	
Hexane and heavier	C6+		3-MethylPentane	3-MP	
Isomers of hexane	C6s				

Terms

Graphic user interface (GUI)

The GUI is a type of user interface that allows people to interact with programs in more ways than just typing. A GUI offers graphical icons and visual indicators to fully represent the information and actions available to a user as opposed to text-based interfaces, typed command labels or text navigation.



Carrier gas

Carrier gas refers to the gas which is used to “carry” or push the other gasses through the columns. The PGCs and the trains are carrier gas specific. A different manifold is required when using hydrogen carrier. Do not use hydrogen carrier with a standard helium carrier PGC.

Train

A column train consists of a valve, detector and a set of chromatograph columns. The column is developed to perform a specific application. The application can be changed by modifying the column set. Two PGCs can be combined with four trains with eight columns.

Target component

A target component is defined for each train. Normally the target component is the last eluting measured component for that train. The purpose is to enable the operator to make minor adjustments to the carrier pressure in order to align all gating for all components.

Elution

Elution refers to the gas components emerging or coming through the column. For example, in the C6+ train, the NC5 elutes at about 160 seconds. Another way of saying this is the NC5 has a retention time of 160 seconds.

Column

Column refers to a tube with a material either packed inside of it (packed column) or attached to the inside diameter of it (capillary column). The purpose of the material in the column is to separate the different components being analyzed.

% Relative standard deviation (RSD)

Relative standard deviation is widely used in analytical chemistry to express the precision and repeatability of an assay:

- $\%RSD = (STD\ DEV) / (MEAN) \times 100$
- STD DEV = Standard deviation

Retention time (RT)

The retention time of a component is the elapsed time between the time of injection of a component and the time of elution of the peak maximum (highest point) of that component. Compounds can be identified based upon their retention time.

NOTE: Chromatograms are typical and may not show all components that can be measured by that train. Auto gating is used on some applications. Gate on and off times may be the same for multiple, sequential components.

Inject and backflush mode

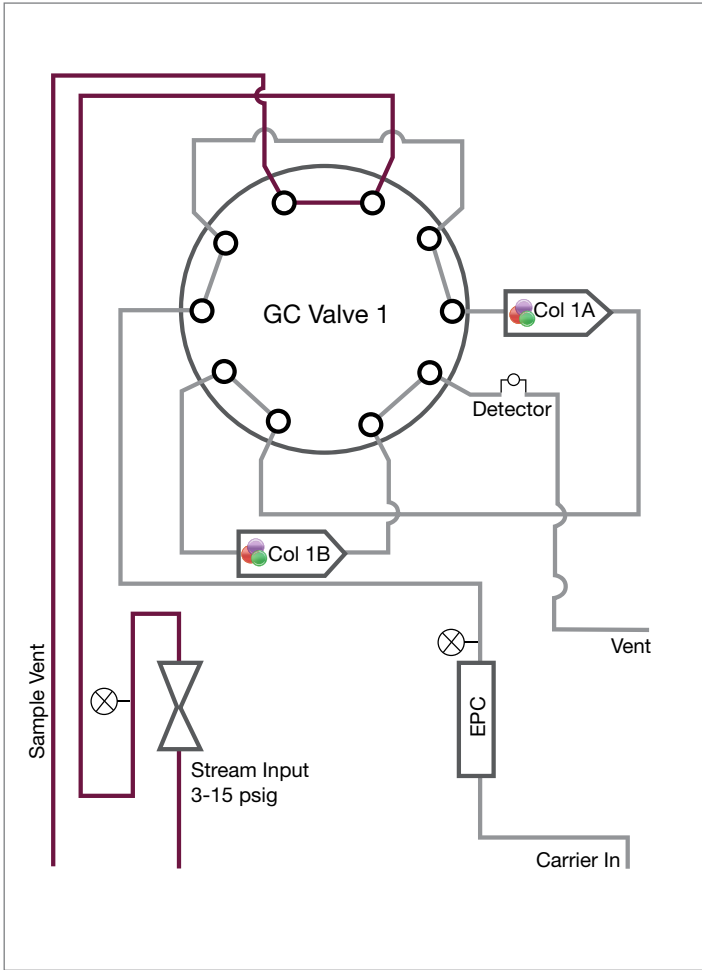


Inject mode

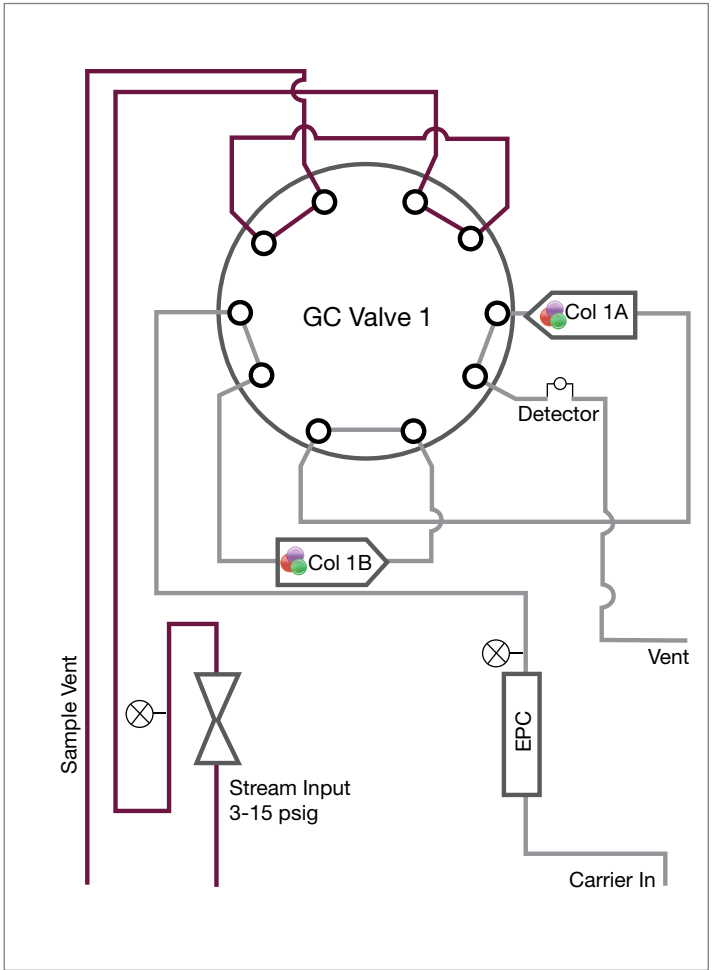
Inject mode refers to the path of the carrier gas when its direction changes to include the sample loop. The sample is “picked up” or carried by the carrier gas and “injected” into the front of column A and carried onto column B. See Figure 1 on the next page.

Backflush mode

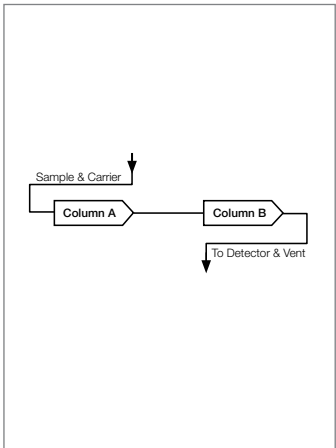
Backflush mode refers to the carrier gas changing paths so it now enters at the front of column B and backflushes the gasses in column A to the detector and vent. See Figure 2 on the next page.



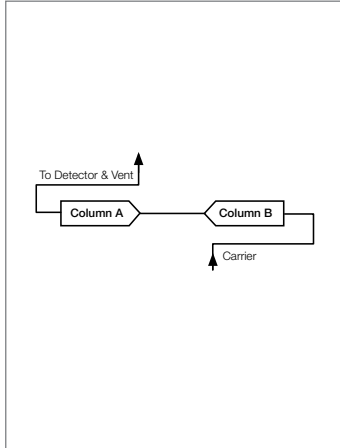
(Fig. 1) In-depth illustration of inject mode



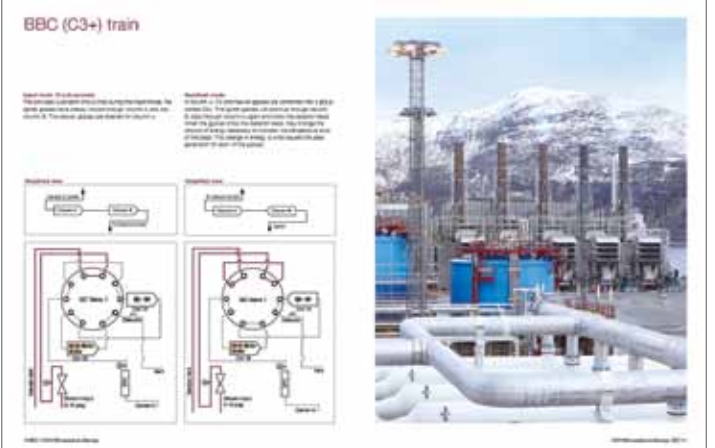
(Fig. 2) In-depth illustration of backflush mode



(Fig. 3) Simplified illustration of inject mode



(Fig. 4) Simplified illustration of backflush mode



(Fig. 5) Sample page layout for inject and backflush mode

BBC train (†helium carrier)



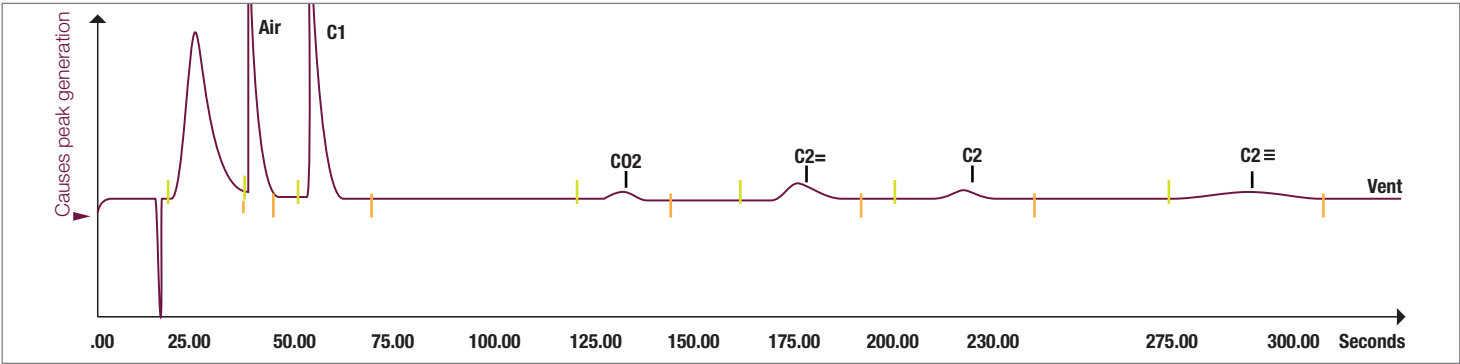
Typical settings (individual analyzers may vary)			
Cycle time	330 seconds	Inject time variance	± 10%
Sort order	1	Carrier pressure	20 psig
Sample size	40 ul	Carrier pressure variance	± 15%
Target component	C2	Flow rate	6.4 ml/min
Target retention time	290 seconds	Flow rate variance	± 15%
Inject time	15 seconds	Oven temperature	60° C
Hydrogen sulfide (H2S) must be less than 0.05%. When used in conjunction with BBF, the Btu repeatability is ± 0.125 Btu.			

Component number	Separated component	Range (mol%)		%RSD	Minimum detectable limit (mol%)	Gate on	Peak retention time	Gate off	Slope (run)	Slope (rise)	Minimum peak area	Front height ratio	Peak detection method	Peak direction	Baseline segment start	Baseline segment end
		Minimum	Maximum													
1	Propane plus	0.05	100	1	0.001	16.5	21.8	31.6	5	3	3000	0.75	Auto	Positive	0	0
2	Hydrogen	0.5	10	1	0.05	33	35.2	37.6	5	3	250	0.75	Auto	Positive	0	0
3	Nitrogen	0.05	100	1	0.01	37.6	40.3	48.9	5	3	3000	0.75	Auto	Positive	0	0
4	Methane	0.05	100	1	0.01	49.6	51.1	55	5	3	3000	0.75	Auto	Positive	0	0
5	Carbon dioxide	0.1	100	1	0.02	121.4	131.5	143.5	10	1	3000	0.75	Auto	Positive	0	0
6	Ethylene	0.1	100	1	0.02	166.6	178.5	192.2	10	1	3000	0.75	Auto	Positive	0	0
7	Ethane	0.1	100	1	0.02	207.5	221.6	238.9	10	1	3000	0.75	Auto	Positive	0	0
8	Acetylene	0.2	100	2	0.03	272	290.2	309	10	1	3000	0.75	Auto	Positive	0	0

Interfering component	Symbol	Max. tolerance	Notes
Water	H2O	0.005	Elutes with C3+

†Hydrogen carrier gas cannot be used in a PGC1000 built for helium.
NOTE: Colored text within a table represents a difference between the carriers.

BBC train (hydrogen carrier)



NOTE: Sample chromatogram is reflective of the hydrogen carrier.

Typical settings (individual analyzers may vary)			
Cycle time	300 seconds	Inject time variance	± 10%
Sort order	1	Carrier pressure	11 psig
Sample size	40 ul	Carrier pressure variance	± 15%
Target component	C2	Flow rate	6.6 ml/min
Target retention time	230 seconds	Flow rate variance	± 15%
Inject time	15 seconds	Oven temperature	60° C

Hydrogen sulfide (H2S) must be less than 0.05%. When used in conjunction with BBF, the Btu repeatability is ± 0.125 Btu.

Component number	Separated component	Range (mol%)		%RSD	Minimum detectable limit (mol%)	Gate on	Peak retention time	Gate off	Slope (run)	Slope (rise)	Minimum peak area	Front height ratio	Peak detection method	Peak direction	Baseline segment start	Baseline segment end
		Minimum	Maximum													
1	Propane plus	0.05	100	1	0.001	16.5	22.3	29.5	5	3	3000	0.75	Auto	Positive	0	0
2	Helium	0.5	10	1	0.05	29.5	31	33	5	3	250	0.75	Auto	Positive	0	0
3	Nitrogen	0.05	100	1	0.01	32.7	35.6	41.4	5	3	3000	0.75	Auto	Positive	0	0
4	Methane	0.05	100	1	0.01	41.4	44.3	60	5	3	3000	0.75	Auto	Positive	0	0
5	Carbon dioxide	0.1	100	1	0.02	98.4	107	117.5	10	1	3000	0.75	Auto	Positive	0	0
6	Ethylene	0.1	100	1	0.02	133.2	143.7	156	10	1	3000	0.75	Auto	Positive	0	0
7	Ethane	0.1	100	1	0.02	164.6	176.9	191.5	10	1	3000	0.75	Auto	Positive	0	0
8	Acetylene	0.2	100	2	0.03	214.2	230.1	248.8	10	1	3000	0.75	Auto	Positive	0	0

Interfering component	Symbol	Max. tolerance	Notes
Water	H2O	0.005	Elutes with C3+

BBC (C3+) train

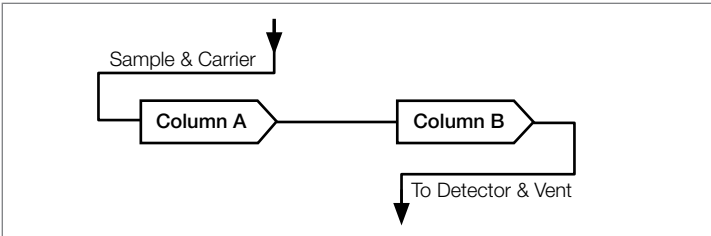
Inject mode 15 (±2) seconds

The provided illustration shows that during the inject mode, the lighter gasses have already moved through column A and into column B. The heavier gasses are retained on column A.

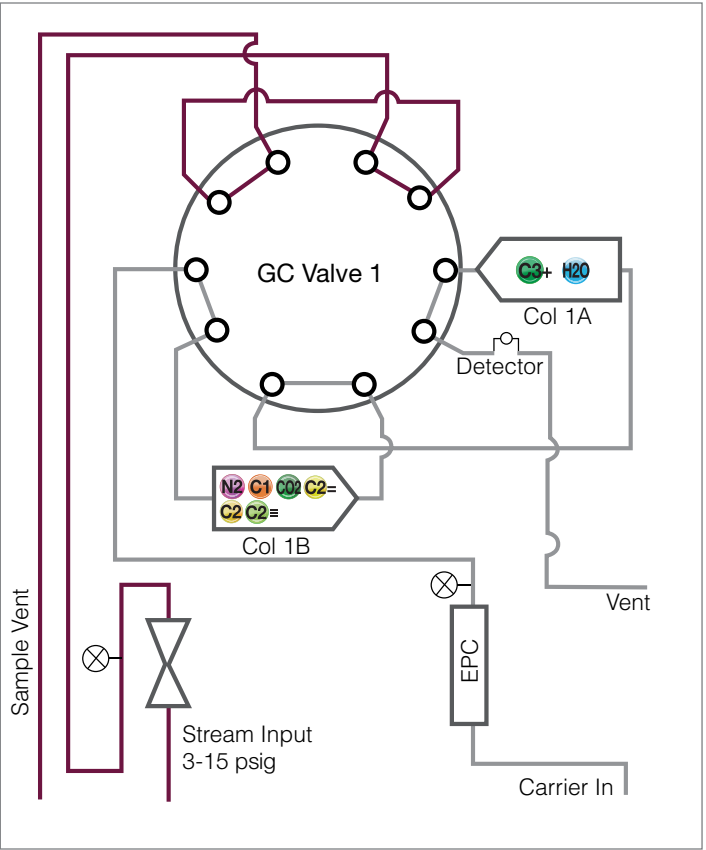
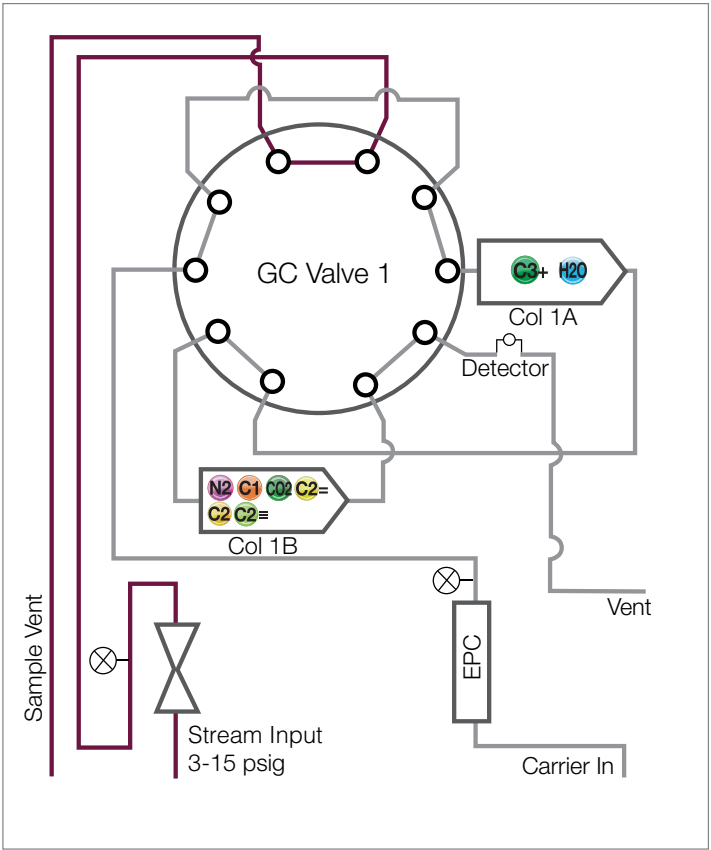
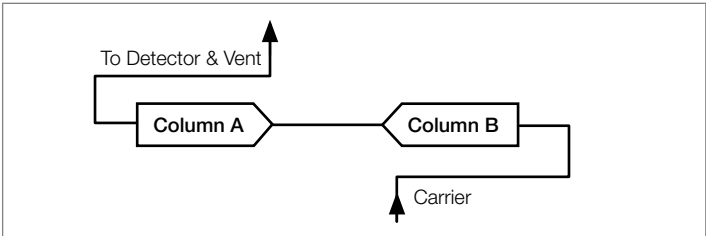
Backflush mode

In column A, C3 and heavier gasses are combined into a group named C3+. The lighter gasses will continue through column B, pass through column A again and cross the detector bead. When the gasses cross the detector bead, they change the amount of energy necessary to maintain the temperature level of the bead. This change in energy is what causes the peak generation for each of the gasses.

Simplified view



Simplified view





BBF train (†helium carrier)



Typical settings (individual analyzers may vary)

Cycle time	315 seconds	Inject time variance	± 10%
Sort order	81	Carrier pressure	16.5 psig
Sample size	40 ul	Carrier pressure variance	± 15%
Target component	C2	Flow rate	4.0 ml/min
Target retention time	220 seconds	Flow rate variance	± 15%
Inject time	15 seconds	Oven temperature	60° C

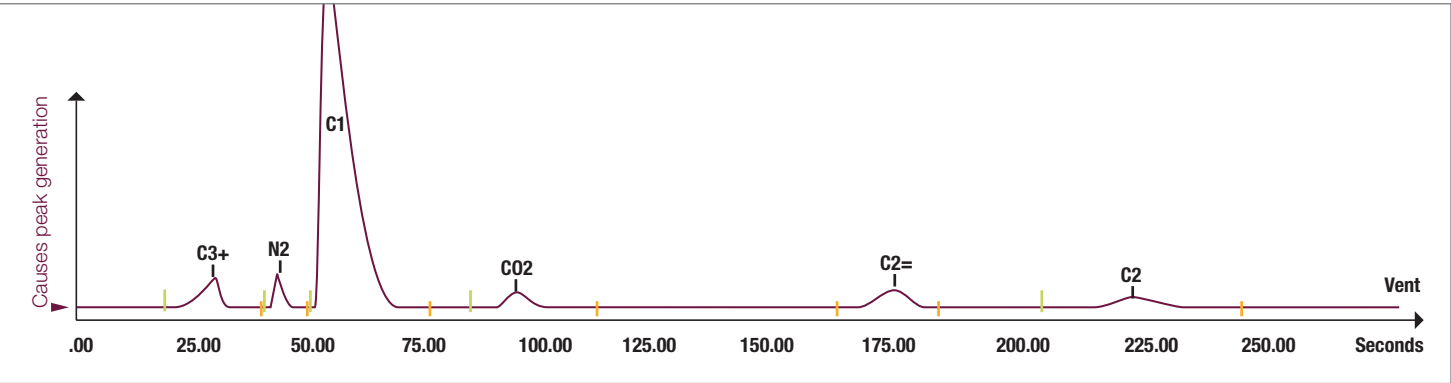
When used in conjunction with BBK, the combination is capable of providing the following calculated performance: ± 0.125 Btu repeatability with a C6+ analysis.

Component number	Separated component	Range (mol%)		%RSD	Minimum detectable limit (mol%)	Gate on	Peak retention time	Gate off	Slope (run)	Slope (rise)	Minimum peak area	Front height ratio	Peak detection method	Peak direction	Baseline segment start	Baseline segment end
		Minimum	Maximum													
1	Propane plus	0.01	100	1	0.005	18	26	36	5	3	3000	0.75	Grouped	Positive	0	0
2	Nitrogen	0.01	100	1	0.005	32	38	46	5	3	3000	0.75	Auto	Positive	0	0
3	Methane	0.01	100	1	0.005	43	48	75	5	3	3000	0.75	Auto	Positive	0	0
4	Carbon dioxide	0.01	100	1	0.005	75	90	110	5	3	3000	0.75	Auto	Positive	0	0
5	Ethylene	0.01	100	1	0.005	178	184	190.4	15	3	3000	0.75	Auto	Positive	0	0
6	Ethane	0.01	50	1	0.005	195	220	270	15	3	3000	0.75	Auto	Positive	0	0

Interfering component	Symbol	Max. tolerance	Notes
Water	H2O	5	Elutes after C2, RT about 275
Acetylene	C2*	0.01	Co-elutes with ethylene

†Hydrogen carrier gas cannot be used in a PGC1000 built for helium.
NOTE: Colored text within a table represents a difference between the carriers.

BBF train (hydrogen carrier)



Typical settings (individual analyzers may vary)

Cycle time	315 seconds	Inject time variance	± 10%
Sort order	81	Carrier pressure	16.5 psig
Sample size	40 ul	Carrier pressure variance	± 15%
Target component	C2	Flow rate	4.0 ml/min
Target retention time	220 seconds	Flow rate variance	± 15%
Inject time	15 seconds	Oven temperature	60° C

When used in conjunction with BBK, the combination is capable of providing the following calculated performance: ± 0.125 Btu repeatability with a C6+ analysis at room temperature. For temperatures from -18 to 55 degrees Celsius, the ± Btu performance value doubles.

Component number	Separated component	Range (mol%)		%RSD	Minimum detectable limit (mol%)	Gate on	Peak retention time	Gate off	Slope (run)	Slope (rise)	Minimum peak area	Front height ratio	Peak detection method	Peak direction	Baseline segment start	Baseline segment end
		Minimum	Maximum													
1	Propane plus	0.01	100	1	0.005	18	26	36	5	3	3000	0.75	Grouped	Positive	0	0
2	Nitrogen	0.01	100	1	0.005	32	38	46	5	3	3000	0.75	Auto	Positive	0	0
3	Methane	0.01	100	1	0.005	43	48	75	5	3	3000	0.75	Auto	Positive	0	0
4	Carbon dioxide	0.01	100	1	0.005	75	90	110	5	3	3000	0.75	Auto	Positive	0	0
5	Ethylene	0.01	100	1	0.005	178	184	190.4	15	3	3000	0.75	Auto	Positive	0	0
6	Ethane	0.01	50	1	0.005	195	220	270	15	3	3000	0.75	Auto	Positive	0	0

Interfering component	Symbol	Max. tolerance	Notes
Water	H2O	0.01	Elutes after C2
Acetylene	C2*	0.01	Co-elutes with C2=

BBF (C3+) train

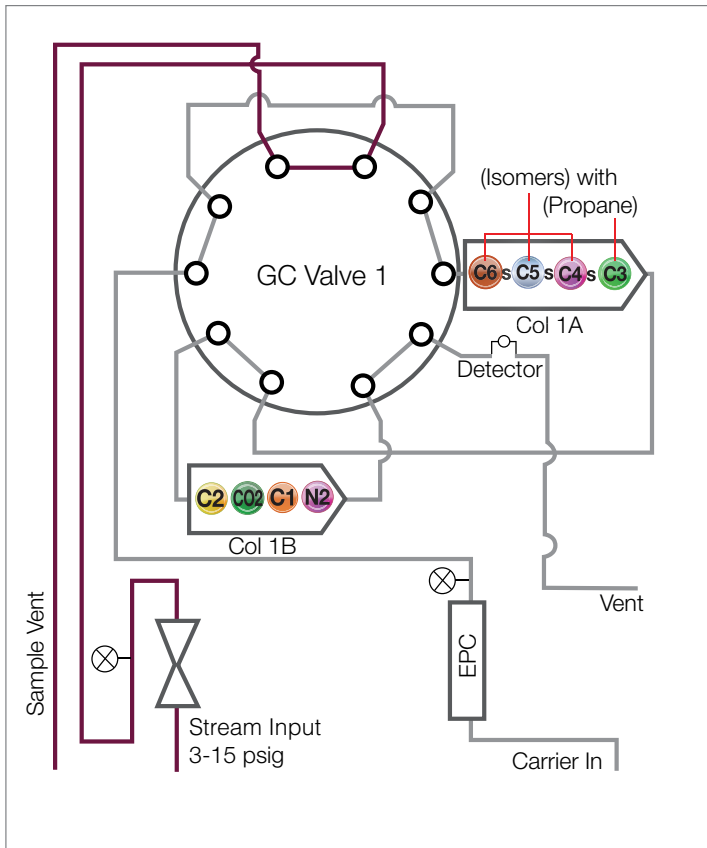
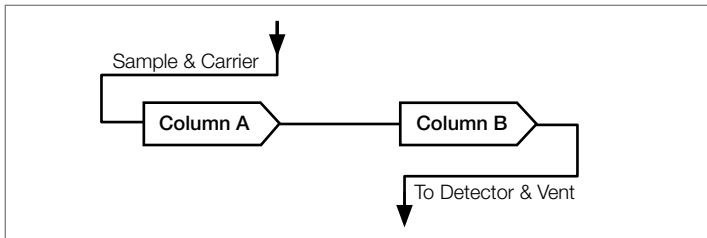
Inject mode 15 (±2) seconds

The illustration displays clouds of gas that represent isomers for hexane, pentane, butane and propane moving through column A. The lighter gasses have already passed through column A and are now moving through column B.

The user should note that if the inject period is too long, the propane will be injected into column B. Once there, it will then elute during a later cycle and return a faulty value.

The factory sets the optimal inject time and pressure. This is performed so that the propane does not get into column B.

Simplified view

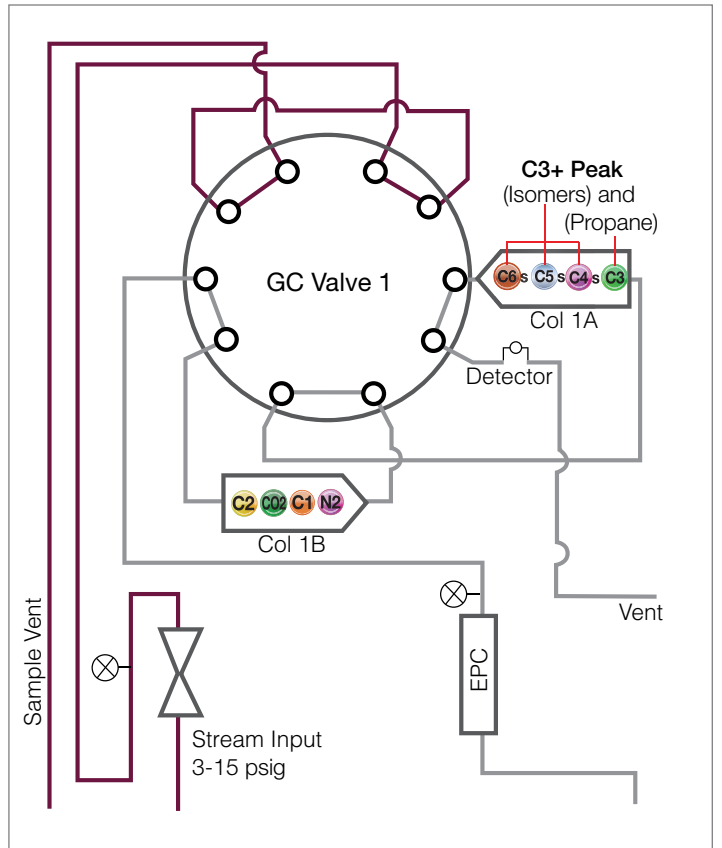
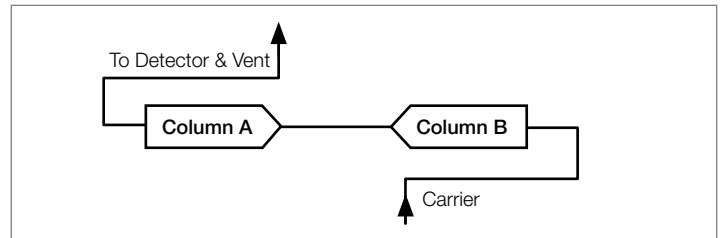


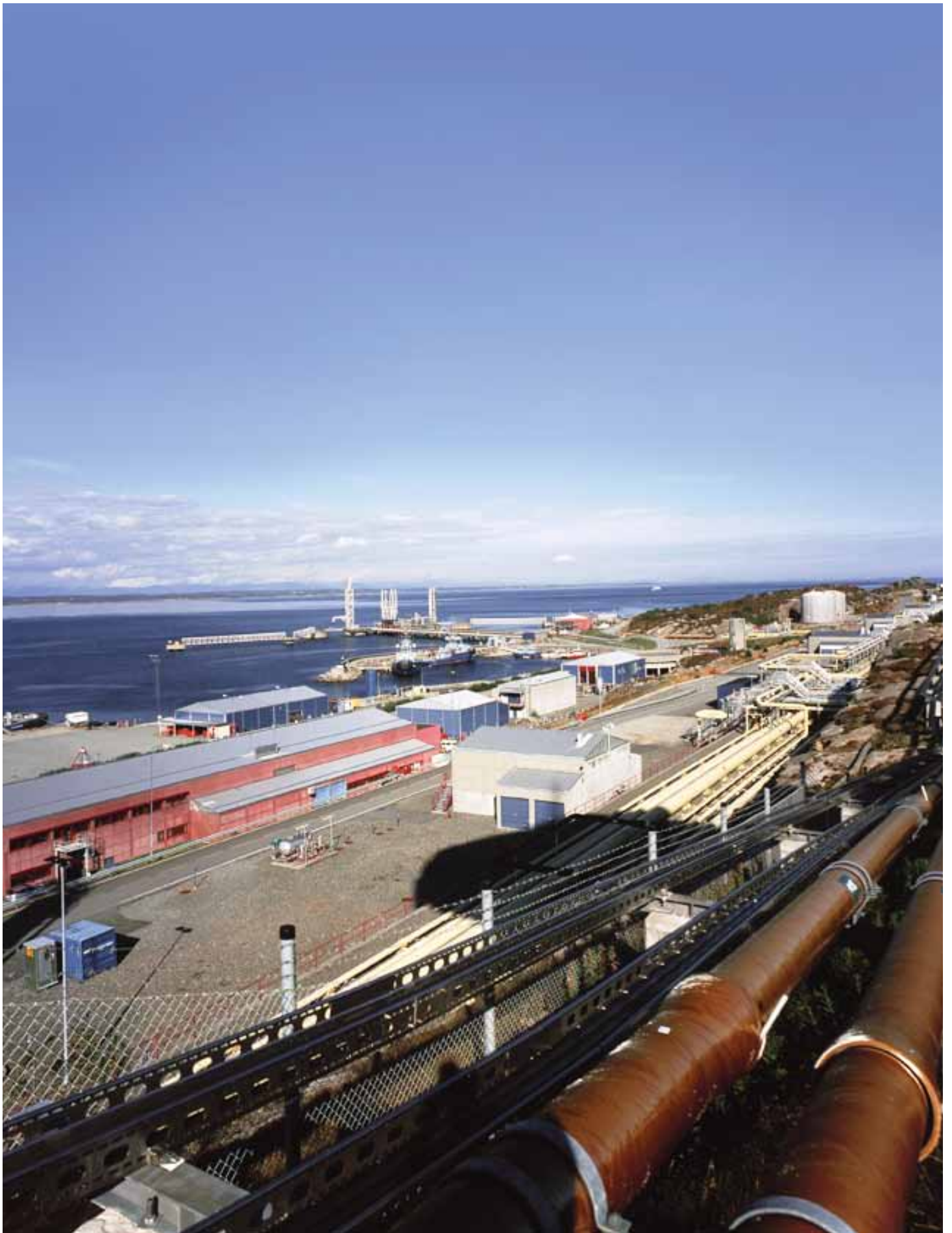
Backflush mode

In column A, the isomers and C3 merge into one peak. This peak is then labeled C3+. The (+) represents heavier gasses such as C4s, C5s and C6s. These heavier gasses may be in the cal or stream gas.

During backflush, the gasses elute off the column and cross the bead. When this occurs, each gas changes the amount of energy required to maintain the temperature level of the detector bead. This change in energy is what causes the peak generation for each of the gasses.

Simplified view





BBG train (†helium carrier)



Typical settings (individual analyzers may vary)

Cycle time	360 seconds	Inject time variance	± 10%
Sort order	82	Carrier pressure	15 psig
Sample size	40 ul	Carrier pressure variance	± 15%
Target component	C2	Flow rate	8 ml/min
Target retention time	220 seconds	Flow rate variance	± 15%
Inject time	15 seconds	Oven temperature	60° C

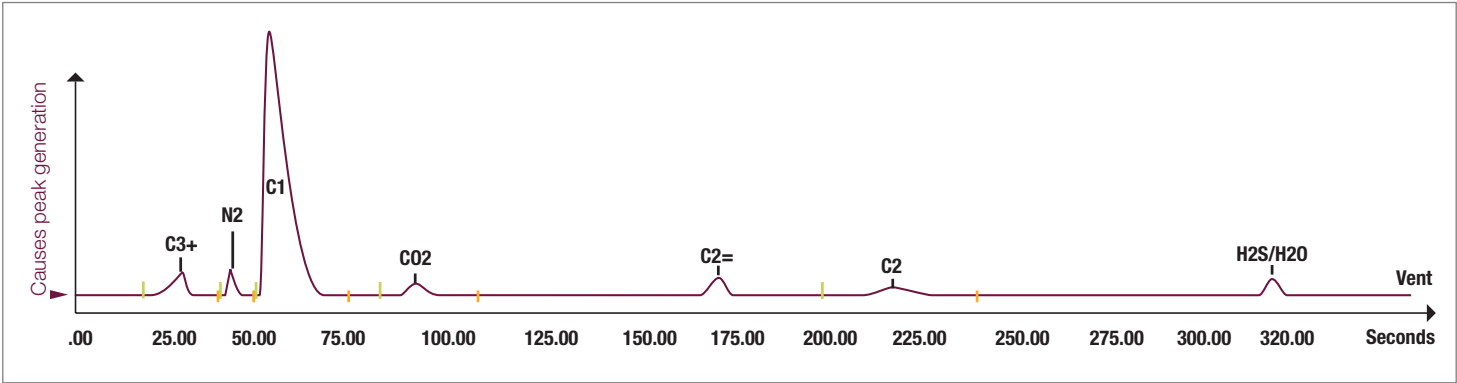
NOTE: H2O and H2S elute together.

Component number	Separated component	Range (mol%)		%RSD	Minimum detectable limit (mol%)	Gate on	Peak retention time	Gate off	Slope (run)	Slope (rise)	Minimum peak area	Front height ratio	Peak detection method	Peak direction	Baseline segment start	Baseline segment end
		Minimum	Maximum													
1	Propane plus	0.1	100	1	0.01	17.8	29	38.8	30	3	3000	0.75	Auto	Positive	0	0
2	Nitrogen	0.1	100	1	0.01	38.8	41.7	47.8	5	3	3000	0.75	Auto	Positive	0	0
3	Methane	0.1	100	1	0.01	49.2	51.8	74.6	100	3	3000	0.75	Auto	Positive	0	0
4	Carbon dioxide	0.2	100	1	0.01	83.6	91.4	103.8	100	3	3000	0.75	Auto	Positive	0	0
5	Ethylene	0.2	100	1	0.01	178	184	190.4	100	3	3000	0.75	Auto	Positive	0	0
6	Ethane	0.2	100	1	0.01	201.4	218.7	241.4	100	3	3000	0.75	Auto	Positive	0	0
7	Hydrogen sulfide	0.3	0.12	2	0.05	250	320	340	15	3	3000	0.75	Auto	Positive	0	0
8	Water	0.4	5	2	0.1	250	320	340	15	3	3000	0.75	Auto	Positive	0	0

Interfering component	Symbol	Max. tolerance	Notes
Acetylene	C2*	0.01	Elutes with C2=

†Hydrogen carrier gas cannot be used in a PGC1000 built for helium.
NOTE: Colored text within a table represents a difference between the carriers.

BBG train (hydrogen carrier)



Typical settings (individual analyzers may vary)

Cycle time	360 seconds	Inject time variance	± 10%
Sort order	82	Carrier pressure	15 psig
Sample size	40 ul	Carrier pressure variance	± 15%
Target component	C2	Flow rate	8 ml/min
Target retention time	220 seconds	Flow rate variance	± 15%
Inject time	15 seconds	Oven temperature	60° C

NOTE: H2O and H2S elute together.

Component number	Separated component	Range (mol%)		%RSD	Minimum detectable limit (mol%)	Gate on	Peak retention time	Gate off	Slope (run)	Slope (rise)	Minimum peak area	Front height ratio	Peak detection method	Peak direction	Baseline segment start	Baseline segment end
		Minimum	Maximum													
1	Propane plus	0.1	100	1	0.01	21	28.3	32	5	3	3000	0.75	Auto	Positive	0	0
2	Nitrogen	0.1	100	1	0.01	32	47.2	48	5	3	3000	0.75	Auto	Positive	0	0
3	Methane	0.1	100	1	0.01	48	57.2	95	5	3	3000	0.75	Auto	Positive	0	0
4	Carbon dioxide	0.2	100	1	0.01	95	97.6	340	5	3	3000	0.75	Auto	Positive	0	0
5	Ethylene	0.2	100	1	0.01	95	180	340	15	3	3000	0.75	Auto	Positive	0	0
6	Ethane	0.2	100	1	0.01	95	220	340	15	3	3000	0.75	Auto	Positive	0	0
7	Hydrogen sulfide	0.3	0.12	1	0.05	95	315	340	15	3	3000	0.75	Auto	Positive	0	0
8	Water	0.4	100	1	0.1	95	315	340	15	3	3000	0.75	Auto	Positive	0	0

Interfering component	Symbol	Max. tolerance	Notes
Acetylene	C2*	0.01	Elutes with C2=

BBG train

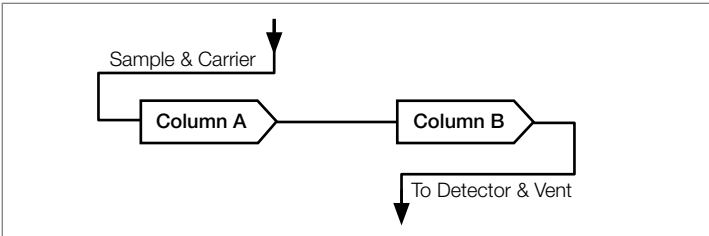
Inject mode 15 (±2) seconds

The provided illustration shows that during the inject mode, the lighter gasses have already moved through column A and into column B. The heavier gasses are retained on column A.

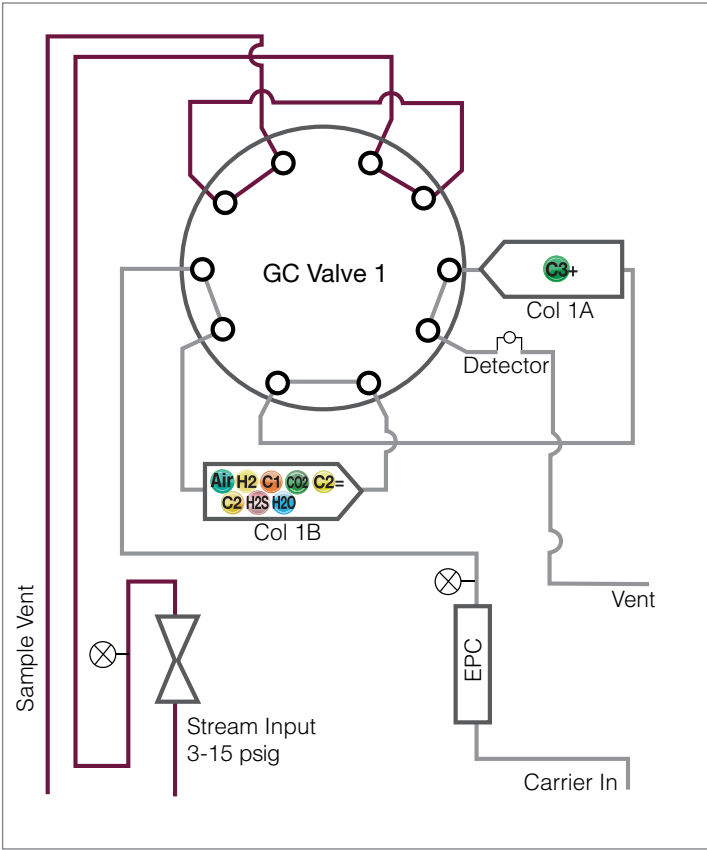
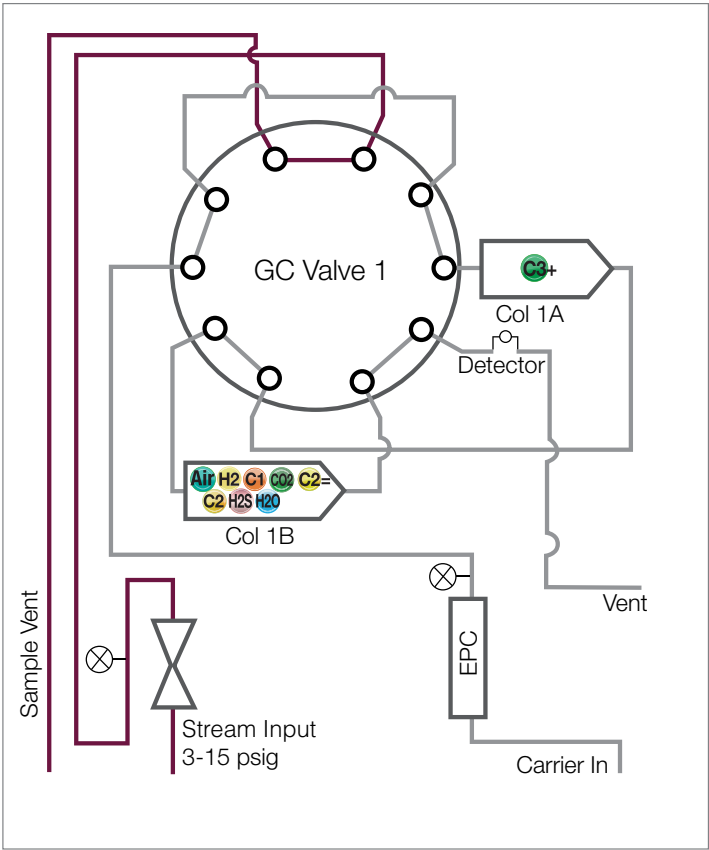
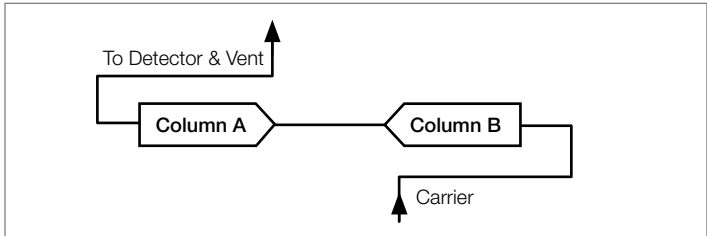
Backflush mode

In column A, C3 and heavier gasses are combined into a group named C3+. The lighter gasses will continue through column B, pass through column A again and cross the detector bead. When the gasses cross the detector bead, they change the amount of energy necessary to maintain the temperature level of the bead. This change in energy is what causes the peak generation for each of the gasses.

Simplified view



Simplified view





BBH “lights” train (†helium carrier)



Typical settings (individual analyzers may vary)			
Cycle time	330 seconds	Inject time variance	± 10%
Sort order	290	Carrier pressure	48 psig
Sample size	20 ul	Carrier pressure variance	± 15%
Target component	CO	Flow rate	7.5 ml/min
Target retention time	265 seconds	Flow rate variance	± 15%
Inject time	15 seconds	Oven temperature	60° C

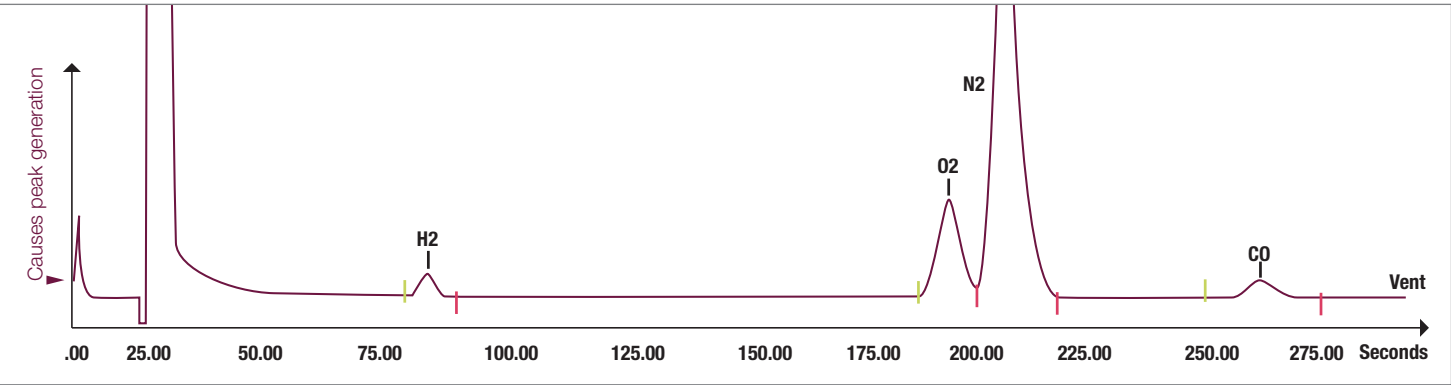
NOTE: This train can tolerate CO₂, H₂O and hydrocarbons heavier than C₁. When used in conjunction with BCB, the combination is capable of providing the following calculated performance: ± 0.25 Btu with a C₃+ analysis. Alternately, if used in combination with BBK-BBF, a C₆+ analysis with an O₂ split can be performed and provides Btu repeatability of ± 0.25 Btu.

Component number	Separated component	Range (mol%)		%RSD	Minimum detectable limit (mol%)	Gate on	Peak retention time	Gate off	Slope (run)	Slope (rise)	Minimum peak area	Front height ratio	Peak detection method	Peak direction	Baseline segment start	Baseline segment end
		Minimum	Maximum													
1	Methane plus	0.4	100	2	0.1	16	20	55	15	3	3000	0.75	Auto	Positive	0	0
2	Hydrogen	0.5	20	1	0.2	65	79.2	95	30	3	3000	0.75	Auto	Positive	0	0
3	Oxygen	0.2	20	1	0.01	175	201.9	202	60	3	3000	0.75	Auto	Positive	0	0
4	Nitrogen	0.1	100	1	0.01	197	213.2	230	60	3	3000	0.75	Auto	Positive	0	0
5	Carbon monoxide	0.2	100	2	0.02	240	277	285	100	3	3000	0.75	Auto	Positive	0	0

Interfering component	Symbol	Max. tolerance	Notes
Water	H ₂ O	0.02	Included in C ₁ +

†Hydrogen carrier gas cannot be used in a PGC1000 built for helium.
NOTE: Colored text within a table represents a difference between the carriers.

BBH “lights” train (hydrogen carrier)



Typical settings (individual analyzers may vary)

Cycle time	240 seconds	Inject time variance	± 10%
Sort order	290	Carrier pressure	48 psig
Sample size	20 ul	Carrier pressure variance	± 15%
Target component	CO	Flow rate	7.5 ml/min
Target retention time	265 seconds	Flow rate variance	± 15%
Inject time	15 seconds	Oven temperature	60° C

NOTE: This train can tolerate CO₂, H₂O and hydrocarbons heavier than C₁. When used in conjunction with BCB, the combination is capable of providing the following calculated performance: ± 0.25 Btu with a C₃+ analysis at room temperature. Alternately, if used in combination with BBK-BBF, a C₆+ analysis with an O₂ split can be performed and provides Btu repeatability of ± 0.25 Btu at room temperature. For temperatures from -18 to 55 degrees Celsius, the ± Btu performance value doubles.

Component number	Separated component	Range (mol%)		%RSD	Minimum detectable limit (mol%)	Gate on	Peak retention time	Gate off	Slope (run)	Slope (rise)	Minimum peak area	Front height ratio	Peak detection method	Peak direction	Baseline segment start	Baseline segment end
		Minimum	Maximum													
1	Methane plus	0.4	100	2	0.1	16	20	55	15	3	3000	0.75	Auto	Positive	0	0
2	Helium	0.5	20	1	0.2	65	79.2	95	30	3	3000	0.75	Auto	Positive	0	0
3	Oxygen	0.1	20	1	0.01	175	201.9	202	60	3	3000	0.75	Auto	Positive	0	0
4	Nitrogen	0.1	100	1	0.01	197	213.2	230	60	3	3000	0.75	Auto	Positive	0	0
5	Carbon monoxide	0.1	100	2	0.02	240	277	285	100	3	3000	0.75	Auto	Positive	0	0

Interfering component	Symbol	Max. tolerance	Notes
Water	H ₂ O	0.02	Included in C ₁ +

BBH (H2-CO) train

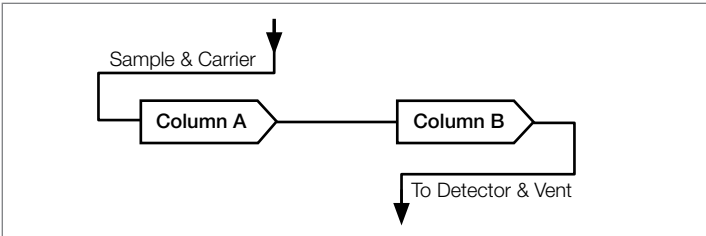
Inject mode 15 (±2) seconds

This illustration shows clouds of gas moving through column A. The lighter gasses have already passed through column A and are now moving through column B. The user should note that if the injection period is too long, the methane will pass into column B. Once there, the methane will elute during a later cycle. The factory sets the optimal retention and injection times so none of the methane is carried into column B.

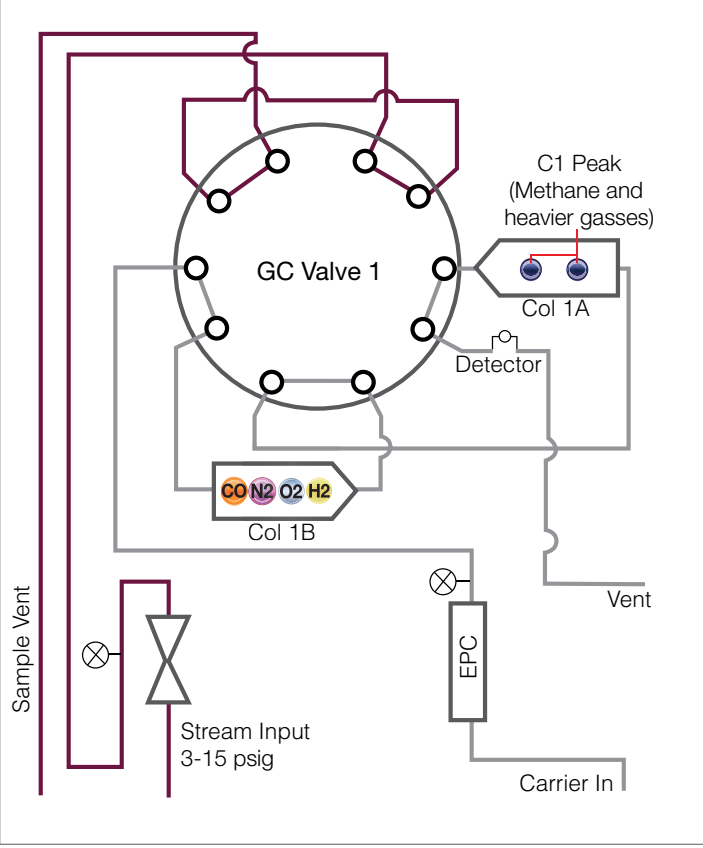
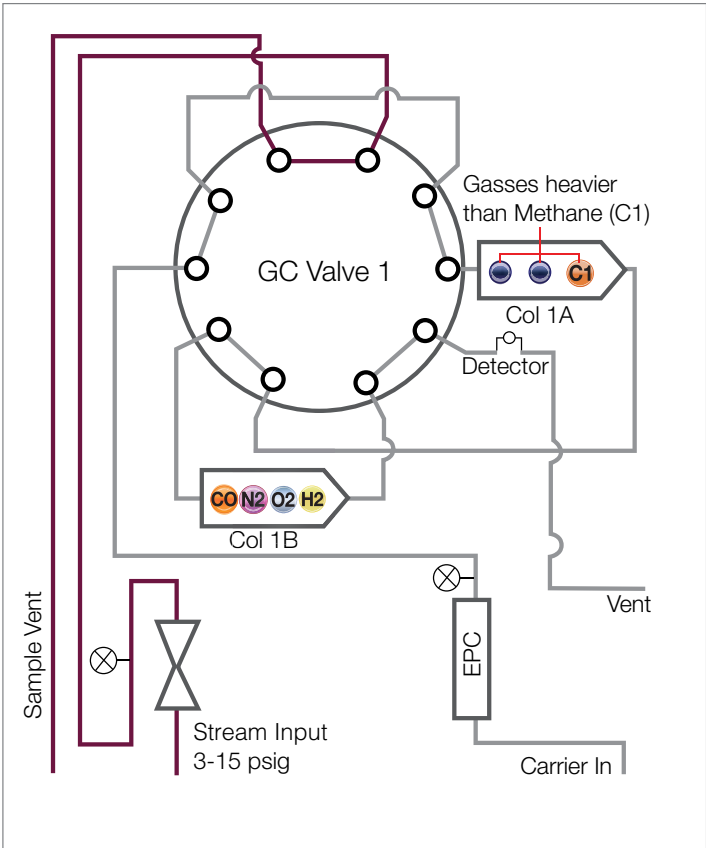
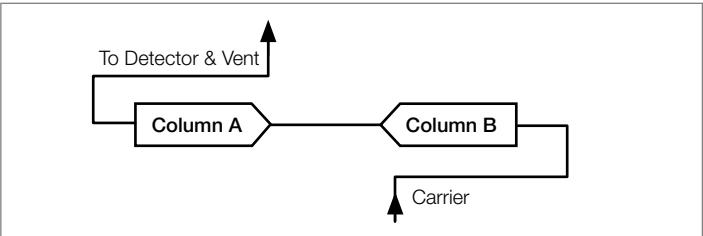
Backflush mode

In column A, C1 and any heavier gasses group back into one peak. The C1+ peak is not labeled in the BBH train. During backflush, the gasses come off the column and cross the detector bead. When this happens, each gas changes the amount of energy required to maintain the temperature level of the bead. This change in energy is what causes the peak generation for each of the gasses.

Simplified view



Simplified view





BBJ train (†helium carrier)

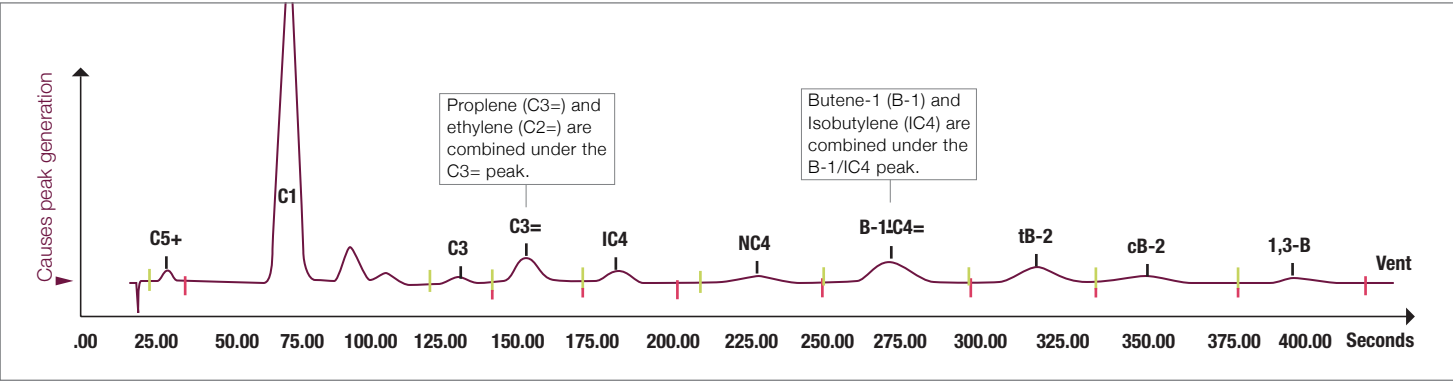


Typical settings (individual analyzers may vary)			
Cycle time	450 seconds	Inject time variance	± 10%
Sort order	61	Carrier pressure	12 psig
Sample size	40 ul	Carrier pressure variance	± 15%
Target component	1, 3-Bd	Flow rate	2.6 ml/min
Target retention time	400 seconds	Flow rate variance	± 15%
Inject time	15 seconds	Oven temperature	60° C
NOTE: Complete test shown. Propylene (C3=) and Acetylene (C2*) combined; Butene-1 (B-1) and Isobutylene (IC4=) combined.			

Component number	Separated component	Range (mol%)		%RSD	Minimum detectable limit (mol%)	Gate on	Peak retention time	Gate off	Slope (run)	Slope (rise)	Minimum peak area	Front height ratio	Peak detection method	Peak direction	Baseline segment start	Baseline segment end
		Minimum	Maximum													
1	Pentane plus	0.02	50	2	0.002	14	25	31	15	3	3000	0.75	Auto	Positive	0	0
2	Propane	0.1	100	1	0.001	111	123	137	15	3	3000	0.75	Auto	Positive	0	0
3	Propylene	0.1	100	1	0.001	131	145	204	30	3	3000	0.75	Auto	Positive	0	0
4	Isobutane	0.1	100	1	0.001	131	173	204	30	3	3000	0.75	Auto	Positive	0	0
5	Normal butane	0.1	100	1	0.001	188	223	244	60	3	3000	0.75	Auto	Positive	0	0
6	Butene-1 & Isobutylene	0.1	50	1	0.001	229	257	290	60	3	3000	0.75	Auto	Positive	0	0
7	Trans-Butene-2	0.1	50	1	0.001	280	303	330	100	3	3000	0.75	Auto	Positive	0	0
8	Cis-Butene-2	0.1	100	1	0.002	320	339	378	100	3	3000	0.75	Auto	Positive	0	0
9	1,3-Butadiene	0.2	100	2	0.001	363	397	434	100	3	3000	0.75	Auto	Positive	0	0
Interfering component													Symbol	Max. tolerance	Notes	
Water													H2O	0.02		

†Hydrogen carrier gas cannot be used in a PGC1000 built for helium.
NOTE: Colored text within a table represents a difference between the carriers.

BBJ train (hydrogen carrier)



Typical settings (individual analyzers may vary)

Cycle time	420 seconds	Inject time variance	± 10%
Sort order	61	Carrier pressure	12 psig
Sample size	40 ul	Carrier pressure variance	± 15%
Target component	1, 3-Bd	Flow rate	2.6 ml/min
Target retention time	400 seconds	Flow rate variance	± 15%
Inject time	15 seconds	Oven temperature	60° C

NOTE: Propylene (C3=) and Acetylene (C2*) combined; Butene-1 (B-1) and Isobutylene (IC4=) combined.

Component number	Separated component	Range (mol%)		%RSD	Minimum detectable limit (mol%)	Gate on	Peak retention time	Gate off	Slope (run)	Slope (rise)	Minimum peak area	Front height ratio	Peak detection method	Peak direction	Baseline segment start	Baseline segment end
		Minimum	Maximum													
1	Pentane plus	0.02	100	2	0.002	14	25	31	15	3	3000	0.75	Auto	Positive	0	0
2	Propane	0.1	100	1	0.001	111	123	137	15	3	3000	0.75	Auto	Positive	0	0
3	Propylene	0.1	100	1	0.001	131	145	204	30	3	3000	0.75	Auto	Positive	0	0
4	Isobutane	0.1	100	1	0.001	131	173	204	30	3	3000	0.75	Auto	Positive	0	0
5	Normal butane	0.1	100	1	0.001	188	223	244	60	3	3000	0.75	Auto	Positive	0	0
6	Butene-1 & Isobutylene	0.1	50	1	0.001	229	257	290	60	3	3000	0.75	Auto	Positive	0	0
7	Trans-Butene-2	0.1	50	1	0.001	280	303	330	100	3	3000	0.75	Auto	Positive	0	0
8	Cis-Butene-2	0.1	100	1	0.002	320	339	378	100	3	3000	0.75	Auto	Positive	0	0
9	1,3-Butadiene	0.2	100	2	0.002	363	397	434	100	3	3000	0.75	Auto	Positive	0	0

Interfering component	Symbol	Max. tolerance	Notes
Water	H2O	0.02	

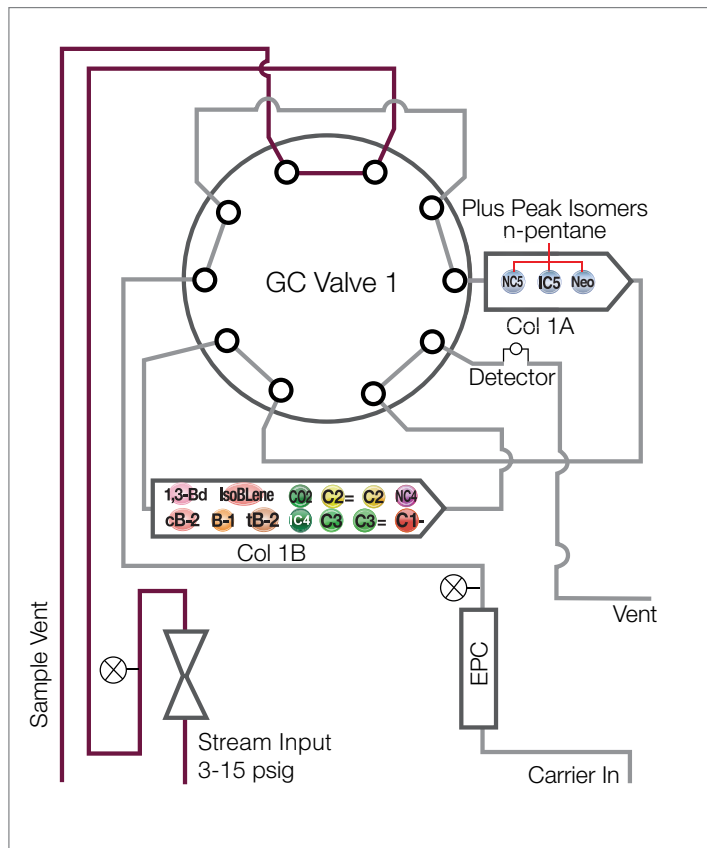
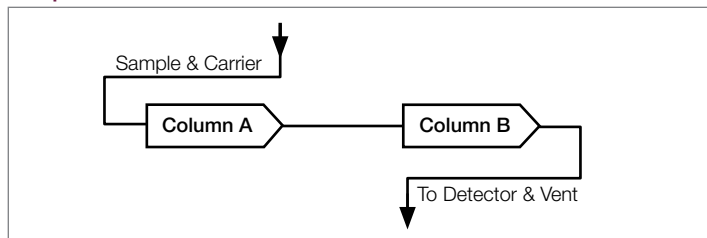
BBJ (C5+) train

Inject mode 15 (±2) seconds

The provided illustration displays the isomers of pentane moving through column A. The lighter gasses have already passed through column A and are now moving through column B. The user should note that if the injection period is too long, the NeoC5 will get into column B.

If injection time is too short, not all of 1,3-Bd will elute off column A. The factory sets the optimal retention and injection times for each train.

Simplified view

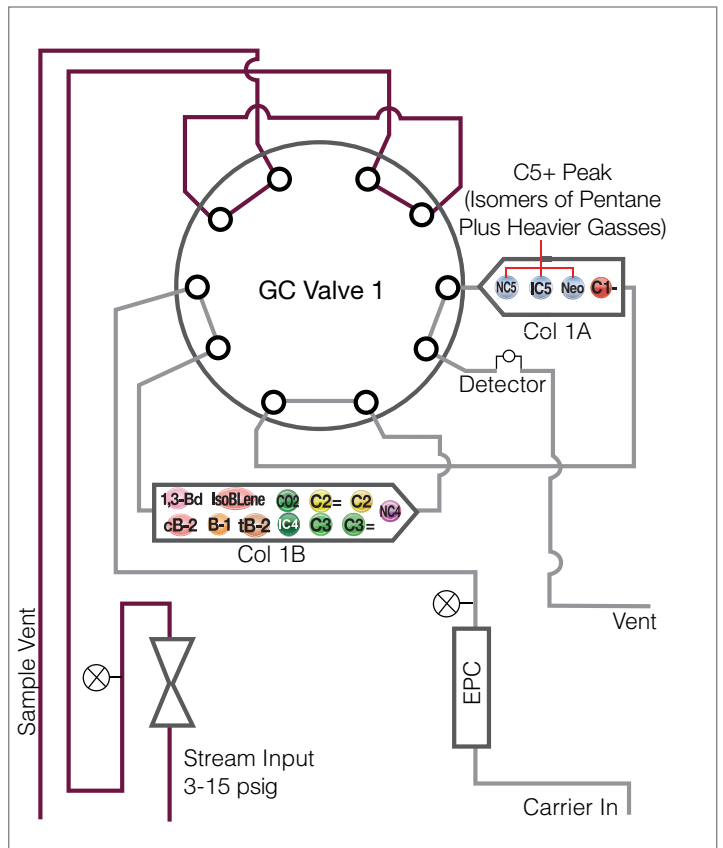
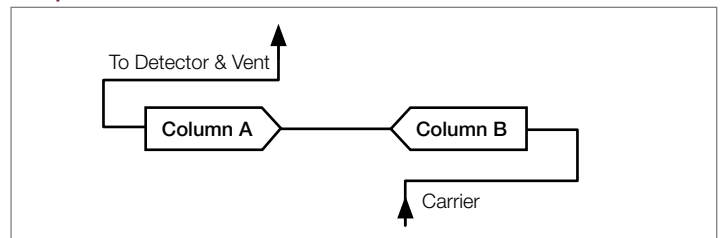


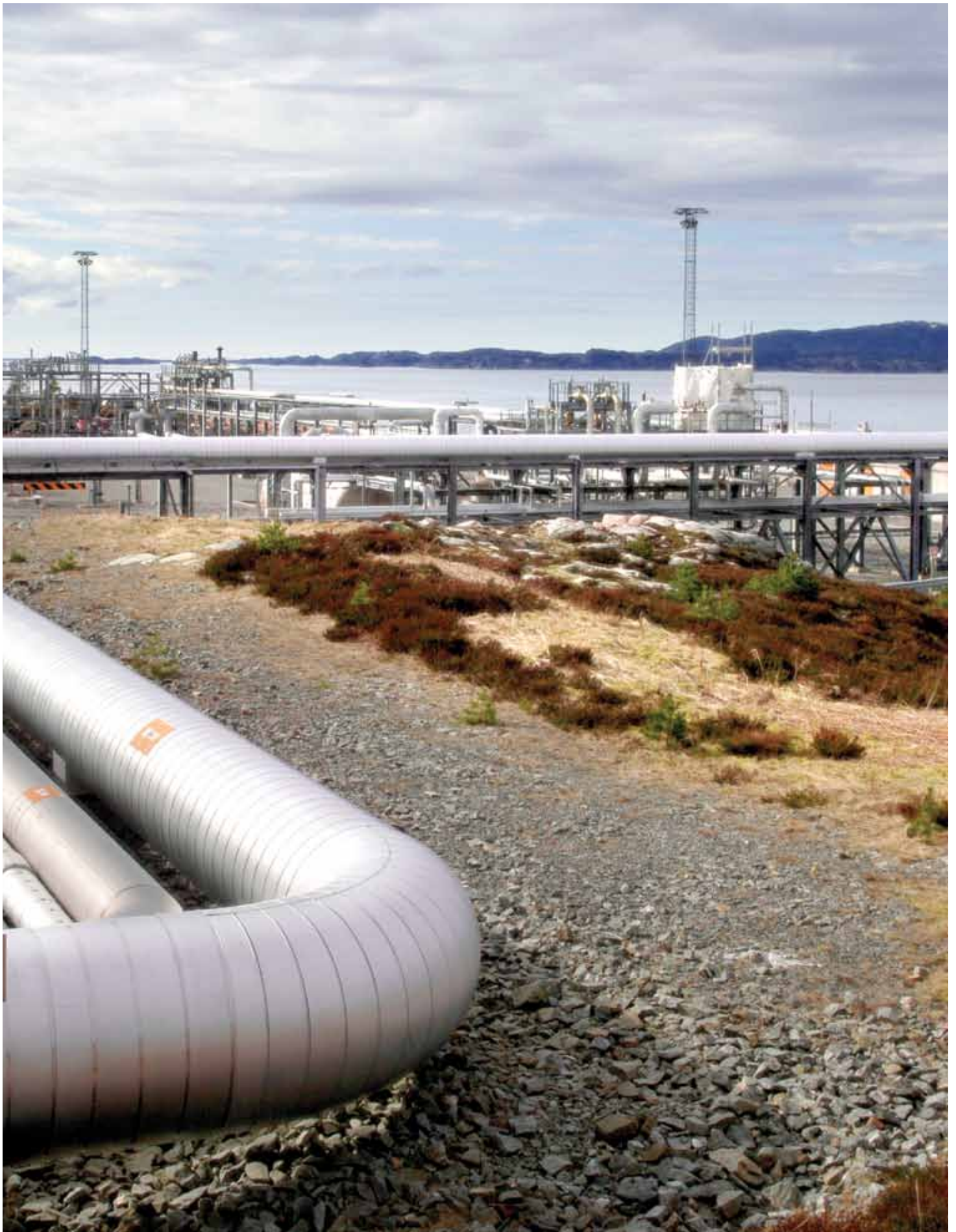
Backflush mode

In column A, the isomers of pentane group back into one peak. These are labeled C5+. The (+) represents heavier gasses such as C6s, C7s, C8s and C9s. These heavier gasses may be in the cal or stream gas.

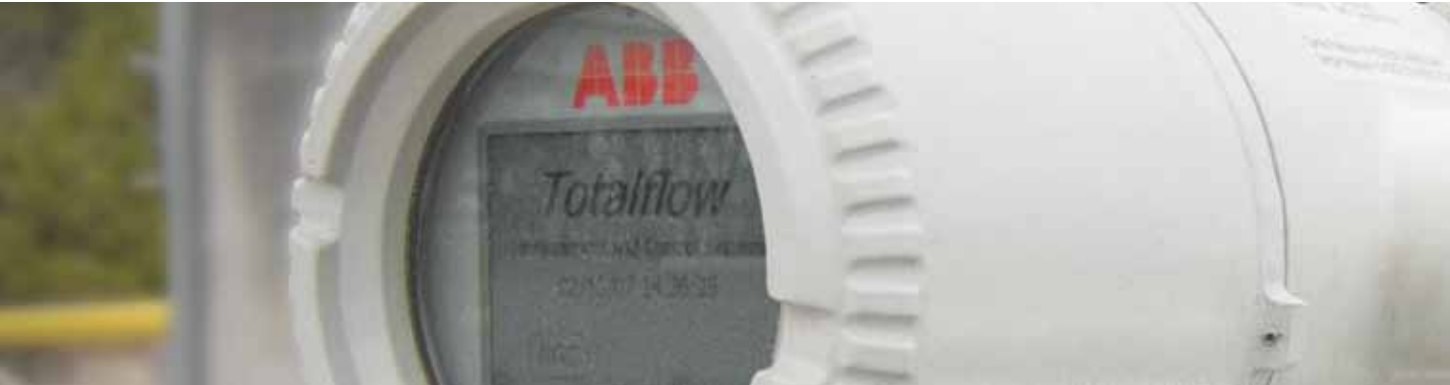
During backflush, the gasses come off the columns (elute) and cross the detector bead. When this takes place, each gas changes the amount of energy required to maintain the temperature level of the bead. This change in energy is what causes the peak generation for each of the gasses.

Simplified view





BBK train (†helium carrier)



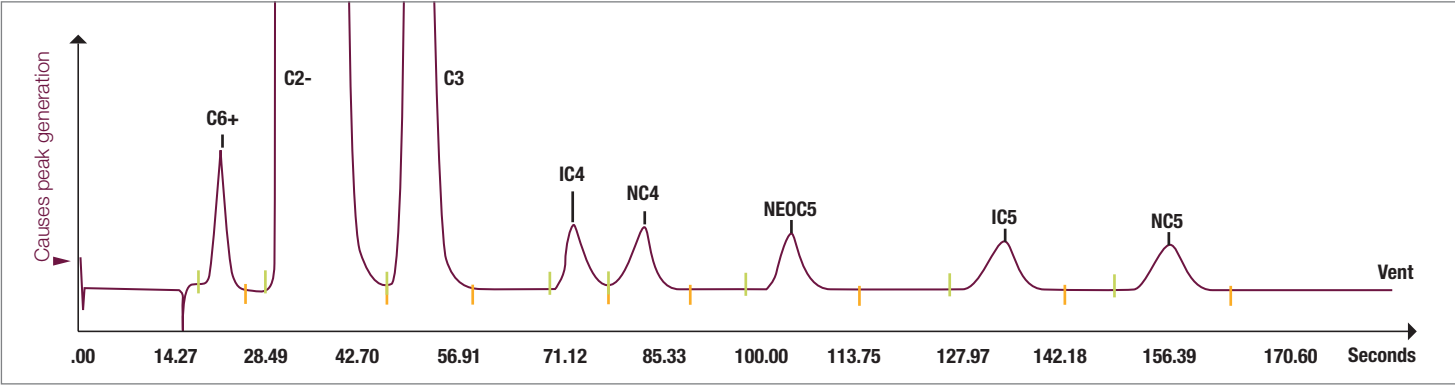
Typical settings (individual analyzers may vary)				
Cycle time	315 seconds		Inject time variance	± 10%
Sort order	21		Carrier pressure	35 psig
Sample size	40 ul		Carrier pressure variance	± 15%
Target component	NC5		Flow rate	6.0 ml/min
Target retention time	160 seconds		Flow rate variance	± 15%
Inject time	15 seconds		Oven temperature	60° C
NOTE: Hydrogen sulfide (H2S) must be less than 0.05%. When used in conjunction with BBF, the Btu repeatability is ± 0.125 Btu.				

Component number	Separated component	Range (mol%)		%RSD	Minimum detectable limit (mol%)	Gate on	Peak retention time	Gate off	Slope (run)	Slope (rise)	Minimum peak area	Front height ratio	Peak detection method	Peak direction	Baseline segment start	Baseline segment end
		Minimum	Maximum													
1	Hexane plus	0.005	5	1	0.001	18	22	26.5	15	10	3000	0.75	Auto	Positive	0	0
2	Propane	0.005	100	1	0.001	40	42	58	15	3	3000	0.75	Auto	Positive	0	0
3	Isobutane	0.005	15	1	0.001	56	63	71	30	3	3000	0.75	Auto	Positive	0	0
4	Normal butane	0.005	15	1	0.001	69	75	85	30	3	3000	0.75	Auto	Positive	0	0
5	Neopentane	0.005	10	1	0.001	85	95	115	60	3	3000	0.75	Auto	Positive	0	0
6	Isopentane	0.005	10	1	0.001	120	132	152	100	3	3000	0.75	Auto	Positive	0	0
7	Normal pentane	0.005	10	1	0.001	145	160	185	100	3	3000	0.75	Auto	Positive	0	0

Interfering component	Symbol	Max. tolerance	Notes	Interfering component	Symbol	Max. tolerance	Notes
Water	H2O	5	Elutes 1 minute behind NC5, RT about 270 seconds	Trans-Butene-2	tB-2	0.0025	Co-elutes with NC4
Propylene	C3=	0.005	Co-elutes with C3	Cis-Butene-2	cB-2	0.0025	Co-elutes with NC4
Butene-1	B-1	0.0025	Elutes between IC4 and NC4	1,3-Butadiene	1,3-BD	0.0025	Co-elutes with NC4
Isobutylene	IC4=	0.0025	Elutes between IC4 and NC4	Methanol	MeOH	10	Elutes behind NC5, RT about 180 seconds

†Hydrogen carrier gas cannot be used in a PGC1000 built for helium.

BBK train (hydrogen carrier)



Typical settings (individual analyzers may vary)

Cycle time	315 seconds	Inject time variance	± 10%
Sort order	21	Carrier pressure	35 psig
Sample size	40 ul	Carrier pressure variance	± 15%
Target component	NC5	Flow rate	6.0 ml/min
Target retention time	160 seconds	Flow rate variance	± 15%
Inject time	15 seconds	Oven temperature	60° C

NOTE: Hydrogen sulfide (H₂S) must be less than 0.05%. When used in conjunction with BBF, the Btu repeatability is ± 0.125 Btu at room temperature. For temperatures from -18 to 55 degrees Celsius, the ± Btu performance value doubles.

Component number	Separated component	Range (mol%)		%RSD	Minimum detectable limit (mol%)	Gate on	Peak retention time	Gate off	Slope (run)	Slope (rise)	Minimum peak area	Front height ratio	Peak detection method	Peak direction	Baseline segment start	Baseline segment end
		Minimum	Maximum													
1	Hexane plus	0.005	5	1	0.001	18	22	26.5	15	10	3000	0.75	Auto	Positive	0	0
2	Propane	0.005	100	1	0.001	40	42	58	15	3	3000	0.75	Auto	Positive	0	0
3	Isobutane	0.005	15	1	0.001	56	63	71	30	3	3000	0.75	Auto	Positive	0	0
4	Normal butane	0.005	15	1	0.001	69	75	85	30	3	3000	0.75	Auto	Positive	0	0
5	Neopentane	0.005	10	1	0.001	85	95	115	60	3	3000	0.75	Auto	Positive	0	0
6	Isopentane	0.005	10	1	0.001	120	132	152	100	3	3000	0.75	Auto	Positive	0	0
7	Normal pentane	0.005	10	1	0.001	145	160	185	100	3	3000	0.75	Auto	Positive	0	0

Interfering component	Symbol	Max. tolerance	Notes
Water	H ₂ O	5	Elutes 1 minute behind NC5
Propylene	C ₃ =	0.005	Co-elutes with C3
Butene-1	B-1	0.0025	Elutes between IC4 and NC4
Isobutylene	IC ₄ =	0.0025	Elutes between IC4 and NC4

Interfering component	Symbol	Max. tolerance	Notes
Trans-Butene-2	tB-2	0.0025	Co-elutes with NC4
Cis-Butene-2	cB-2	0.0025	Co-elutes with NC4
1,3-Butadiene	1,3-BD	0.0025	Co-elutes with NC4
Methanol	MeOH	10	Elutes behind NC5 retention time

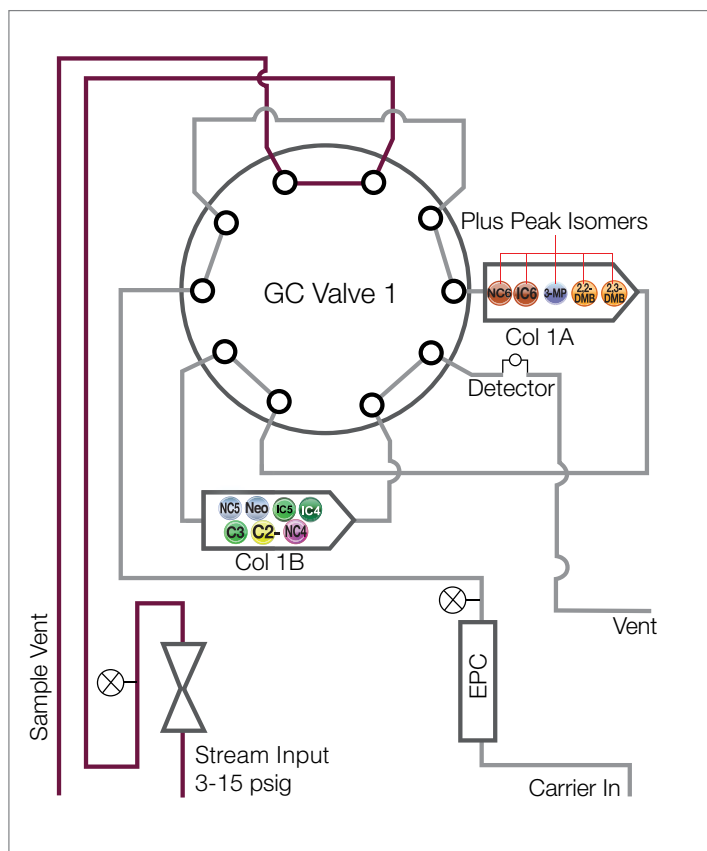
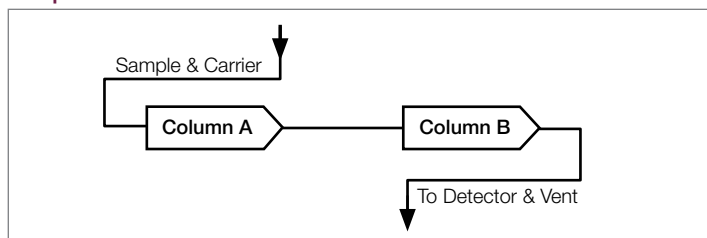
BBK (C6+) train

Inject mode 15 (±2) seconds

The provided illustration displays the isomers of hexane moving through column A. The lighter gasses have already passed through column A and are now moving through column B. The user should note that if they inject too long, the 2,2-dimethylbutane will get into column B. If the injection time is too short, NC5 will be caught on column A, and add to the C6+ peak area. The factory sets the optimal retention and injection times for each train.

 2,3-dimethylbutane elutes first but is not in the sample cal gas.

Simplified view

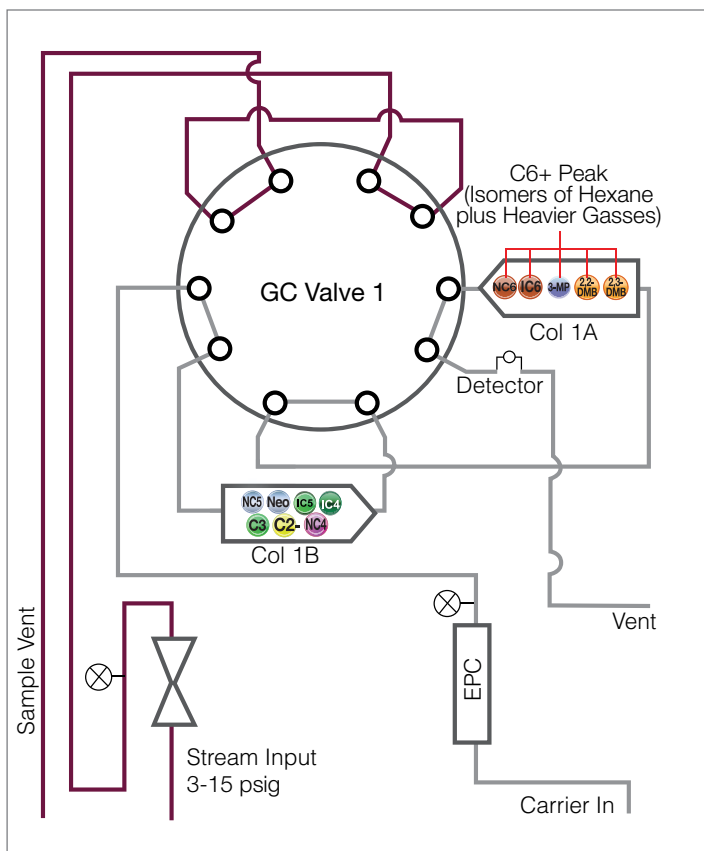
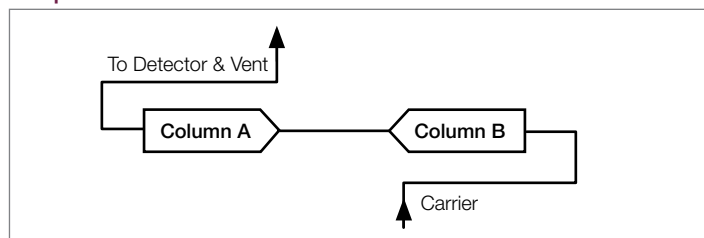


Backflush mode

In column A, the isomers of hexane group back into one peak. These are labeled C6+. The (+) represents heavier gasses such as C7s, C8s and C9s. These heavier gasses may be in the cal or stream gas.

During backflush, the gasses come off the column (elute) and cross the detector bead. When this takes place, each gas changes the amount of energy necessary to maintain the temperature level of the bead. This change in energy is what causes the peak generation for each of the gasses.

Simplified view





BBM train (†helium carrier)



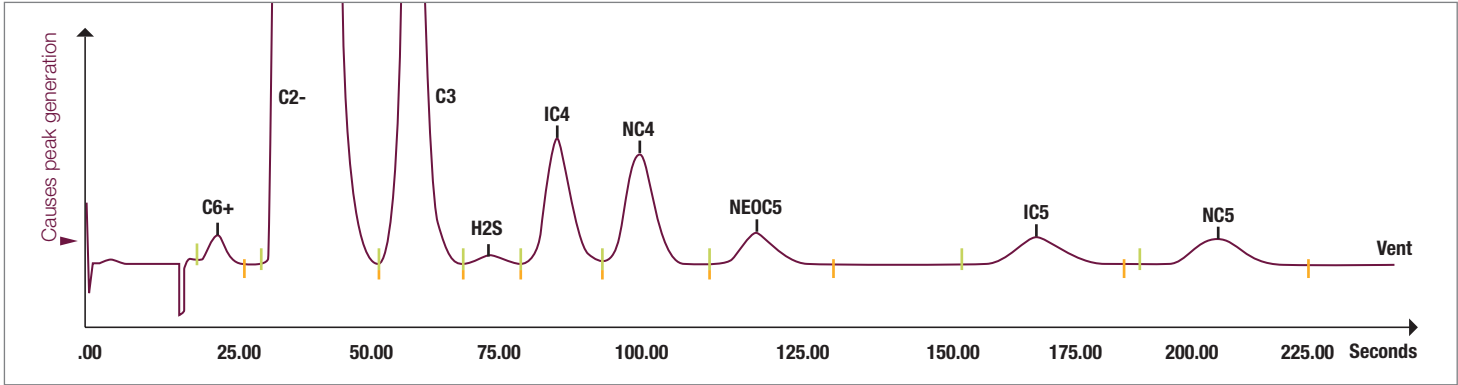
Typical settings (individual analyzers may vary)			
Cycle time	310 seconds	Inject time variance	± 10%
Sort order	321	Carrier pressure	43 psig
Sample size	40 ul	Carrier pressure variance	± 15%
Target component	NC5	Flow rate	8.3 ml/min
Target retention time	200 seconds	Flow rate variance	± 15%
Inject time	15 seconds	Oven temperature	60° C
NOTE: When used in conjunction with BBF, the Btu repeatability is ± 0.125 Btu.			

Component number	Separated component	Range (mol%)		%RSD	Minimum detectable limit (mol%)	Gate on	Peak retention time	Gate off	Slope (run)	Slope (rise)	Minimum peak area	Front height ratio	Peak detection method	Peak direction	Baseline segment start	Baseline segment end
		Minimum	Maximum													
1	Hexane plus	0.005	5	1	0.001	18	21	28	15	15	3000	0.75	Auto	Positive	0	0
2	Propane	0.005	50	1	0.001	45	58	69	15	3	3000	0.75	Auto	Positive	0	0
3	Hydrogen sulfide	0.02	0.12	3	0.005	65	72	81	30	3	3000	0.75	Auto	Positive	0	0
4	Isobutane	0.005	15	1	0.001	75	84	95	30	3	3000	0.75	Auto	Positive	0	0
5	Normal butane	0.005	15	1	0.001	89	98	117	60	3	3000	0.75	Auto	Positive	0	0
6	Neopentane	0.005	10	1	0.001	104	119	144	60	3	3000	0.75	Auto	Positive	0	0
7	Isopentane	0.005	10	1	0.001	144	169	192	100	3	3000	0.75	Auto	Positive	0	0
8	Normal pentane	0.005	10	1	0.001	175	200	245	100	3	3000	0.75	Auto	Positive	0	0

Interfering component	Symbol	Max. tolerance	Notes
Water	H2O	0.01	

†Hydrogen carrier gas cannot be used in a PGC1000 built for helium.
NOTE: Colored text within a table represents a difference between the carriers.

BBM train (hydrogen carrier)



Typical settings (individual analyzers may vary)

Cycle time	270 seconds	Inject time variance	± 10%
Sort order	321	Carrier pressure	43 psig
Sample size	40 ul	Carrier pressure variance	± 15%
Target component	NC5	Flow rate	8.3 ml/min
Target retention time	200 seconds	Flow rate variance	± 15%
Inject time	15 seconds	Oven temperature	60° C

NOTE: When used in conjunction with BBF, the Btu repeatability is ± 0.125 Btu at room temperature, with temperatures from -18 to 55 degrees Celsius, the ± Btu performance value doubles.

Component number	Separated component	Range (mol%)		%RSD	Minimum detectable limit (mol%)	Gate on	Peak retention time	Gate off	Slope (run)	Slope (rise)	Minimum peak area	Front height ratio	Peak detection method	Peak direction	Baseline segment start	Baseline segment end
		Minimum	Maximum													
1	Hexane plus	0.005	5	1	0.001	18	21	28	15	15	3000	0.75	Auto	Positive	0	0
2	Propane	0.005	50	1	0.001	45	58	69	15	3	3000	0.75	Auto	Positive	0	0
3	Hydrogen sulfide	0.02	0.12	3	0.005	65	72	81	30	3	3000	0.75	Auto	Positive	0	0
4	Isobutane	0.005	15	1	0.001	75	84	95	30	3	3000	0.75	Auto	Positive	0	0
5	Normal butane	0.005	15	1	0.001	89	98	117	60	3	3000	0.75	Auto	Positive	0	0
6	Neopentane	0.005	10	1	0.001	104	119	144	60	3	3000	0.75	Auto	Positive	0	0
7	Isopentane	0.005	10	1	0.001	144	169	192	100	3	3000	0.75	Auto	Positive	0	0
8	Normal pentane	0.005	10	1	0.001	175	200	245	100	3	3000	0.75	Auto	Positive	0	0

Interfering component	Symbol	Max. tolerance	Notes
Water	H2O	0.01	

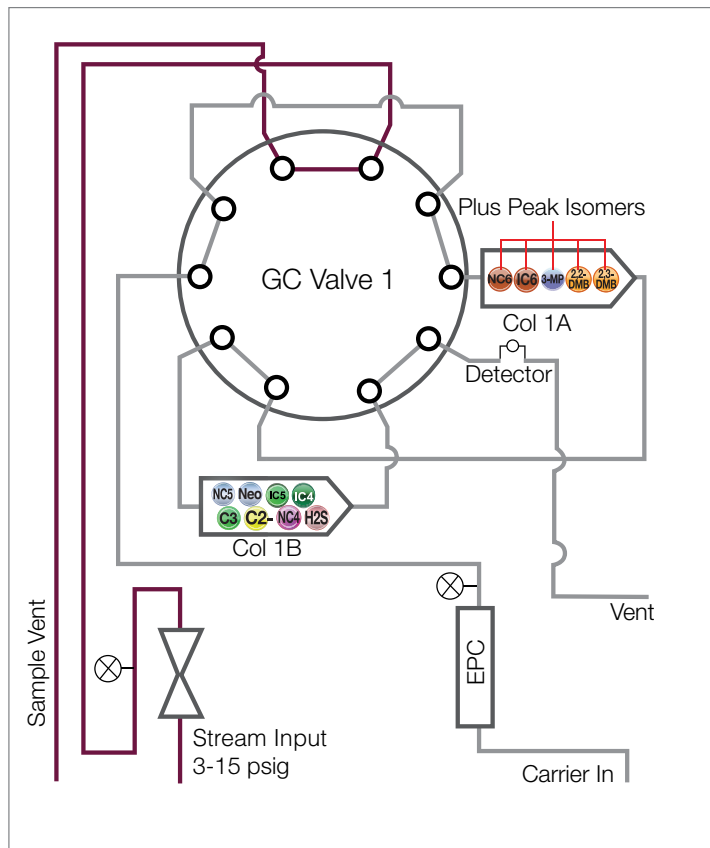
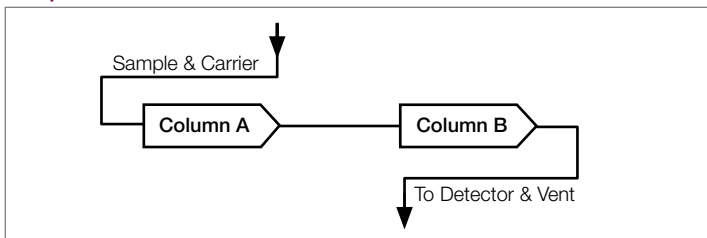
BBM (C6+, H2S) train

Inject mode 15 (±2) seconds

The provided example displays isomers of hexane moving through column A. The lighter gasses have already passed through column A and are now moving through column B. The user should note that if the injection period is too long, the 2,2 Dimethylbutane will get into column B. If the injection duration is too short, not all of NC5 will be injected into column B. The factory sets the optimal retention and injection times for each train.

 2,3-dimethylbutane moves through column A (elutes) first but is not in the sample cal gas.

Simplified view

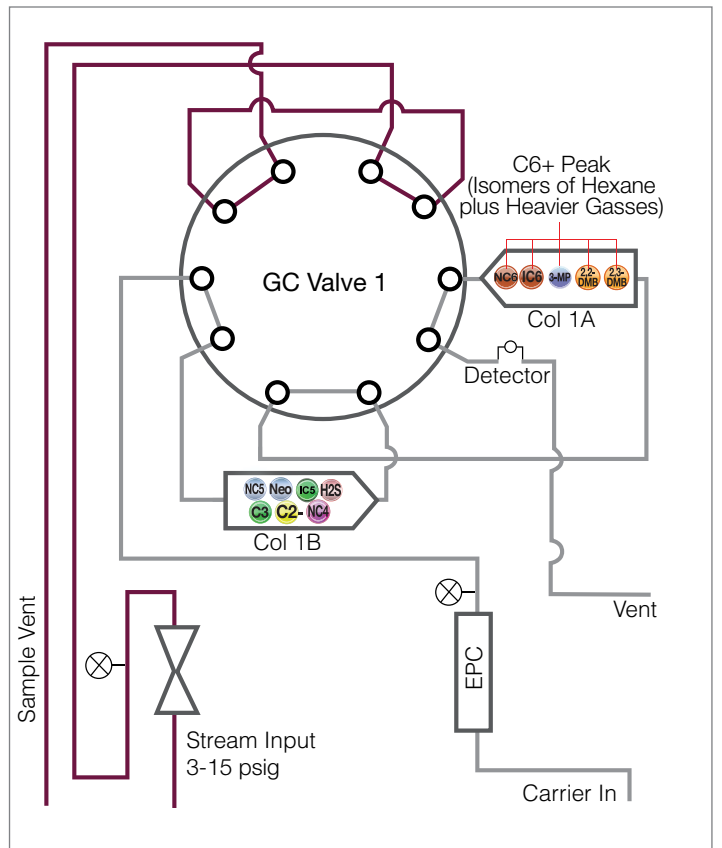
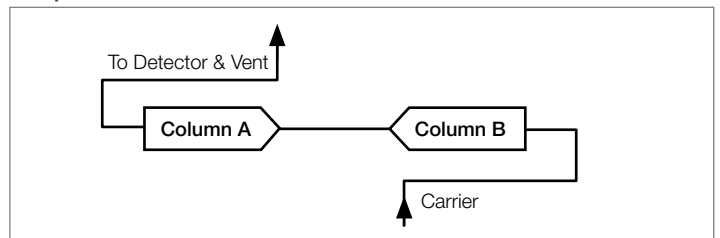


Backflush mode

In column A, the isomers of hexane merge back into one peak. These are labeled as C6+ peak. The (+) represents heavier gasses like C7s, C8s and C9s. These may be in the cal or stream gas.

During backflush, the gasses elute and cross the detector bead. When this occurs, each gas changes the amount of energy required to maintain the temperature level of the bead. This change in energy is what causes the peak generation for each of the gasses.

Simplified view





BBP/BBW train (†helium carrier)



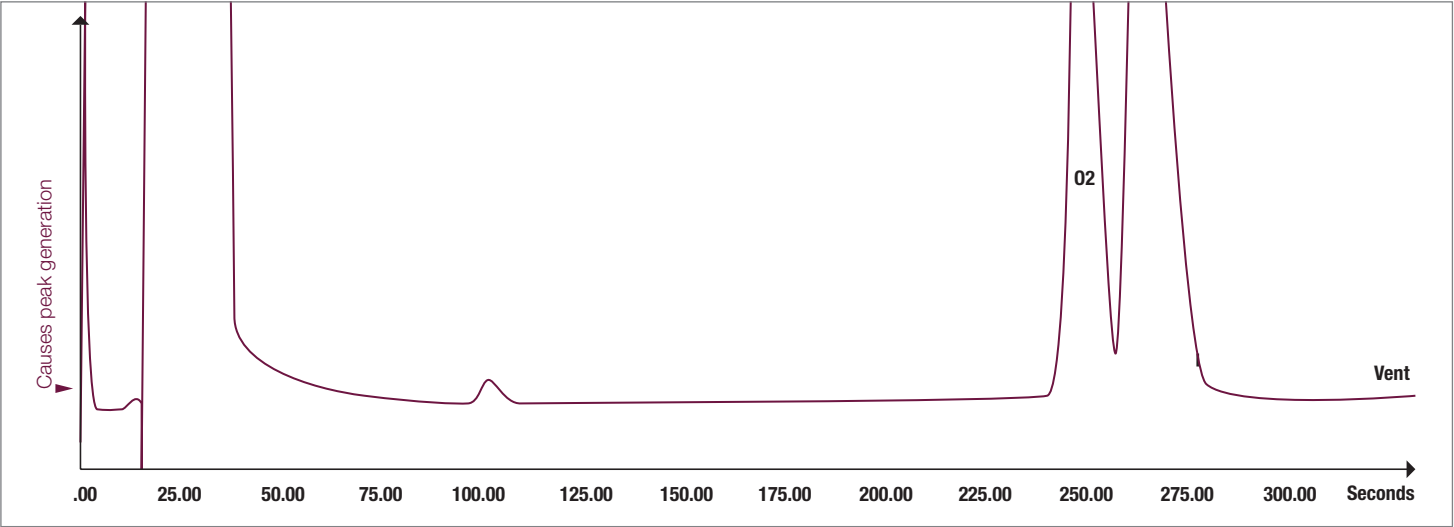
Typical settings (individual analyzers may vary)				
Cycle time	330 seconds	Inject time variance	± 10%	
Sort order	21	Carrier pressure	40 psig	
Sample size	815 ul	Carrier pressure variance	± 15%	
Target component	O2	Flow rate	5.4 ml/min	
Target retention time	247 seconds	Flow rate variance	± 15%	
Inject time	15 seconds	Oven temperature	60° C	
NOTE: 30-2000 ppm oxygen				

Component number	Separated component	Range (mol%)		%RSD	Minimum detectable limit (mol%)	Gate on	Peak retention time	Gate off	Slope (run)	Slope (rise)	Minimum peak area	Front height ratio	Peak detection method	Peak direction	Baseline segment start	Baseline segment end
		Minimum	Maximum													
1	Oxygen	0.003	0.2	3	0.0003	220	248	290	100	3	100	0.75	Auto	Positive	+O2	312

Interfering component	Symbol	Max. tolerance	Notes
Nitrogen	N2	4	Interferes with O2 measurement on the backside of peak
Hydrogen	H2	0.02	Interferes with O2 measurement on the frontside of peak

†Hydrogen carrier gas cannot be used in a PGC1000 built for helium.

BBP/BBW train (hydrogen carrier)



Typical settings (individual analyzers may vary)

Cycle time	330 seconds	Inject time variance	± 10%
Sort order	21	Carrier pressure	40 psig
Sample size	815 ul	Carrier pressure variance	± 15%
Target component	O2	Flow rate	5.4 ml/min
Target retention time	247 seconds	Flow rate variance	± 15%
Inject time	15 seconds	Oven temperature	60° C

NOTE: 30-2000 ppm oxygen

Component number	Separated component	Range (mol%)		%RSD	Minimum detectable limit (mol%)	Gate on	Peak retention time	Gate off	Slope (run)	Slope (rise)	Minimum peak area	Front height ratio	Peak detection method	Peak direction	Baseline segment start	Baseline segment end
		Minimum	Maximum													
1	Oxygen	0.003	0.2	3	0.0003	220	248	290	100	3	100	0.75	Auto	Positive	+O2	312

Interfering component	Symbol	Max. tolerance	Notes
Nitrogen	N2	4	Interferes with O2 measurement on the backside of peak
Hydrogen	H2	0.02	Interferes with O2 measurement on the frontside of peak

BBP 30-2000 ppm/BBW 0-30 ppm O₂ train

Inject mode 15 (±2) seconds

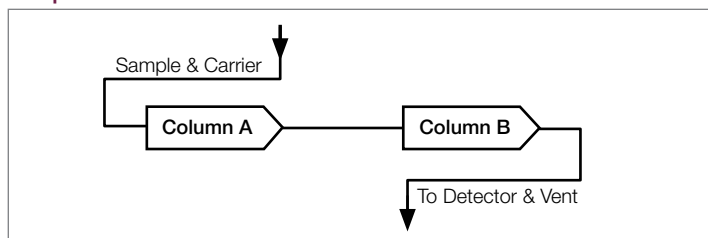
The following illustration shows that the oxygen and nitrogen, during the inject mode, have moved through column A and into column B. The heavier gasses will be retained on column A unless the injection time is too high. If the injection time is too high, then some of the C1 (methane) will be carried into column B. This may cause a problem in subsequent cycles as the C1 elutes off column B.

The factory sets the optimal retention and injection times so that none of the methane is carried into column B.

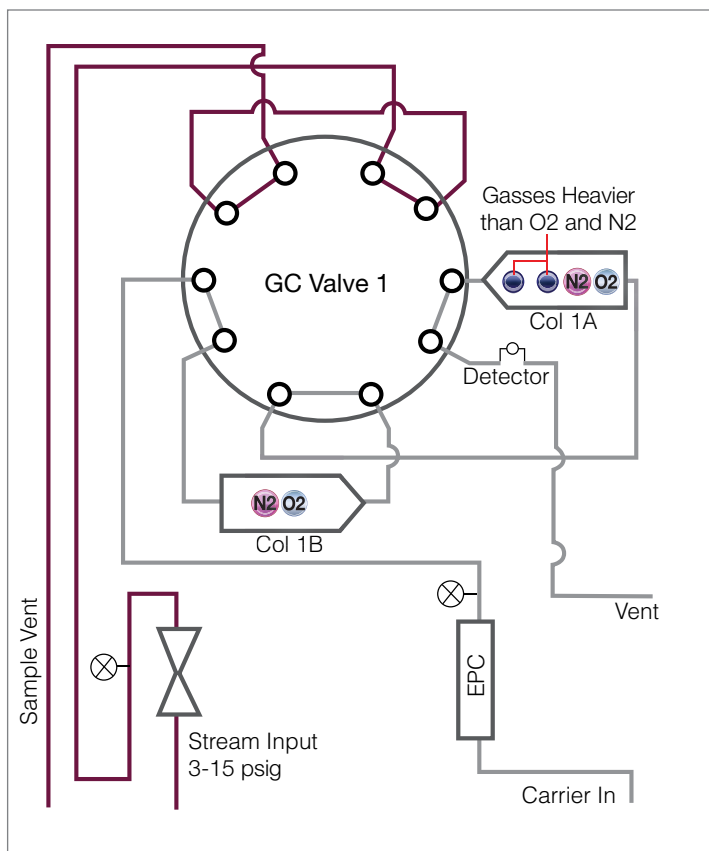
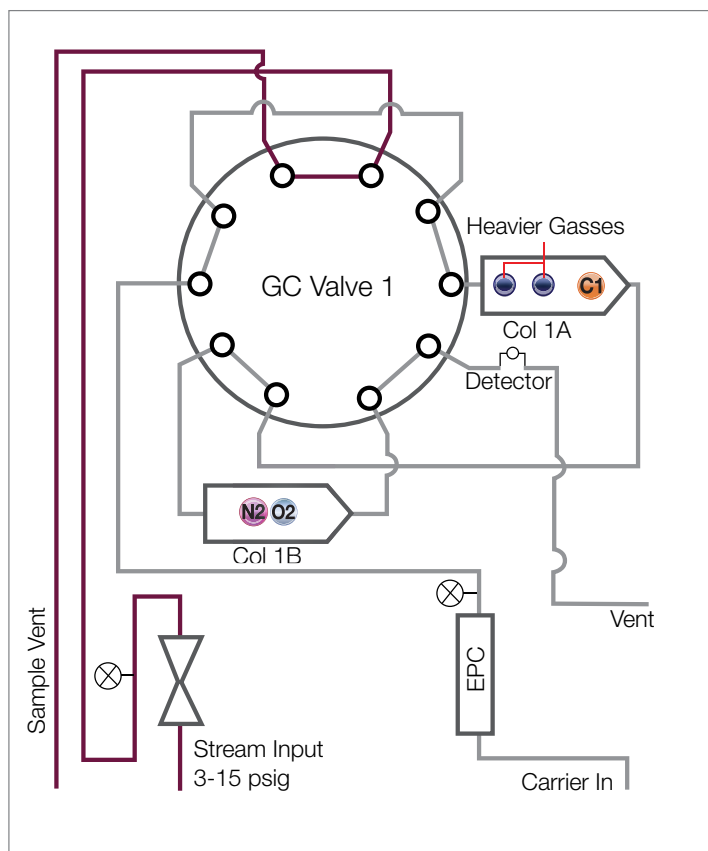
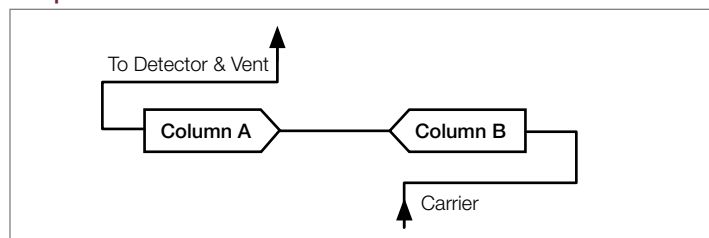
Backflush mode

In column A, the heavier gasses, including C1, merge back into one group and are not labeled for the BBP/BBW train. The oxygen and nitrogen will continue through column B, pass through column A again and cross the detector bead. When the oxygen and nitrogen cross the detector bead, they change the amount of energy necessary to maintain the temperature level of the bead. This change in energy is what causes the peak generation for each of the gasses.

Simplified view



Simplified view





BBR/BCM train (†helium carrier)



BBR train ~ Typical settings (individual analyzers may vary)					
Cycle time	150 seconds	Inject time variance	± 10%		
Sort order	141	Carrier pressure	37 psig		
Sample size	247 ul	Carrier pressure variance	± 15%		
Target component	H2S	Flow rate	4.4 ml/min		
Target retention time	100 seconds	Flow rate variance	± 15%		
Inject time	15 seconds	Oven temperature	60° C		
NOTE: A common application is hydrogen sulfide (H2S) in fuel gas.					

BCM train ~ Typical settings (individual analyzers may vary)					
Cycle time	150 seconds	Inject time variance	± 10%		
Sort order	142	Carrier pressure	27 psig		
Sample size	247 ul	Carrier pressure variance	± 15%		
Target component	H2S	Flow rate	4.4 ml/min		
Target retention time	100 seconds	Flow rate variance	± 15%		
Inject time	15 seconds	Oven temperature	60° C		

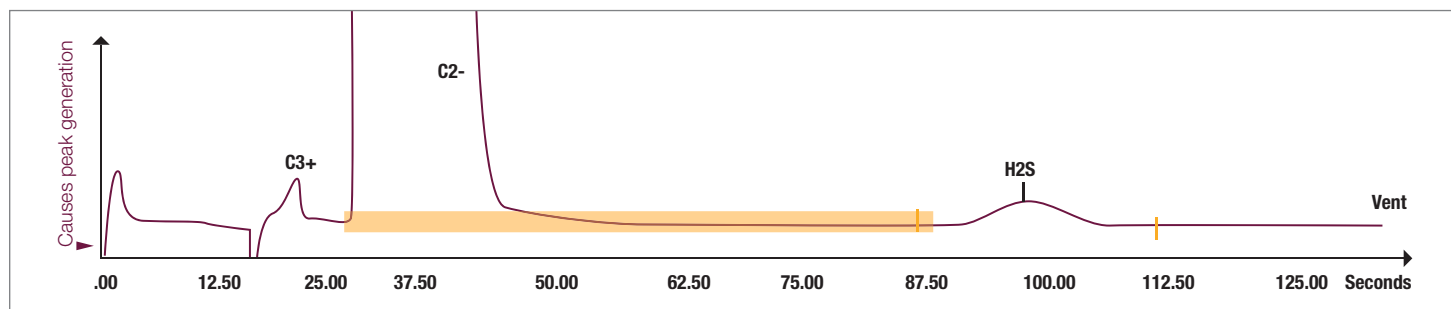
			Range (mol%)		%RSD												
	Component number	Separated component	Minimum	Maximum		Minimum detectable limit (mol%)	Gate on	Peak retention time	Gate off	Slope (run)	Slope (rise)	Minimum peak area	Front height ratio	Peak detection method	Peak direction	Baseline segment start	Baseline segment end
BBR	1	Hydrogen sulfide	0.003	0.12	3	0.0003	86	98.5	116	75	3	1000	1	Auto	Positive	0	0
BCM	1	Hydrogen sulfide	0.0002	0.003	10	0.0002	86	98.5	116	60	1	500	1	Auto	Positive	0	0

- Due to the low levels of H2S measured, the following items are recommended in order to ensure proper performance:

 - Calibration and carrier regulators should be stainless steel with stainless steel diaphragms.
 - Connective tubing for calibration gas and streams should be sulfi-nert or the equivalent.
- Brass parts cannot be used in sample, wetted paths. At startup, the system should be leak tested.
 - A moisture trap is recommended for the carrier bottle(s).
 - Liquid leak detection should not be used on this train. Electronic leak detectors or a pressure method are recommended.

†Hydrogen carrier gas cannot be used in a PGC1000 built for helium.
NOTE: Colored text within a table represents a difference between the carriers.

BBR/BCM train (hydrogen carrier)



BBR train ~ Typical settings (individual analyzers may vary)

Cycle time	120 seconds	Inject time variance	± 10%
Sort order	141	Carrier pressure	37 psig
Sample size	247 ul	Carrier pressure variance	± 15%
Target component	H2S	Flow rate	4.4 ml/min
Target retention time	100 seconds	Flow rate variance	± 15%
Inject time	15 seconds	Oven temperature	60° C

NOTE: A common application is hydrogen sulfide (H2S) in fuel gas per 40 CFR part B.

BCM train ~ Typical settings (individual analyzers may vary)

Cycle time	150 seconds	Inject time variance	± 10%
Sort order	142	Carrier pressure	27 psig
Sample size	247 ul	Carrier pressure variance	± 15%
Target component	H2S	Flow rate	4.4 ml/min
Target retention time	100 seconds	Flow rate variance	± 15%
Inject time	15 seconds	Oven temperature	60° C

	Component number	Separated component	Range (mol%)		%RSD	Minimum detectable limit (mol%)	Gate on	Peak retention time	Gate off	Slope (run)	Slope (rise)	Minimum peak area	Front height ratio	Peak detection method	Peak direction	Baseline segment start	Baseline segment end
			Minimum	Maximum													
BBR	1	Hydrogen sulfide	0.003	0.12	3	0.0003	86	98.5	116	75	3	1000	1	Auto	Positive	0	0
BCM	1	Hydrogen sulfide	0.0002	0.003	10	0.0002	86	98.5	116	60	1	500	1	Auto	Positive	0	0

Due to the low levels of H2S measured, the following items are recommended in order to ensure proper performance:

- Calibration and carrier regulators should be stainless steel with stainless steel diaphragms.
- Connective tubing for calibration gas and streams should be sulfurnert or the equivalent.
- Brass parts cannot be used in sample, wetted paths.
- At startup, the system should be leak tested.
- A moisture trap is recommended for the carrier bottle(s).
- Liquid leak detection fluids should not be used on this system.
- Electronic leak detectors or a pressure method are recommended.

Interfering component	Symbol	Max. tolerance	Notes
Carbon dioxide	CO2	3	Above this limit the Cycle time increases proportionately

BBR 30-1200 ppm/BCM 0-30 ppm train

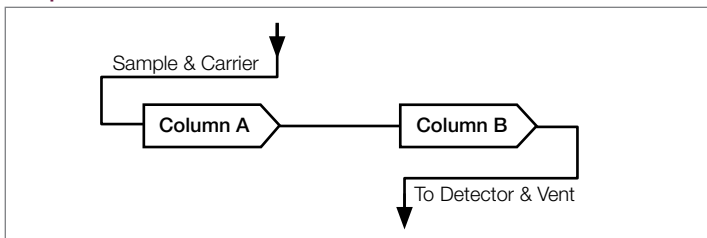
Inject mode 15 (±2) seconds

The provided illustration shows that during the inject mode, the lighter gasses, including hydrogen sulfide (H₂S), have already moved through column A and into column B. The heavier gasses are retained on column A.

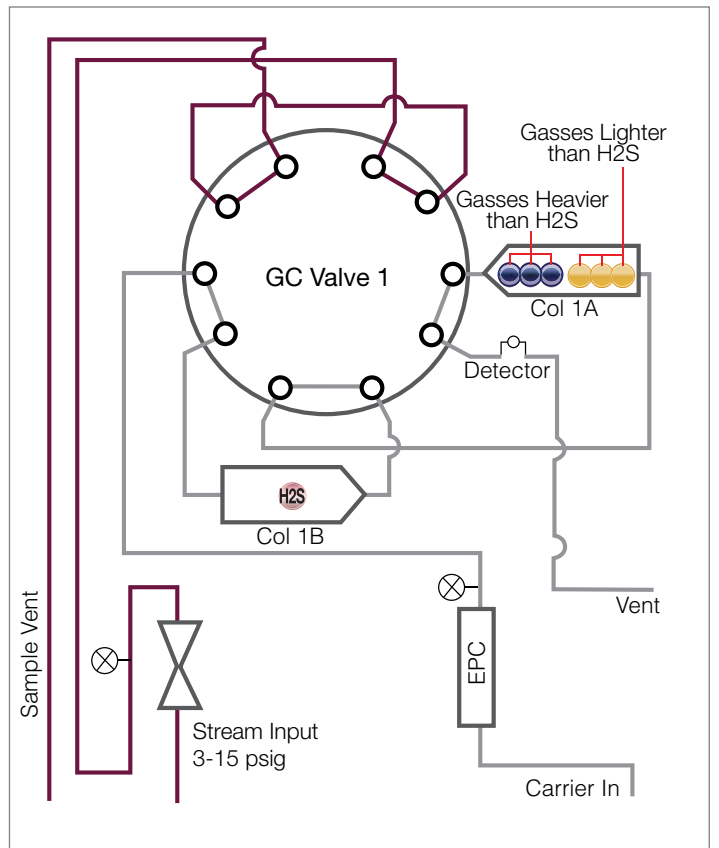
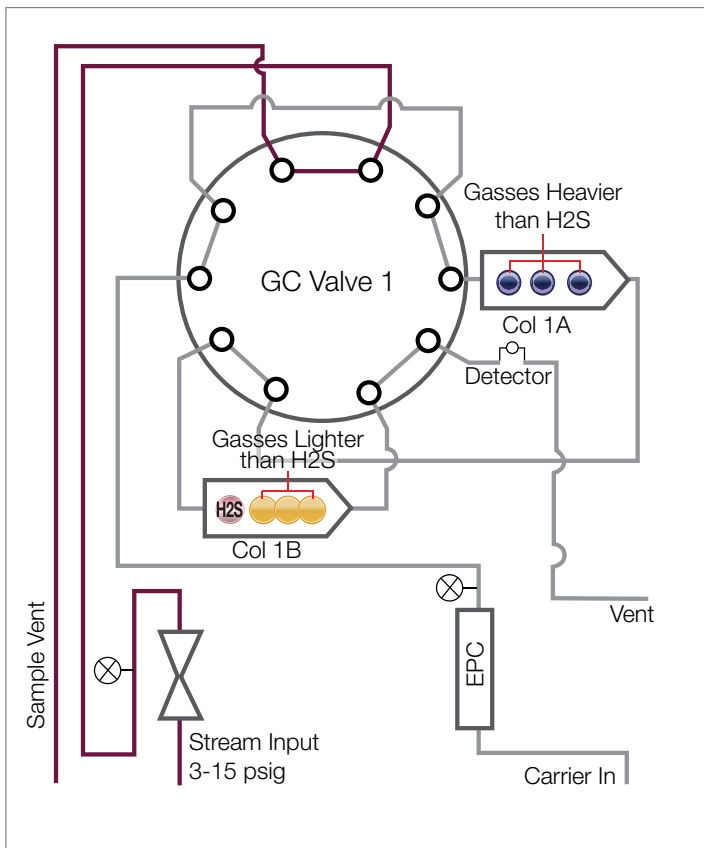
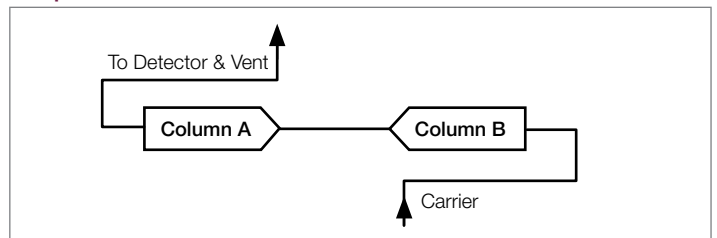
Backflush mode

In column A, the heavier gasses combine into one group and are not labeled for the BBR train. In other trains, this is called the plus peak. The lighter gasses, including H₂S, will continue through column B, pass through column A again and cross the detector bead. When the gasses cross the detector bead, they change the amount of energy required to maintain the temperature level of the bead. This change in energy is what causes the peak generation for each of the gasses.

Simplified view



Simplified view





BBS train (†helium carrier)



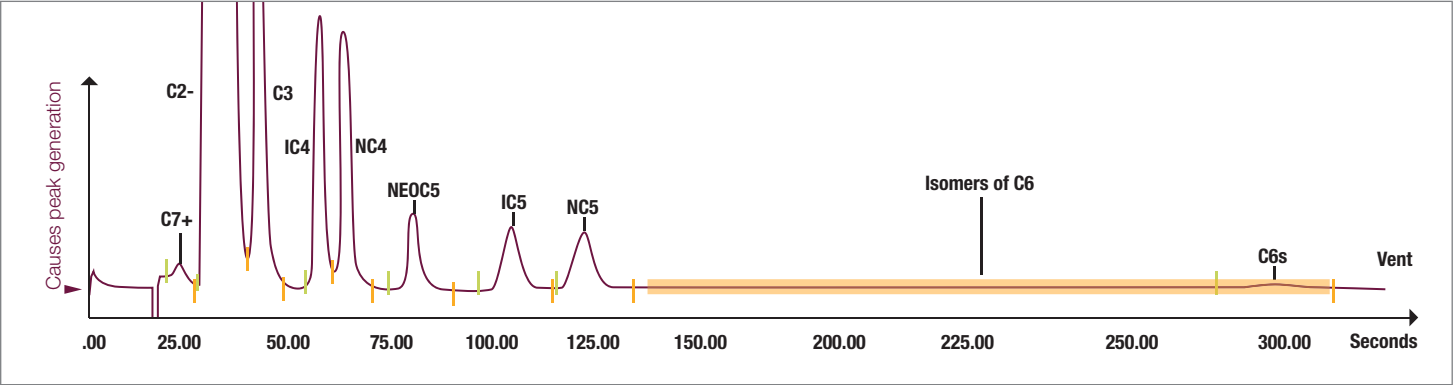
Typical settings (individual analyzers may vary)				
Cycle time	360 seconds	Inject time variance	± 10%	
Sort order	161	Carrier pressure	27 psig	
Sample size	40 ul	Carrier pressure variance	± 15%	
Target component	NC6	Flow rate	7.4 ml/min	
Target retention time	295 seconds	Flow rate variance	± 15%	
Inject time	15 seconds	Oven temperature	60° C	
NOTE: When used in conjunction with BBF, the Btu repeatability is ± 0.25 Btu.				

Component number	Separated component	Range (mol%)		%RSD	Minimum detectable limit (mol%)	Gate on	Peak retention time	Gate off	Slope (run)	Slope (rise)	Minimum peak area	Front height ratio	Peak detection method	Peak direction	Baseline segment start	Baseline segment end
		Minimum	Maximum													
1	Hexane plus	0.05	5	1	0.001	19	22.3	27	15	1	3000	0.75	Auto	Positive	0	0
2	Propane	0.05	15	1	0.001	37	41	51	30	3	3000	0.75	Auto	Positive	0	0
3	Isobutane	0.05	10	1	0.001	50	56	65	60	3	3000	0.75	Auto	Positive	0	0
4	Normal butane	0.05	10	1	0.001	57	62	73	60	3	3000	0.75	Auto	Positive	0	0
5	Neopentane	0.05	15	1	0.001	72	79	140	100	3	3000	0.75	Auto	Positive	0	0
6	Isopentane	0.05	10	1	0.001	72	103	140	100	3	3000	0.75	Auto	Positive	0	0
7	Normal pentane	0.05	10	1	0.001	72	121	140	100	3	3000	0.75	Auto	Positive	0	0
8	Hexane	0.05	10	2	0.01	140	292	300	100	3	1000	0.75	APG	Positive	0	0

Interfering component	Symbol	Max. tolerance	Notes
Water	H2O	3	Smears out on Col 2
Hydrogen sulfide	H2S	1	Adsorbed on Col 2

†Hydrogen carrier gas cannot be used in a PGC1000 built for helium.

BBS train (hydrogen carrier)



Typical settings (individual analyzers may vary)

Cycle time	360 seconds	Inject time variance	± 10%
Sort order	161	Carrier pressure	27 psig
Sample size	40 ul	Carrier pressure variance	± 15%
Target component	NC6	Flow rate	7.4 ml/min
Target retention time	295 seconds	Flow rate variance	± 15%
Inject time	15 seconds	Oven temperature	60° C

NOTE: When used in conjunction with BBF, the Btu repeatability is ± 0.25 Btu at room temperature. For temperatures from -18 to 55 degrees Celsius, the ± Btu performance value doubles.

Component number	Separated component	Range (mol%)		%RSD	Minimum detectable limit (mol%)	Gate on	Peak retention time	Gate off	Slope (run)	Slope (rise)	Minimum peak area	Front height ratio	Peak detection method	Peak direction	Baseline segment start	Baseline segment end
		Minimum	Maximum													
1	Hexane plus	0.05	5	1	0.001	19	22.3	27	15	1	3000	0.75	Auto	Positive	0	0
2	Propane	0.05	15	1	0.001	37	41	51	30	3	3000	0.75	Auto	Positive	0	0
3	Isobutane	0.05	10	1	0.001	50	56	65	60	3	3000	0.75	Auto	Positive	0	0
4	Normal butane	0.05	10	1	0.001	57	62	73	60	3	3000	0.75	Auto	Positive	0	0
5	Neopentane	0.05	15	1	0.001	72	79	140	100	3	3000	0.75	Auto	Positive	0	0
6	Isopentane	0.05	10	1	0.001	72	103	140	100	3	3000	0.75	Auto	Positive	0	0
7	Normal pentane	0.05	10	1	0.001	72	121	140	100	3	3000	0.75	Auto	Positive	0	0
8	Hexane	0.05	10	2	0.01	140	292	300	100	3	1000	0.75	APG	Positive	0	0

Interfering component	Symbol	Max. tolerance	Notes
Water	H2O	3	Smears out on Col 2
Hydrogen sulfide	H2S	1	Adsorbed on Col 2

BBS (C7+) train

Inject mode 15 (±2) seconds

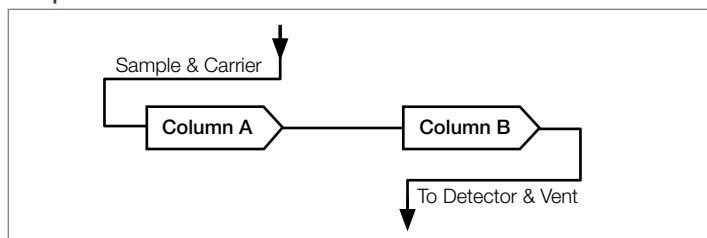
The provided illustration shows a few isomers of heptane, plus octane, nonane and decane moving through column A. The lighter gasses have already passed through column A and are now moving through column B. The user should note that if the injection period is too long, the 2,2-dimethylpentane will get into column B, or if the injection duration is too short, not all of the NC6 (hexane) gas will be injected into column B.

Backflush mode

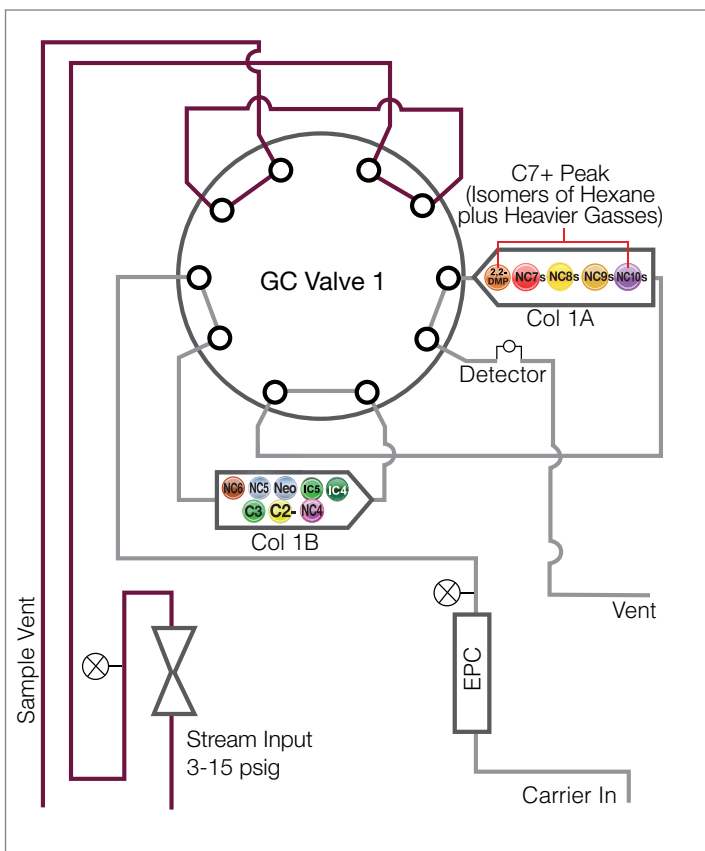
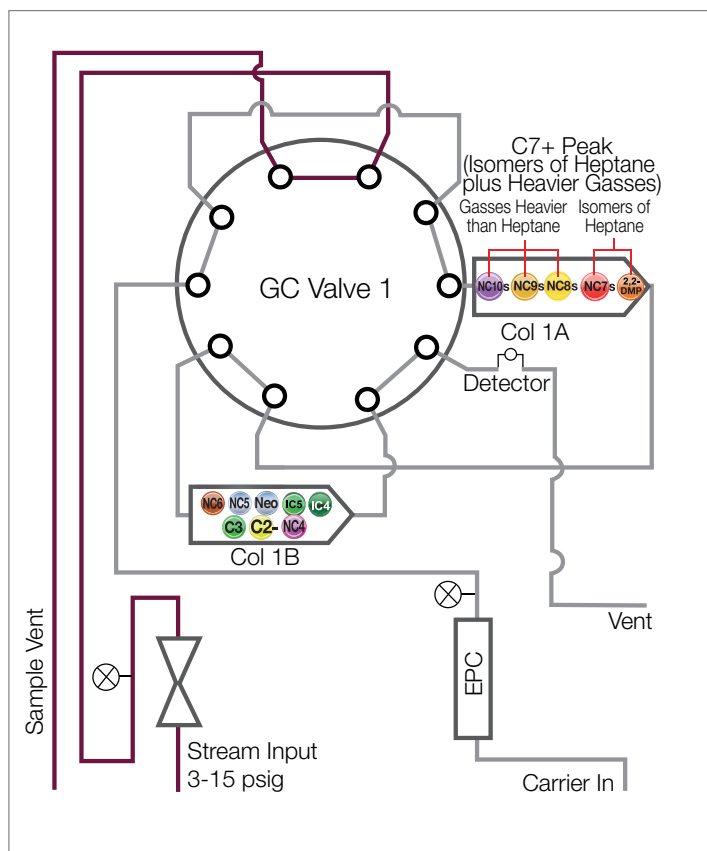
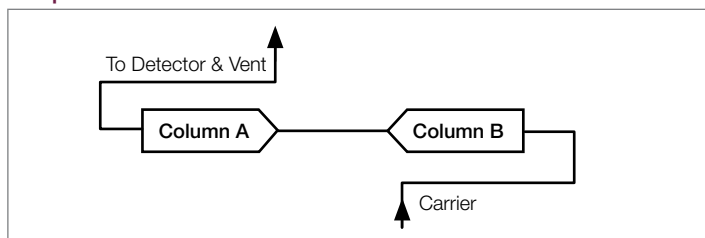
In column A, a few isomers of heptane merge back into one peak and are labeled as C7+. The (+) represents heavier gasses like C8s, C9s and C10s. These heavier gasses may be in the cal or stream gas.

During backflush, the gasses come off the column (elute) and cross the detector bead. When this occurs, each gas changes the amount of energy required to maintain the temperature level of the bead. This change in energy is what causes the peak generation for each of the gasses.

Simplified view



Simplified view





BBT train (†helium carrier)

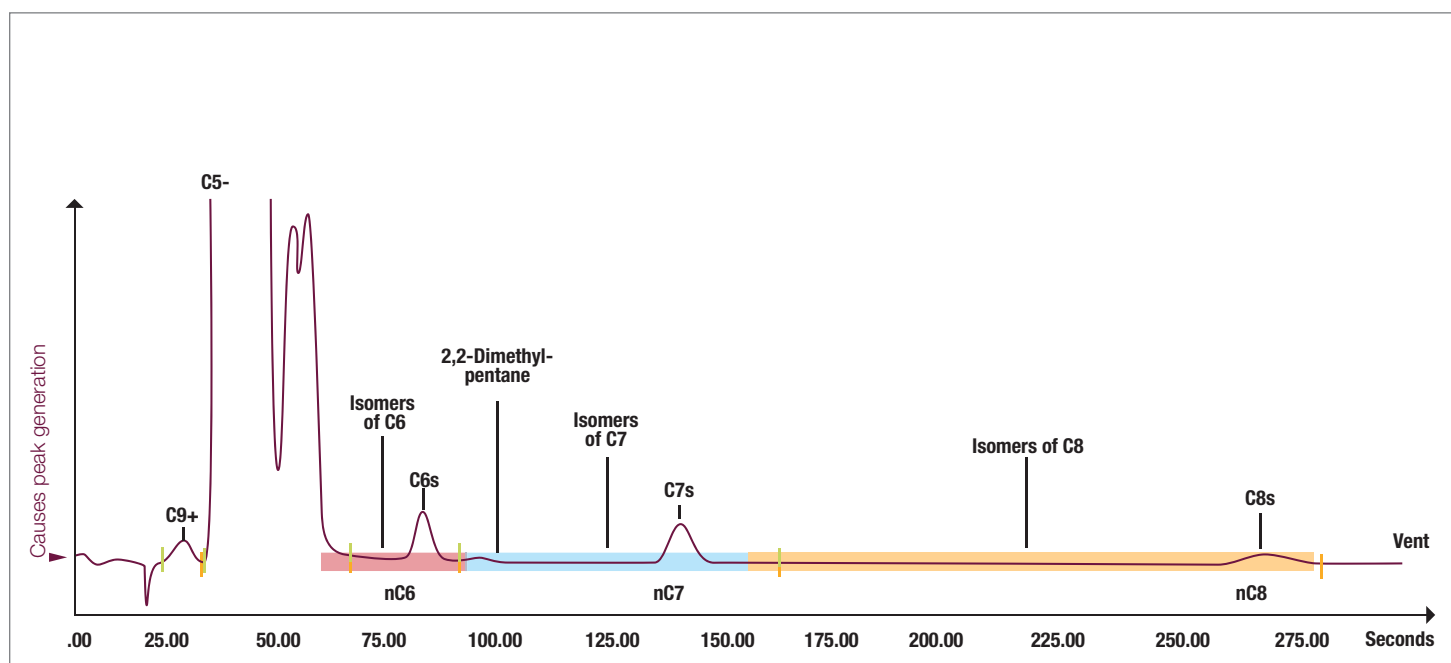


Typical settings (individual analyzers may vary)				
Cycle time	400 seconds		Inject time variance	± 10%
Sort order	181		Carrier pressure	14 psig
Sample size	185 ul		Carrier pressure variance	± 15%
Target component	NC8		Flow rate	5 ml/min
Target retention time	270 seconds		Flow rate variance	± 15%
Inject time	15 seconds		Oven temperature	60° C
NOTE: When used in conjunction with BBF and BBK trains, a calculated Btu performance of ± 0.25 Btu with a C9+ analysis can be accomplished.				

Component number	Separated component	Range (mol%)		%RSD	Minimum detectable limit (mol%)	Gate on	Peak retention time	Gate off	Slope (run)	Slope (rise)	Minimum peak area	Front height ratio	Peak detection method	Peak direction	Baseline segment start	Baseline segment end
		Minimum	Maximum													
1	Nonane plus	0.01	10	2	0.002	17	22	28	15	3	3000	0.75	Auto	Positive	0	0
2	Hexane	0.01	10	1	0.001	54	79	87	30	3	300	0.75	Grouped	Positive	0	0
3	Heptane	0.01	10	1	0.001	80	138	160	60	3	300	0.75	Grouped	Positive	0	0
4	Octane	0.02	10	1	0.001	160	270	300	140	3	300	0.75	Grouped	Positive	0	0

†Hydrogen carrier gas cannot be used in a PGC1000 built for helium.
NOTE: Colored text within a table represents a difference between the carriers.

BBT train (hydrogen carrier)



Typical settings (individual analyzers may vary)

Cycle time	360 seconds	Inject time variance	± 10%
Sort order	181	Carrier pressure	14 psig
Sample size	185 ul	Carrier pressure variance	± 15%
Target component	NC8	Flow rate	5 ml/min
Target retention time	270 seconds	Flow rate variance	± 15%
Inject time	15 seconds	Oven temperature	60° C

NOTE: When used in conjunction with BBF and BBK trains, a calculated Btu performance of ± 0.25 Btu at room temperature with a C9+ analysis can be accomplished. For temperatures from -18 to 55 degrees Celsius, the ± Btu performance doubles.

Component number	Separated component	Range (mol%)		%RSD	Minimum detectable limit (mol%)	Gate on	Peak retention time	Gate off	Slope (run)	Slope (rise)	Minimum peak area	Front height ratio	Peak detection method	Peak direction	Baseline segment start	Baseline segment end
		Minimum	Maximum													
1	Nonane plus	0.01	10	2	0.002	17	22	28	15	3	3000	0.75	Auto	Positive	0	0
2	Hexane	0.01	10	1	0.001	54	79	87	30	3	300	0.75	Grouped	Positive	0	0
3	Heptane	0.01	10	1	0.001	80	138	160	60	3	300	0.75	Grouped	Positive	0	0
4	Octane	0.02	10	1	0.001	160	270	300	140	3	300	0.75	Grouped	Positive	0	0

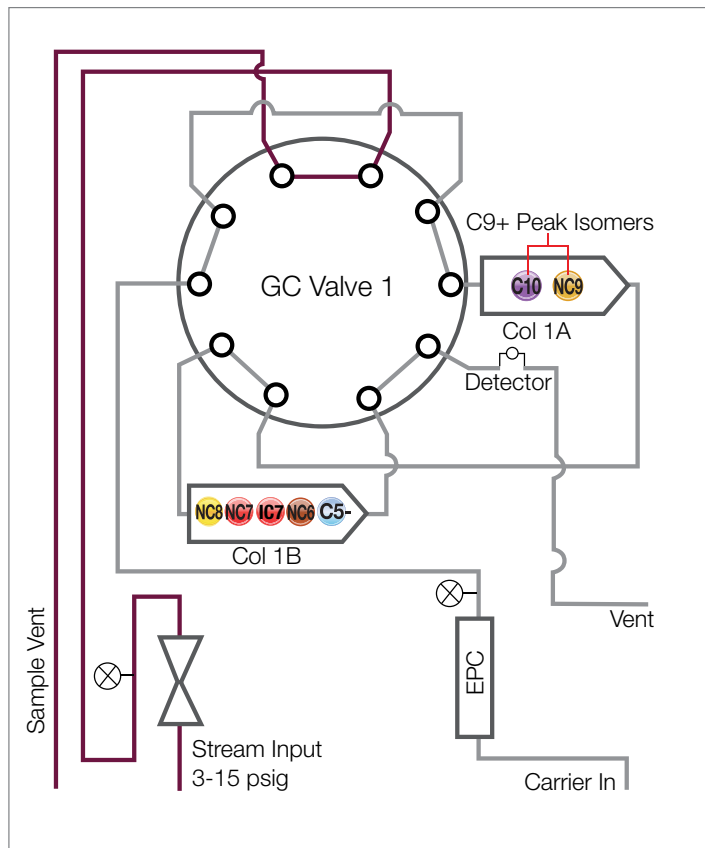
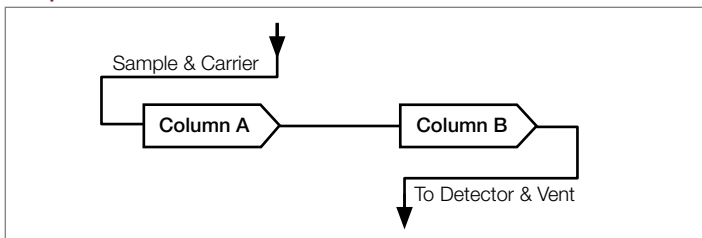
BBT (C9+) train

Inject mode 15 (±2) seconds

The present example shows n-nonane (C9) plus n-decane (C10) moving through column A. The lighter gasses, relative to nonane, have already passed through column A and are now moving through column B.

There are 35 isomers of C9. Some isomers occur in small amounts and are not present in the standard calibration blend. Many of these will not be present in the stream gas. There are 18 isomers of C8 (octane), 9 isomers of C7 (heptane), 5 isomers of C6 (hexane), 3 isomers of C5 (pentane) and 2 isomers of C4 (butane). Propane, ethane and methane do not have skeletal isomers.

Simplified view

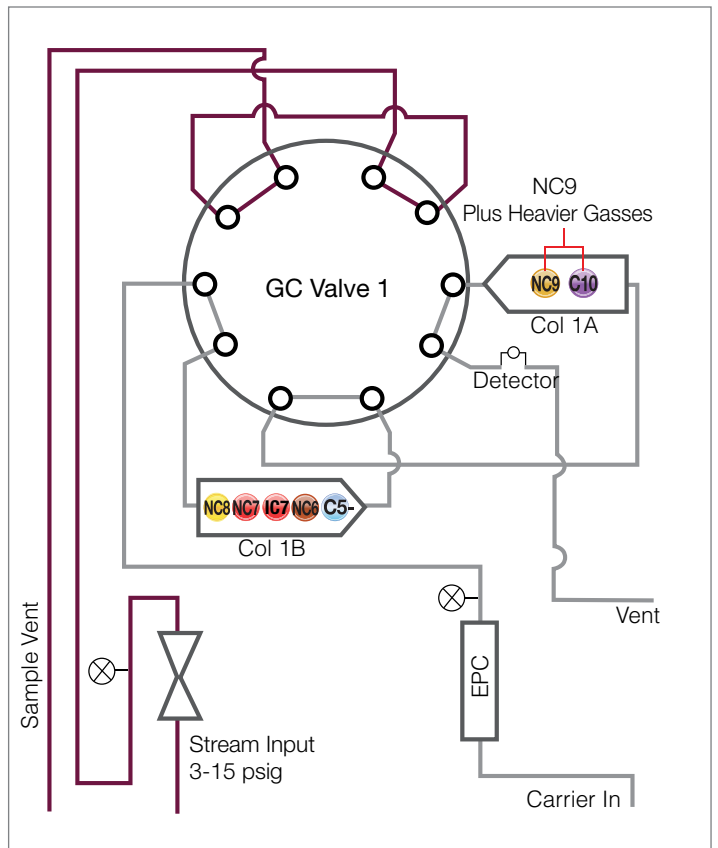
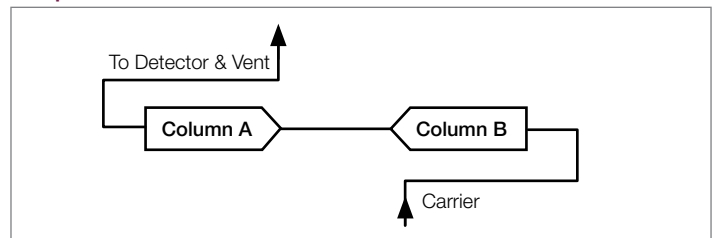


Backflush mode

In column A, nonane (C9) and any heavier gasses group back into one peak and are labeled as C9+. The (+) represents heavier gasses that may be present in the cal or stream gas. This chrom only displays one isomer (2,2-dimethylpentane) which is an isomer of C7. The user may see isomers in the stream gasses for C6, C7 and C8. These will come out (elute) in the areas illustrated.

During backflush, the gasses come off the column (elute) and cross the detector bead. When this occurs, each gas changes the amount of energy required to maintain the temperature level of the bead. This change in energy is what causes the peak generation for each of the gasses.

Simplified view





BBX/BCN train (†helium carrier)

BBX train ~ Typical settings (individual analyzers may vary)					
Cycle time		300 seconds	Inject time variance		± 10%
Sort order		241	Carrier pressure		21 psig
Sample size		40 ul	Carrier pressure variance		± 15%
Target component		MA	Flow rate		4.3 ml/min
Target retention time		270 seconds	Flow rate variance		± 15%
Inject time		15 seconds	Oven temperature		60° C

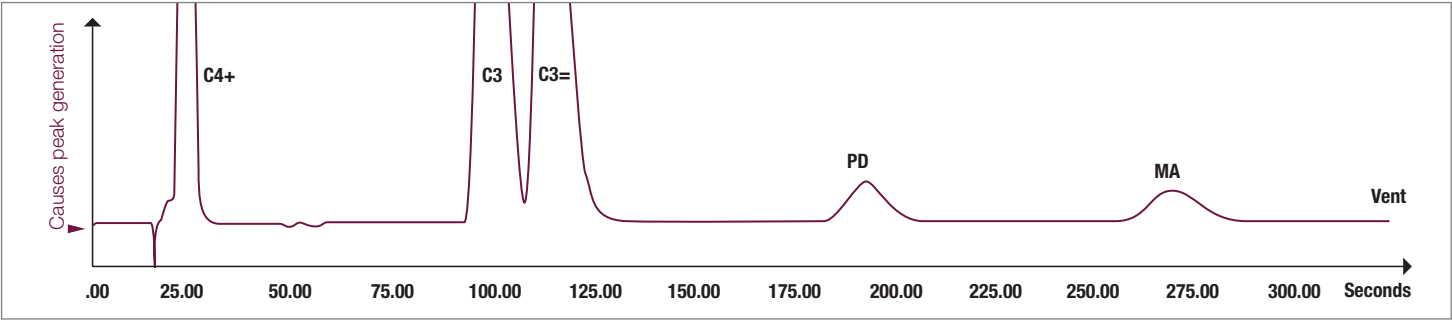
BCN train ~ Typical settings (individual analyzers may vary)					
Cycle time		300 seconds	Inject time variance		± 10%
Sort order		242	Carrier pressure		21 psig
Sample size		80 ul	Carrier pressure variance		± 15%
Target component		MA	Flow rate		4.3 ml/min
Target retention time		270 seconds	Flow rate variance		± 15%
Inject time		15 seconds	Oven temperature		60° C

			Range (mol%)		%RSD												
	Component number	Separated component	Minimum	Maximum		Minimum detectable limit (mol%)	Gate on	Peak retention time	Gate off	Slope (run)	Slope (rise)	Minimum peak area	Front height ratio	Peak detection method	Peak direction	Baseline segment start	Baseline segment end
BBX	1	Butane plus	0.05	100	1	0.002	0	0	0	0	3	3000	0.75	Auto	Positive	0	0
	2	Cyclopropane	0.05	20	1	0.001	150	161	173	30	3	3000	0.75	Auto	Positive	0	0
	3	Propadiene	0.05	20	1	0.001	180	194	205	30	3	3000	0.75	Auto	Positive	0	0
	4	Methylacetylene	0.05	40	1	0.001	252	270	284	30	3	3000	0.75	Auto	Positive	0	0
BCN	1	Butane plus	0.01	0.1	5	0.002	0	27	0	30	5	3000	0.75	Auto	Positive	0	0
	2	Cyclopropane	0.002	0.1	3	0.001	152	161	173	30	3	3000	0.75	Auto	Positive	0	0
	3	Propadiene	0.002	0.1	3	0.001	180	194	205	30	3	3000	0.75	Auto	Positive	0	0
	4	Methylacetylene	0.002	0.1	3	0.001	252	270	284	30	3	3000	0.75	Auto	Positive	0	0

Interfering component	Symbol	Max. tolerance	Notes
Water	H2O	0.01	Elutes with C4+

†Hydrogen carrier gas cannot be used in a PGC1000 built for helium.

BBX/BCN train (hydrogen carrier)



BBX train ~ Typical settings (individual analyzers may vary)

Cycle time	270 seconds	Inject time variance	± 10%
Sort order	241	Carrier pressure	21 psig
Sample size	40 ul	Carrier pressure variance	± 15%
Target component	MA	Flow rate	4.3 ml/min
Target retention time	270 seconds	Flow rate variance	± 15%
Inject time	15 seconds	Oven temperature	60° C

BCN train ~ Typical settings (individual analyzers may vary)

Cycle time	300 seconds	Inject time variance	± 10%
Sort order	242	Carrier pressure	21 psig
Sample size	80 ul	Carrier pressure variance	± 15%
Target component	MA	Flow rate	4.3 ml/min
Target retention time	270 seconds	Flow rate variance	± 15%
Inject time	15 seconds	Oven temperature	60° C

			Range (mol%)		%RSD												
	Component number	Separated component	Minimum	Maximum		Minimum detectable limit (mol%)	Gate on	Peak retention time	Gate off	Slope (run)	Slope (rise)	Minimum peak area	Front height ratio	Peak detection method	Peak direction	Baseline segment start	Baseline segment end
BBX	1	Butane plus	0.05	100	1	0.002	0	0	0	0	3	3000	0.75	Auto	Positive	0	0
	2	Cyclopropane	0.05	20	1	0.001	150	161	173	30	3	3000	0.75	Auto	Positive	0	0
	3	Propadiene	0.05	20	1	0.001	180	194	205	30	3	3000	0.75	Auto	Positive	0	0
	4	Methylacetylene	0.05	40	1	0.001	252	270	284	30	3	3000	0.75	Auto	Positive	0	0
BCM	1	Butane plus	0.01	0.1	5	0.002	0	27	0	30	5	3000	0.75	Auto	Positive	0	0
	2	Cyclopropane	0.002	0.1	3	0.001	152	161	173	30	3	3000	0.75	Auto	Positive	0	0
	3	Propadiene	0.002	0.1	3	0.001	180	194	205	30	3	3000	0.75	Auto	Positive	0	0
	4	Methylacetylene	0.002	0.1	3	0.001	252	270	284	30	3	3000	0.75	Auto	Positive	0	0

Interfering component	Symbol	Max. tolerance	Notes
Water	H2O	0.01	Elutes with C4+

BBX/BCN train

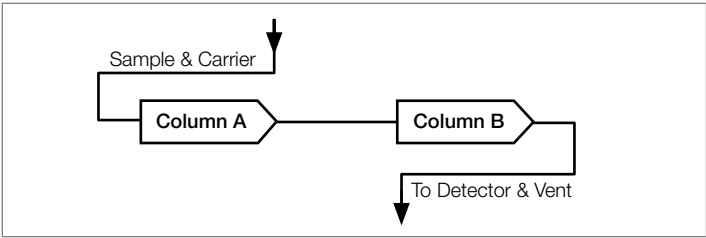
Inject mode 15 (±2) seconds

The provided illustration shows that during the inject mode, the lighter gasses have already moved through column A and into column B. The heavier gasses are retained on column A.

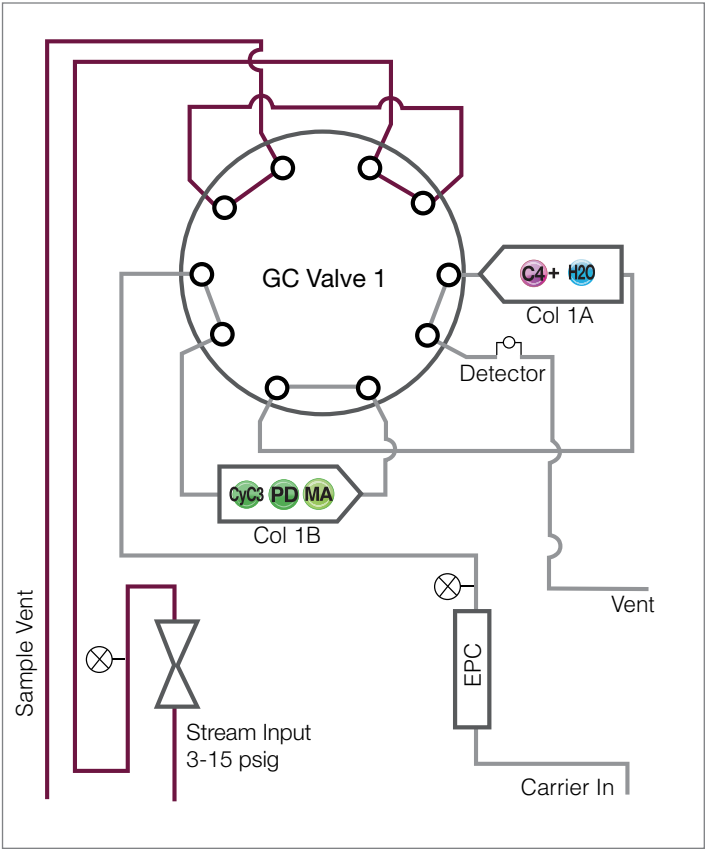
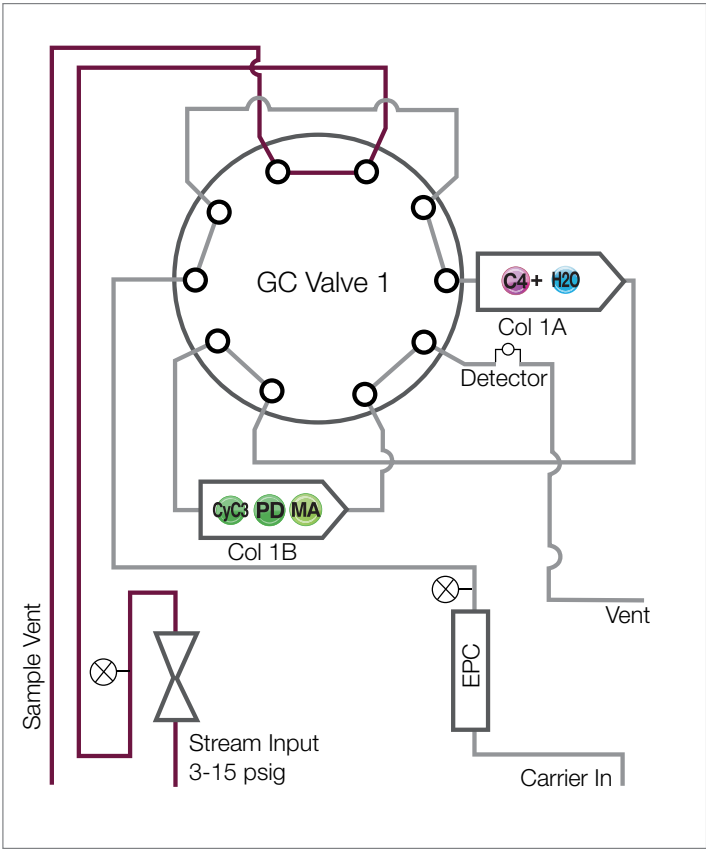
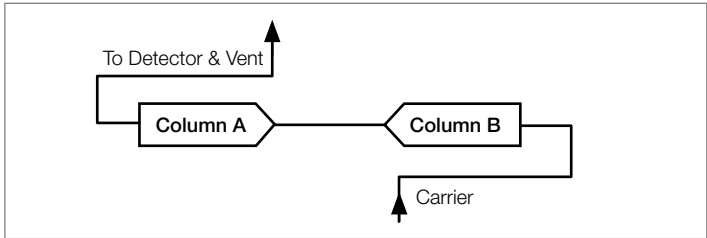
Backflush mode

In column A, C4 and heavier gasses are combined into a group named C4+. The lighter gasses will continue through column B, pass through column A again and cross the detector bead. When the gasses cross the detector bead, they change the amount of energy necessary to maintain the temperature level of the bead. This change in energy is what causes the peak generation for each of the gasses.

Simplified view



Simplified view





BCB train (†helium carrier)

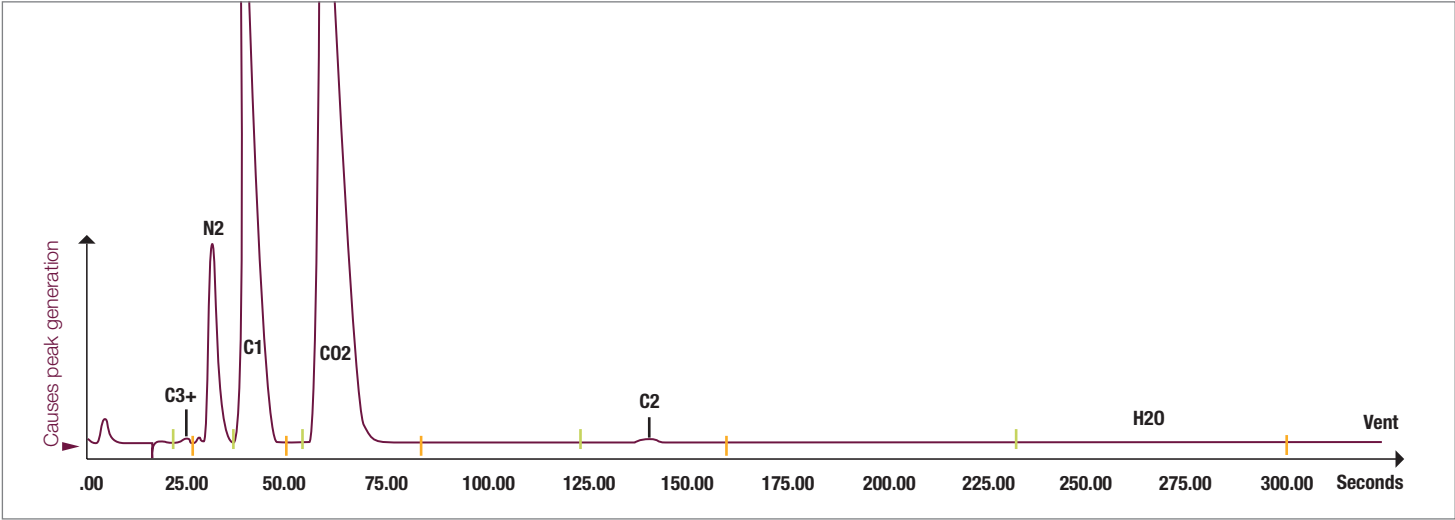


Typical settings (individual analyzers may vary)			
Cycle time	345 seconds	Inject time variance	± 10%
Sort order	301	Carrier pressure	26 psig
Sample size	40 ul	Carrier pressure variance	± 15%
Target component	C2	Flow rate	6.3 ml/min
Target retention time	140 seconds	Flow rate variance	± 15%
Inject time	15 seconds	Oven temperature	60° C
NOTE: Air analyzed or hydrogen (H2) if air not present. This train can tolerate CO2 and H2O as well as hydrocarbons heavier than C1. When used in conjunction with BBH, the combination is capable of providing the following calculated performance: ± 0.25 Btu with a C3+ analysis.			

Component number	Separated component	Range (mol%)		%RSD	Minimum detectable limit (mol%)	Gate on	Peak retention time	Gate off	Slope (run)	Slope (rise)	Minimum peak area	Front height ratio	Peak detection method	Peak direction	Baseline segment start	Baseline segment end
		Minimum	Maximum													
1	Propane plus	0.05	100	1	0.001	17.5	23.3	25.2	15	3	3000	0.75	Auto	Positive	0	0
2	Hydrogen	0.5	10	1	0.05	23.3	27.4	31.4	15	3	3000	0.75	Auto	Positive	0	0
3	Nitrogen	0.05	100	1	0.001	28.4	30.8	37	60	3	3000	0.75	Auto	Positive	0	0
4	Methane	0.05	100	1	0.001	36	38	52	60	3	3000	0.75	Auto	Positive	0	0
5	Carbon dioxide	0.1	100	1	0.002	50	59	100	100	3	3000	0.75	Auto	Positive	0	0
6	Ethylene	0.1	100	1	0.002	110	112	300	200	3	3000	0.75	Auto	Positive	0	0
7	Ethane	0.1	100	1	0.002	110	140	165	150	3	3000	0.75	Auto	Positive	0	0
8	Hydrogen sulfide	0.01	0.12	2	0.003	110	200	240	200	3	3000	0.75	Auto	Positive	0	0

†Hydrogen carrier gas cannot be used in a PGC1000 built for helium.

BCB train (hydrogen carrier)



Typical settings (individual analyzers may vary)

Cycle time	345 seconds	Inject time variance	± 10%
Sort order	301	Carrier pressure	26 psig
Sample size	40 ul	Carrier pressure variance	± 15%
Target component	C2	Flow rate	6.3 ml/min
Target retention time	140 seconds	Flow rate variance	± 15%
Inject time	15 seconds	Oven temperature	60° C

NOTE: Air analyzed or hydrogen (H2) if air not present. This train can tolerate CO2 and H2O as well as hydrocarbons heavier than C1. When used in conjunction with BBH, the combination is capable of providing the following calculated performance: ± 0.25 Btu with a C3+ analysis at room temperature. For temperatures from -18 to 55 degrees Celsius, the ±Btu performance value doubles.

Component number	Separated component	Range (mol%)		%RSD	Minimum detectable limit (mol%)	Gate on	Peak retention time	Gate off	Slope (run)	Slope (rise)	Minimum peak area	Front height ratio	Peak detection method	Peak direction	Baseline segment start	Baseline segment end
		Minimum	Maximum													
1	Propane plus	0.05	100	1	0.001	17.5	23.3	25.2	15	3	3000	0.75	Auto	Positive	0	0
2	Helium	0.5	10	1	0.05	23.3	27.4	31.4	15	3	3000	0.75	Auto	Positive	0	0
3	Nitrogen	0.05	100	1	0.001	28.4	30.8	37	60	3	3000	0.75	Auto	Positive	0	0
4	Methane	0.05	100	1	0.001	36	38	52	60	3	3000	0.75	Auto	Positive	0	0
5	Carbon dioxide	0.1	100	1	0.002	50	59	100	100	3	3000	0.75	Auto	Positive	0	0
6	Ethylene	0.1	100	1	0.002	110	112	300	200	3	3000	0.75	Auto	Positive	0	0
7	Ethane	0.1	100	1	0.002	110	140	165	150	3	3000	0.75	Auto	Positive	0	0
8	Hydrogen sulfide	0.01	0.12	2	0.003	110	200	240	200	3	3000	0.75	Auto	Positive	0	0

BCB heavy hydrocarbon train

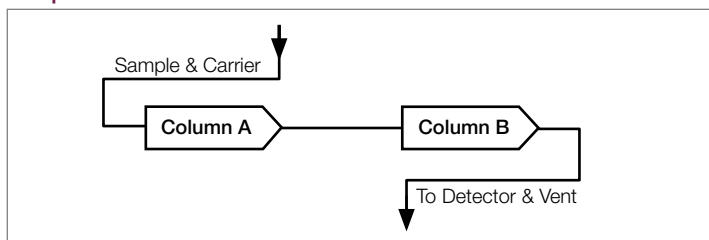
Inject mode 15 (±2) seconds

The following illustration shows clouds of gas moving through column A. The lighter gasses have already passed through column A and are now moving through column B. The user should note that, if the injection period is too long, the propane will pass into column B. Once there, it will elute during a later cycle and give a faulty Btu value.

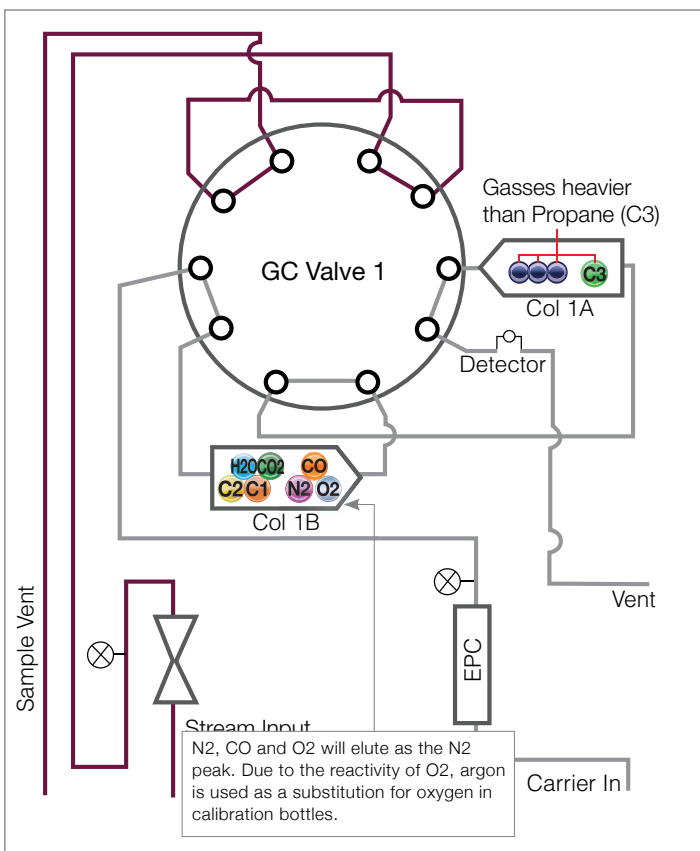
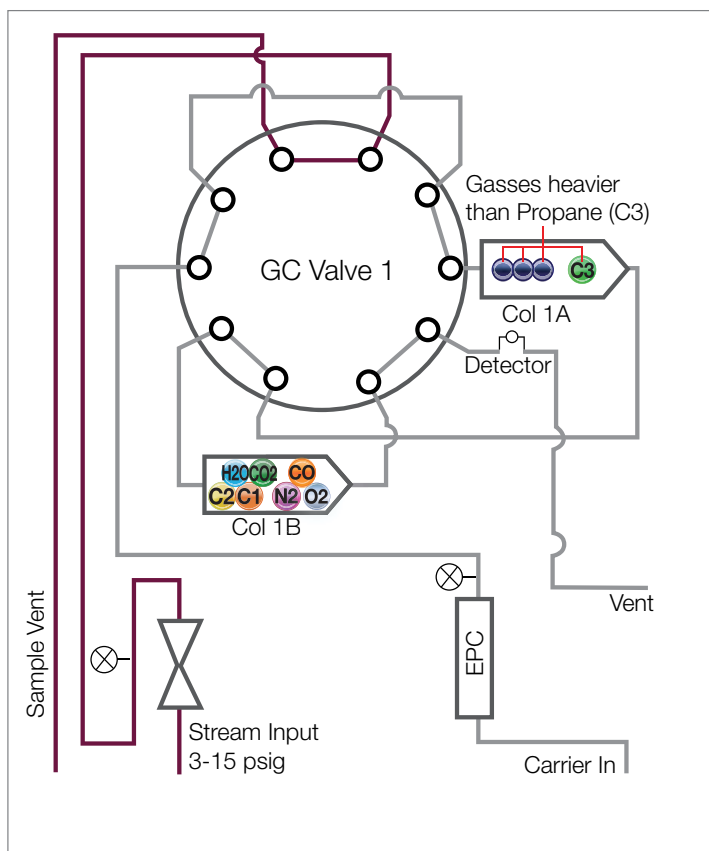
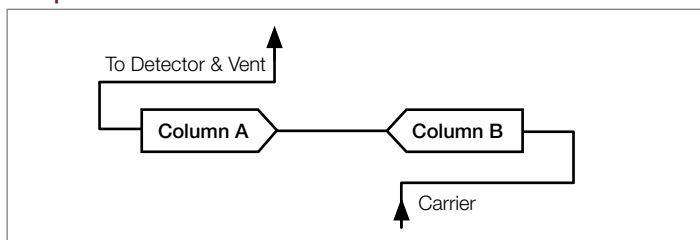
Backflush mode

In column A, the C3 and any heavier gasses merge back into one small peak. These are labeled as C3+ for the BCB train. During backflush, the gasses move off the column and cross the detector bead. When this happens, each gas changes the amount of energy required to maintain the temperature level of the bead. This change in energy is what causes the peak generation for each of the gasses.

Simplified view

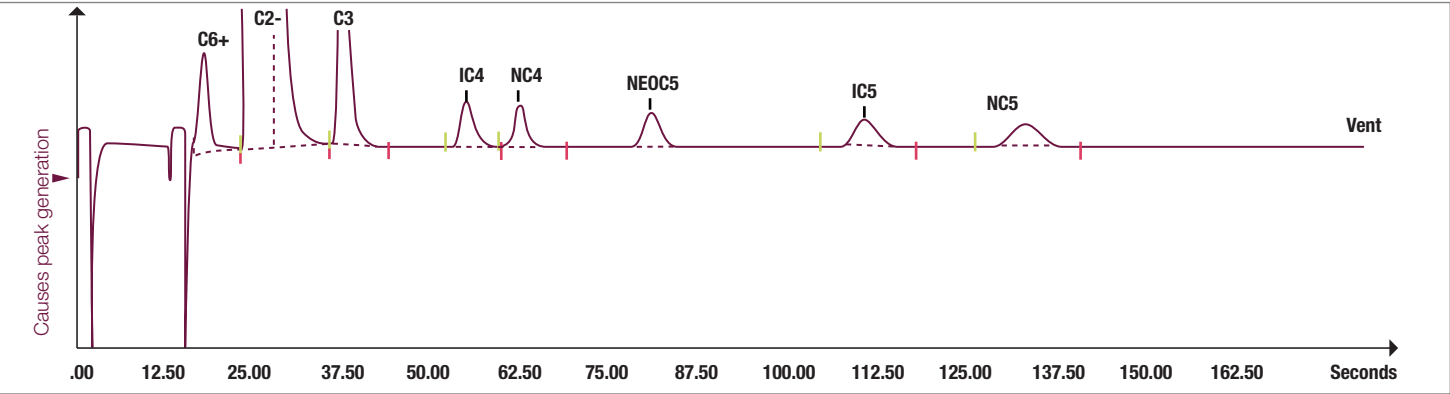


Simplified view





BCC train (†helium carrier)



Typical settings (individual analyzers may vary)

Cycle time	180 seconds	Inject time variance	± 10%
Sort order	22	Carrier pressure	25 psig
Sample size	40 ul	Carrier pressure variance	± 15%
Target component	NC5	Flow rate	7 ml/min
Target retention time	130 seconds	Flow rate variance	± 15%
Inject time	13 seconds	Oven temperature	60° C

NOTE: When used in conjunction with BCG, the combination is capable of providing the following calculated performance: ± 1 Btu.

Component number	Separated component	Range (mol%)		%RSD	Minimum detectable limit (mol%)	Gate on	Peak retention time	Gate off	Slope (run)	Slope (rise)	Minimum peak area	Front height ratio	Peak detection method	Peak direction	Baseline segment start	Baseline segment end
		Minimum	Maximum													
1	Hexane plus	0.02	10	2	0.004	14	18	20	30	1	3000	0.75	Auto	Positive	0	0
2	Propane	0.1	100	2	0.002	35	40	50	15	1	3000	0.75	Auto	Positive	0	0
3	Isobutane	0.1	40	2	0.002	50	58	63	15	1	3000	0.75	Auto	Positive	0	0
4	Normal butane	0.1	40	2	0.002	59	65	75	30	3	3000	0.75	Auto	Positive	0	0
5	Neopentane	0.1	15	2	0.002	75	84	160	60	3	3000	0.75	Auto	Positive	0	0
6	Isopentane	0.1	15	2	0.002	75	112	160	60	3	3000	0.75	Auto	Positive	0	0
7	Normal pentane	0.1	15	2	0.002	75	132	160	60	3	3000	0.75	Auto	Positive	0	0

Interfering component	Symbol	Max. tolerance	Notes
Water	H2O	0.03	Elutes 1 minute behind NC5
Propylene	C3=	0.005	Co-elutes with C3
Butene-1	B-1	0.0025	Elutes between IC4 and NC4
Isobutylene	IC4=	0.0025	Elutes between IC4 and NC4

Interfering component	Symbol	Max. tolerance	Notes
Trans-Butene-2	tB-2	0.0025	Co-elutes with NC4
Cis-Butene-2	cB-2	0.0025	Co-elutes with NC4
1,3-Butadiene	1,3-BD	0.0025	Co-elutes with NC4

†Hydrogen carrier gas cannot be used in a PGC1000 built for helium.

BCC train

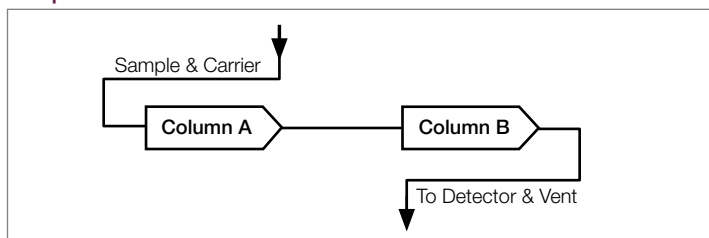
Inject mode 15 (±2) seconds

The provided illustration shows that during the inject mode, the lighter gasses have already moved through column A and into column B. The heavier gasses are retained on column A.

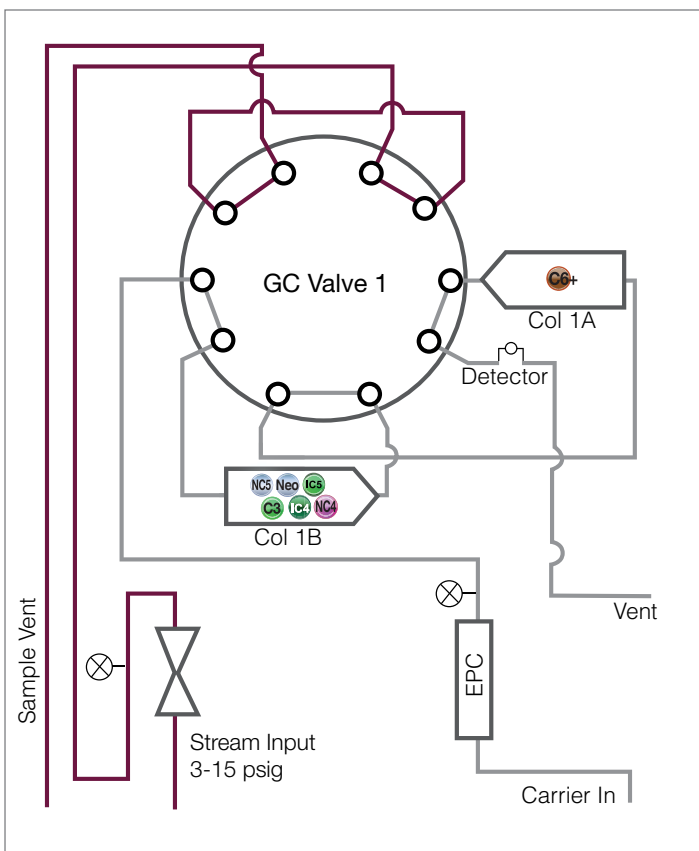
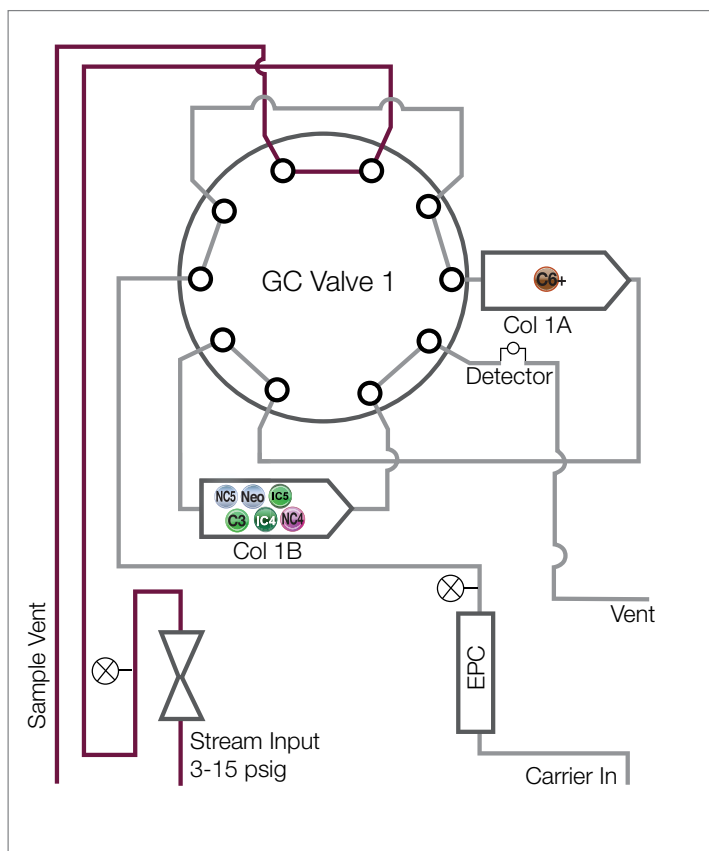
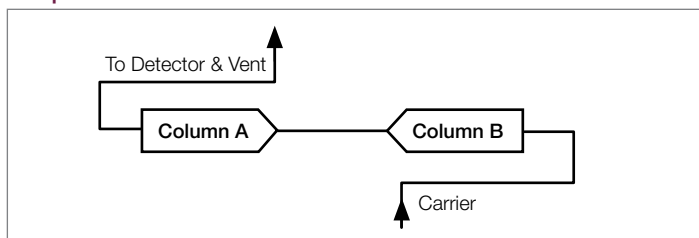
Backflush mode

In column A, C6 and heavier gasses are combined into a group named C6+. C3-C5 will continue through column B, pass through column A again and cross the detector bead. When the gasses cross the detector bead, they change the amount of energy necessary to maintain the temperature level of the bead. This change in energy is what causes the peak generation for each of the gasses.

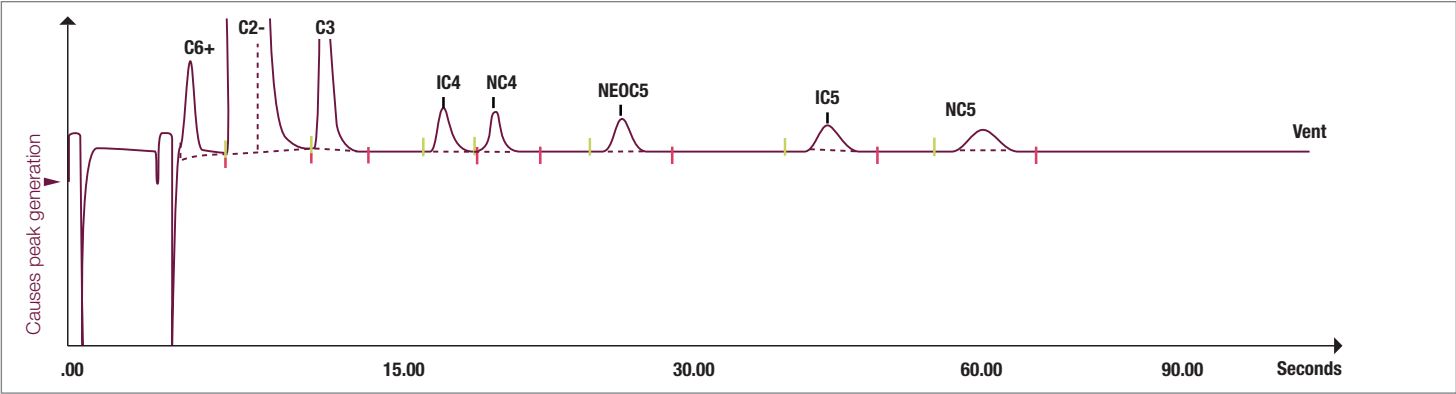
Simplified view



Simplified view



BCD train (hydrogen carrier)



Typical settings (individual analyzers may vary)

Cycle time	90 seconds	Inject time variance	± 10%
Sort order	83	Carrier pressure	25 psig
Sample size	40 ul	Carrier pressure variance	± 15%
Target component	NC5	Flow rate	17 ml/min
Target retention time	59 seconds	Flow rate variance	± 15%
Inject time	6 seconds	Oven temperature	60° C

NOTE: When used in conjunction with BCG, the combination is capable of providing the following calculated performance: ± 1 Btu.

Component number	Separated component	Range (mol%)		%RSD	Minimum detectable limit (mol%)	Gate on	Peak retention time	Gate off	Slope (run)	Slope (rise)	Minimum peak area	Front height ratio	Peak detection method	Peak direction	Baseline segment start	Baseline segment end
		Minimum	Maximum													
1	Hexane plus	0.02	10	2	0.004	7	8.2	10	9	1	3000	0.95	Auto	Positive	0	0
2	Propane	0.1	100	2	0.002	18.3	19.4	63	5	3	3000	0.95	Auto	Positive	0	0
3	Isobutane	0.1	40	2	0.002	18.3	27.3	63	5	3	3000	0.75	Auto	Positive	0	0
4	Normal butane	0.1	40	2	0.002	18.3	30.5	63	5	3	3000	0.75	Auto	Positive	0	0
5	Neopentane	0.1	15	2	0.002	18.3	38.9	63	5	3	3000	0.75	Auto	Positive	0	0
6	Isopentane	0.1	15	2	0.002	18.3	51	63	5	3	3000	0.75	Auto	Positive	0	0
7	Normal pentane	0.1	15	2	0.002	18.3	59.1	63	5	3	3000	0.75	Auto	Positive	0	0

Interfering component	Symbol	Max. tolerance	Notes
Water	H2O	0.03	Elutes 1 minute behind NC5
Propylene	C3=	0.005	Co-elutes with C3
Butene-1	B-1	0.0025	Elutes between IC4 and NC4
Isobutylene	IC4=	0.0025	Elutes between IC4 and NC4

Interfering component	Symbol	Max. tolerance	Notes
Trans-Butene-2	tB-2	0.0025	Co-elutes with NC4
Cis-Butene-2	cB-2	0.0025	Co-elutes with NC4
1,3-Butadiene	1,3-BD	0.0025	Co-elutes with NC4

BCD train

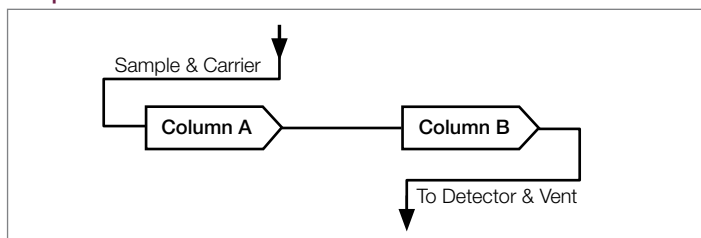
Inject mode 15 (±2) seconds

The provided illustration shows that during the inject mode, the lighter gasses have already moved through column A and into column B. The heavier gasses are retained on column A.

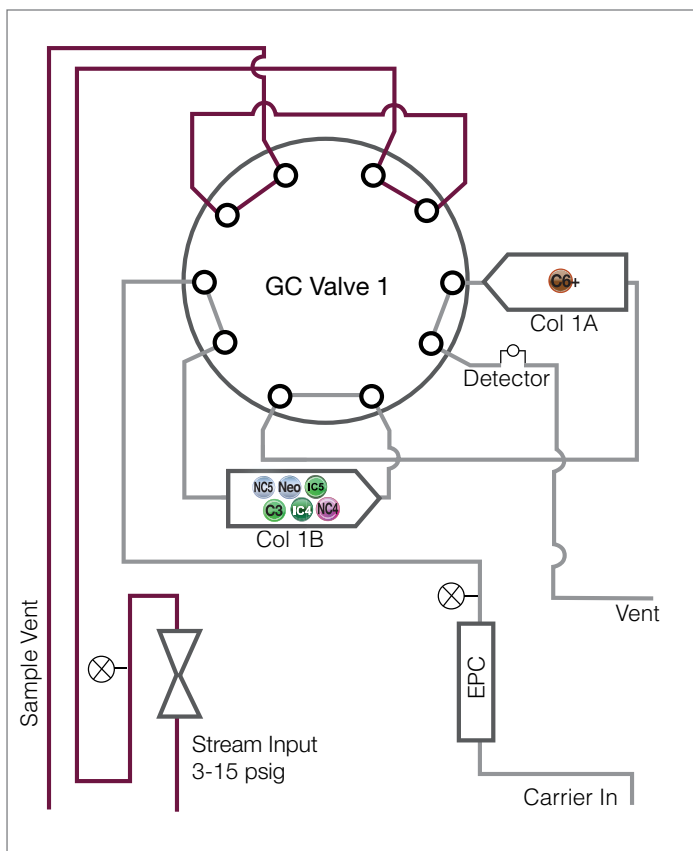
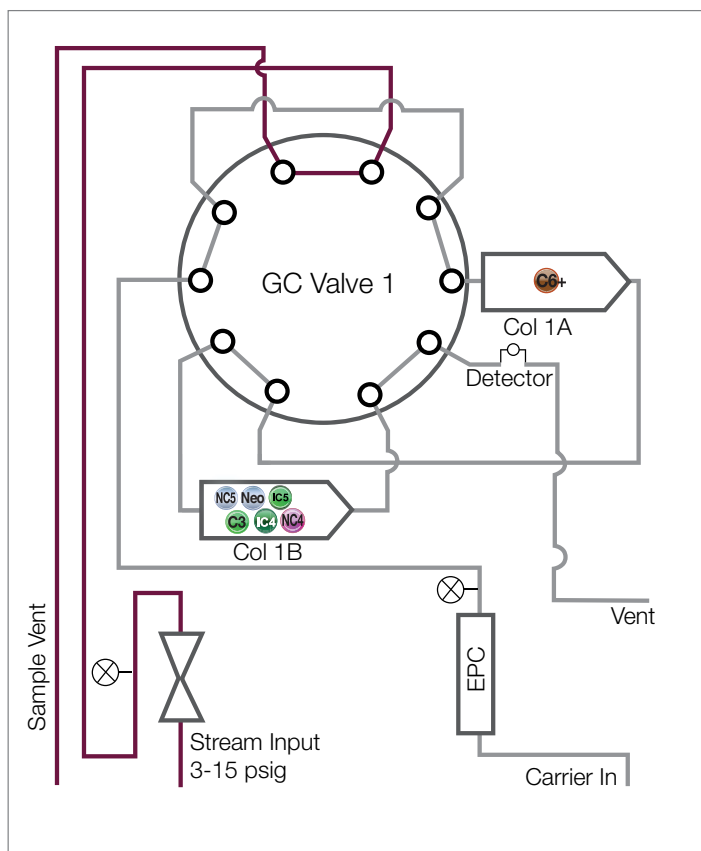
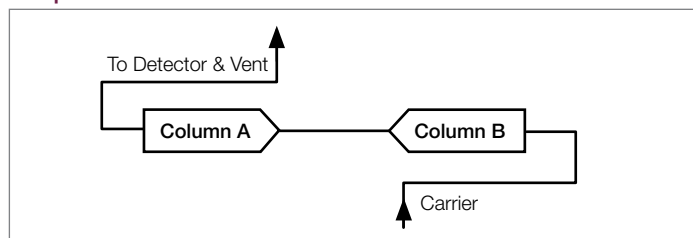
Backflush mode

In column A, C6 and heavier gasses are combined into a group named C6+. C3-C5 will continue through column B, pass through column A again and cross the detector bead. When the gasses cross the detector bead, they change the amount of energy necessary to maintain the temperature level of the bead. This change in energy is what causes the peak generation for each of the gasses.

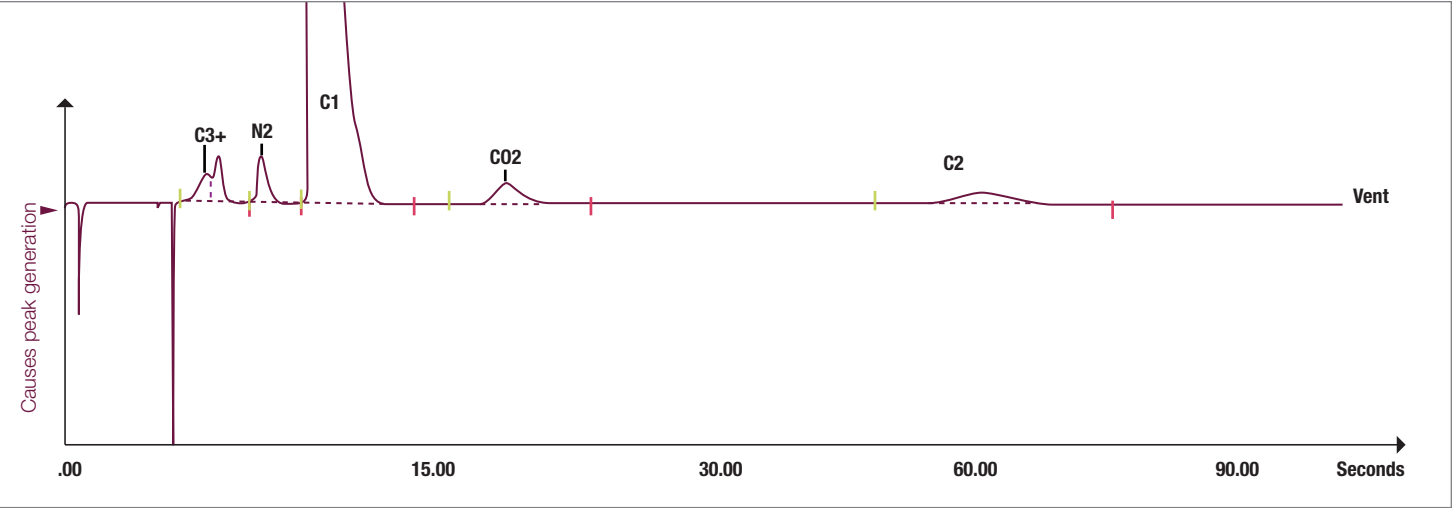
Simplified view



Simplified view



BCF train (hydrogen carrier)



Typical settings (individual analyzers may vary)			
Cycle time	90 seconds	Inject time variance	± 10%
Sort order	84	Carrier pressure	30 psig
Sample size	40 ul	Carrier pressure variance	± 15%
Target component	C2	Flow rate	20 ml/min
Target retention time	60 seconds	Flow rate variance	± 15%
Inject time	6 seconds	Oven temperature	60° C

Component number	Separated component	Range (mol%)		%RSD	Minimum detectable limit (mol%)	Gate on	Peak retention time	Gate off	Slope (run)	Slope (rise)	Minimum peak area	Front height ratio	Peak detection method	Peak direction	Baseline segment start	Baseline segment end
		Minimum	Maximum													
1	Propane plus	0.1	100	2	0.02	7.2	8.8	10.4	9	3	3000	0.95	Auto	Positive	0	0
2	Nitrogen	0.1	100	2	0.02	10.4	11.07	21.75	5	3	3000	0.95	Auto	Positive	0	0
3	Methane	0.1	100	2	0.02	10.4	14	21.75	5	3	3000	0.75	Auto	Positive	0	0
4	Carbon dioxide	0.2	100	2	0.02	21.75	24	26	5	3	3000	0.75	Auto	Positive	0	0
5	Ethylene	0.2	100	2	0.02	28	44	52	5	3	3000	0.75	Auto	Positive	0	0
6	Ethane	0.2	100	2	0.02	52	57.4	64	5	3	3000	0.75	Auto	Positive	0	0

Interfering component	Symbol	Max. tolerance	Notes
Water	H2O	0.02	Elutes with H2S
Acetylene	C2*	0.01	Elutes with C2=

BCF train

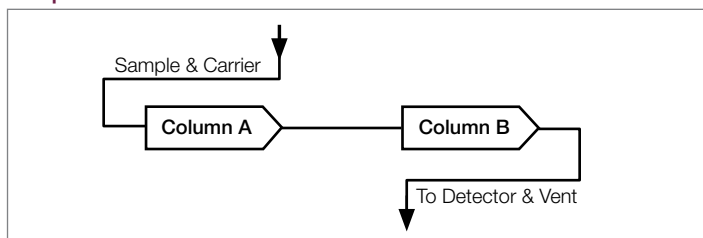
Inject mode 15 (±2) seconds

The provided illustration shows that during the inject mode, the lighter gasses have already moved through column A and into column B. The heavier gasses are retained on column A.

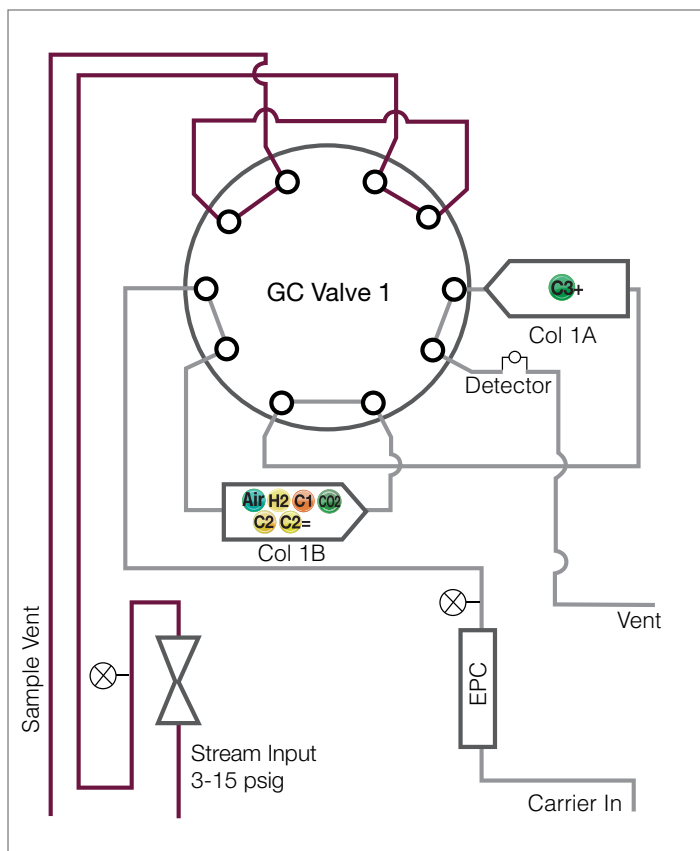
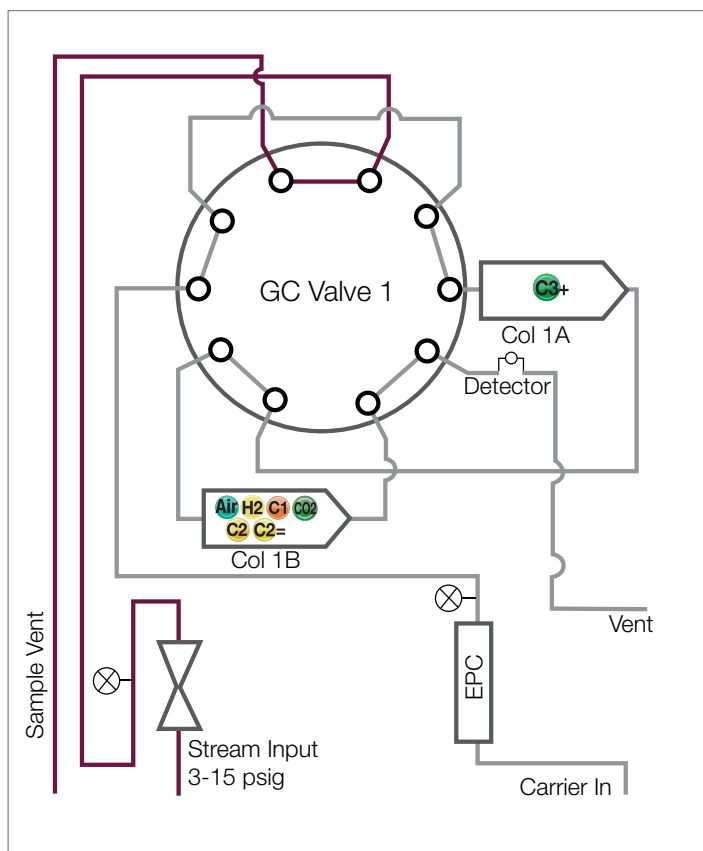
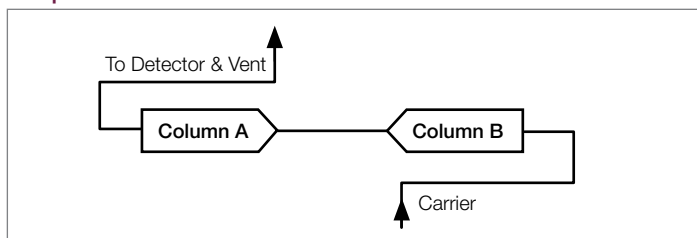
Backflush mode

In column A, C3 and heavier gasses are combined into a group named C3+. The lighter gasses will continue through column B, pass through column A again and cross the detector bead. When the gasses cross the detector bead, they change the amount of energy necessary to maintain the temperature level of the bead. This change in energy is what causes the peak generation for each of the gasses.

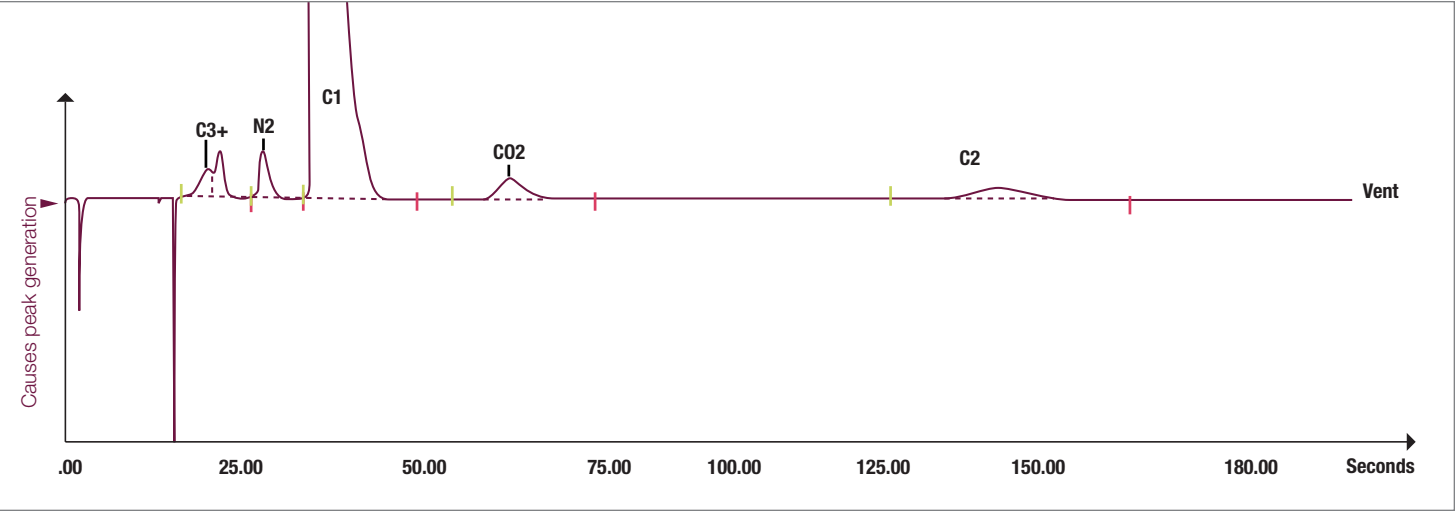
Simplified view



Simplified view



BCG train (†helium carrier)



Typical settings (individual analyzers may vary)			
Cycle time	180 seconds	Inject time variance	± 10%
Sort order	84	Carrier pressure	40 psig
Sample size	40 ul	Carrier pressure variance	± 15%
Target component	C2	Flow rate	14 ml/min
Target retention time	150 seconds	Flow rate variance	± 15%
Inject time	13 seconds	Oven temperature	60° C
When used in conjunction with BCC, the combination is capable of providing the following calculated performance: ± 1 Btu.			

Component number	Separated component	Range (mol%)		%RSD	Minimum detectable limit (mol%)	Gate on	Peak retention time	Gate off	Slope (run)	Slope (rise)	Minimum peak area	Front height ratio	Peak detection method	Peak direction	Baseline segment start	Baseline segment end
		Minimum	Maximum													
1	Propane plus	0.1	100	2	0.02	14	19	20	15	15	3000	0.75	Auto	Positive	0	0
2	Nitrogen	0.1	100	2	0.02	23	26	38	15	15	3000	0.75	Auto	Positive	0	0
3	Methane	0.1	100	2	0.02	23	33	38	30	3	3000	0.75	Auto	Positive	0	0
4	Carbon dioxide	0.2	100	2	0.02	50	60	70	30	3	3000	0.75	Auto	Positive	0	0
5	Ethylene	0.2	100	2	0.02	75	126	160	30	3	3000	0.75	Auto	Positive	0	0
6	Ethane	0.2	100	2	0.02	75	146	160	30	3	3000	0.75	Auto	Positive	0	0

Interfering component	Symbol	Max. tolerance	Notes
Water	H2O	0.02	Elutes with H2S
Acetylene	C2*	0.01	Elutes with C2=

*Hydrogen carrier gas cannot be used in a PGC1000 built for helium.

BCG train

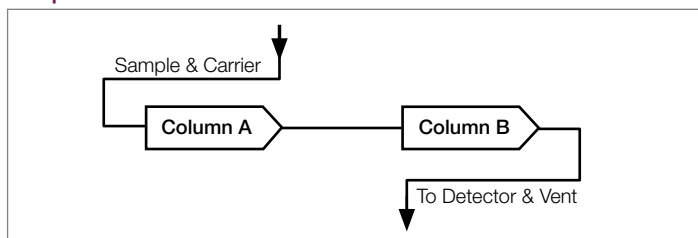
Inject mode 15 (±2) seconds

The provided illustration shows that during the inject mode, the lighter gasses have already moved through column A and into column B. The heavier gasses are retained on column A.

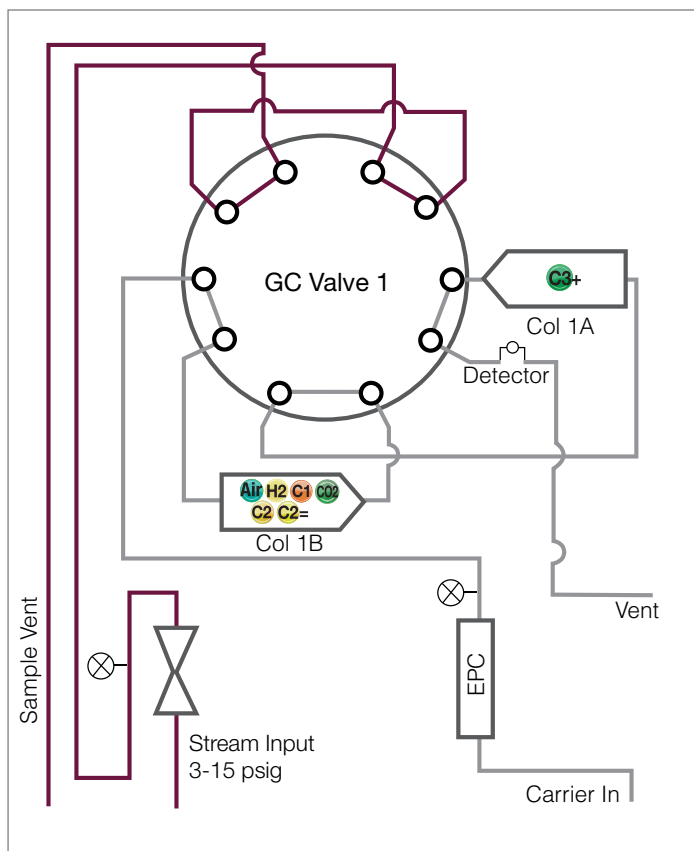
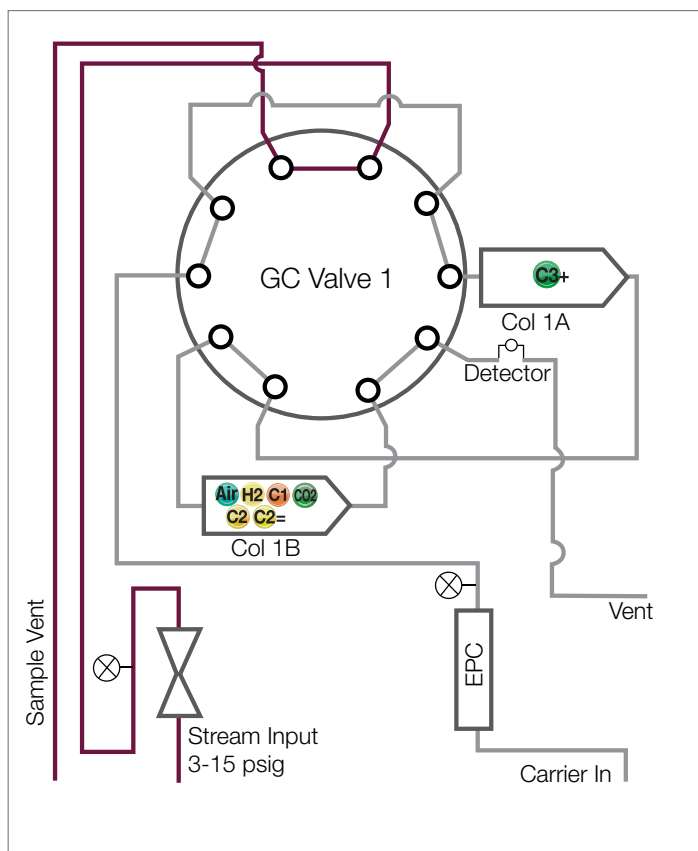
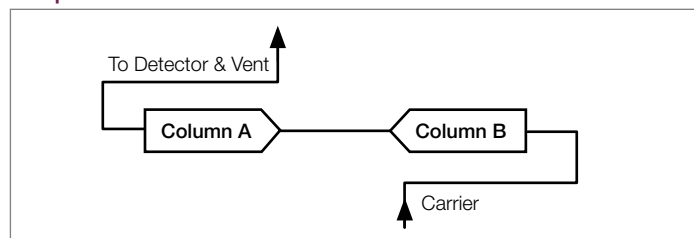
Backflush mode

In column A, C3 and heavier gasses are combined into a group named C3+. The lighter gasses will continue through column B, pass through column A again and cross the detector bead. When the gasses cross the detector bead, they change the amount of energy necessary to maintain the temperature level of the bead. This change in energy is what causes the peak generation for each of the gasses.

Simplified view



Simplified view



BCH train (†helium carrier)



Typical settings (individual analyzers may vary)

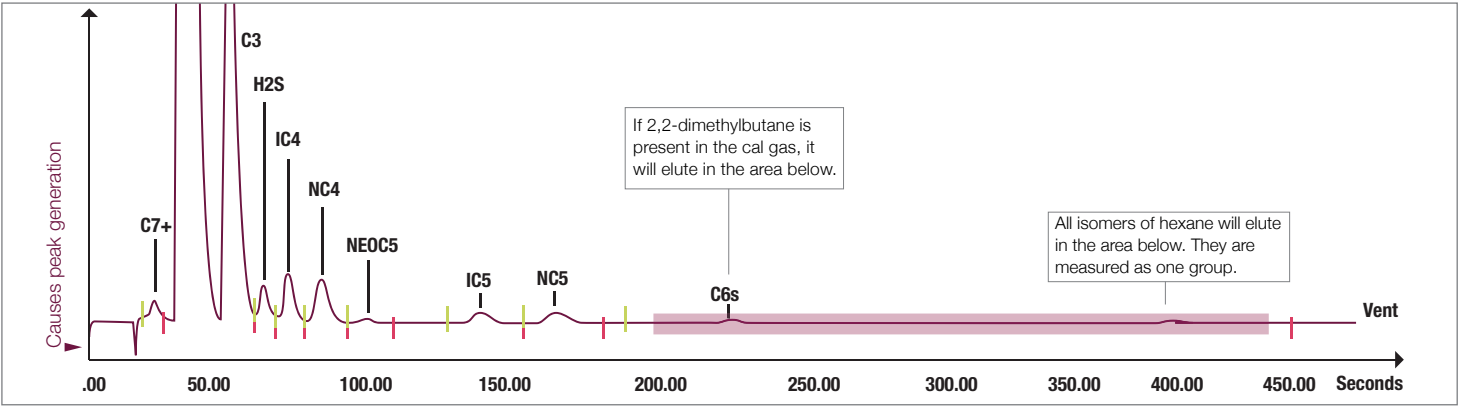
Cycle time	490 seconds	Inject time variance	± 10%
Sort order	162	Carrier pressure	25 psig
Sample size	40 ul	Carrier pressure variance	± 15%
Target component	NC6	Flow rate	5.4 ml/min
Target retention time	400 seconds	Flow rate variance	± 15%
Inject time	15 seconds	Oven temperature	60° C

NOTE: When used in conjunction with BBF & BBK trains, a calculated Btu performance of ± 0.25 Btu with a C9+ analysis can be performed.

Component number	Separated component	Range (mol%)		%RSD	Minimum detectable limit (mol%)	Gate on	Peak retention time	Gate off	Slope (run)	Slope (rise)	Minimum peak area	Front height ratio	Peak detection method	Peak direction	Baseline segment start	Baseline segment end
		Minimum	Maximum													
1	Heptane plus	0.005	5	2	0.001	19	21	30	30	3	3000	0.75	Auto	Positive	0	0
2	Propane	0.005	50	1	0.001	43	54	59	15	3	3000	0.75	Auto	Positive	0	0
3	Hydrogen sulfide	0.05	0.12	3	0.02	55	67	67	30	3	300	0.75	Auto	Positive	0	0
4	Isobutane	0.005	15	1	0.001	63	76	78	30	3	3000	0.75	Auto	Positive	0	0
5	Normal butane	0.005	15	1	0.001	72	89	94	60	3	3000	0.75	Auto	Positive	0	0
6	Neopentane	0.005	10	1	0.001	86	107	115	100	3	3000	0.75	Auto	Positive	0	0
7	Isopentane	0.005	10	1	0.001	115	149	192	100	3	3000	0.75	Auto	Positive	0	0
8	Normal pentane	0.005	10	1	0.002	115	176	192	100	3	3000	0.75	Auto	Positive	0	0
9	Hexane	0.005	5	5	0.002	192	366	455	200	3	3000	0.75	APG	Positive	0	0

†Hydrogen carrier gas cannot be used in a PGC1000 built for helium.
NOTE: Colored text within a table represents a difference between the carriers.

BCH train (hydrogen carrier)



Typical settings (individual analyzers may vary)

Cycle time	450 seconds	Inject time variance	± 10%
Sort order	162	Carrier pressure	25 psig
Sample size	40 ul	Carrier pressure variance	± 15%
Target component	NC6	Flow rate	5.4 ml/min
Target retention time	400 seconds	Flow rate variance	± 15%
Inject time	15 seconds	Oven temperature	60° C

NOTE: When used in conjunction with BBF, the Btu repeatability is ± 0.25 Btu at room temperature. For temperatures from -18 to 55 degrees Celsius, the ± Btu performance value doubles.

Component number	Separated component	Range (mol%)		%RSD	Minimum detectable limit (mol%)	Gate on	Peak retention time	Gate off	Slope (run)	Slope (rise)	Minimum peak area	Front height ratio	Peak detection method	Peak direction	Baseline segment start	Baseline segment end
		Minimum	Maximum													
1	Heptane plus	0.05	5	2	0.001	19	21	30	30	3	3000	0.75	Auto	Positive	0	0
2	Propane	0.05	100	1	0.001	43	54	59	15	3	3000	0.75	Auto	Positive	0	0
3	Hydrogen sulfide	0.05	0.12	3	0.02	55	67	67	30	3	300	0.75	Auto	Positive	0	0
4	Isobutane	0.05	15	1	0.001	63	76	78	30	3	3000	0.75	Auto	Positive	0	0
5	Normal butane	0.05	15	1	0.001	72	89	94	60	3	3000	0.75	Auto	Positive	0	0
6	Neopentane	0.05	15	1	0.001	86	107	115	100	3	3000	0.75	Auto	Positive	0	0
7	Isopentane	0.05	10	1	0.001	115	149	192	100	3	3000	0.75	Auto	Positive	0	0
8	Normal pentane	0.05	10	1	0.002	115	176	192	100	3	3000	0.75	Auto	Positive	0	0
9	Hexane	0.01	5	5	0.002	192	366	455	200	3	3000	0.75	APG	Positive	0	0

Interfering component	Symbol	Max. tolerance	Notes
Water	H2O	0.01	

BCH (C7+, H2S) train

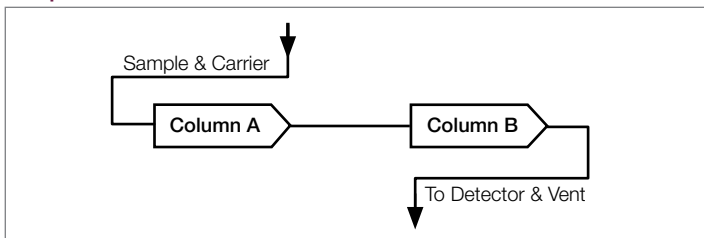
Inject mode 15 (±2) seconds

The provided illustration displays the isomers of heptane, octane, nonane and decane moving through column A. The lighter gasses have already passed through column A and are now moving through column B. The user should note that if the injection period is too long, isomers of heptane will be carried into column B, or if the injection duration is too short, not all of the NC6 (hexane) gas will be injected into column B.

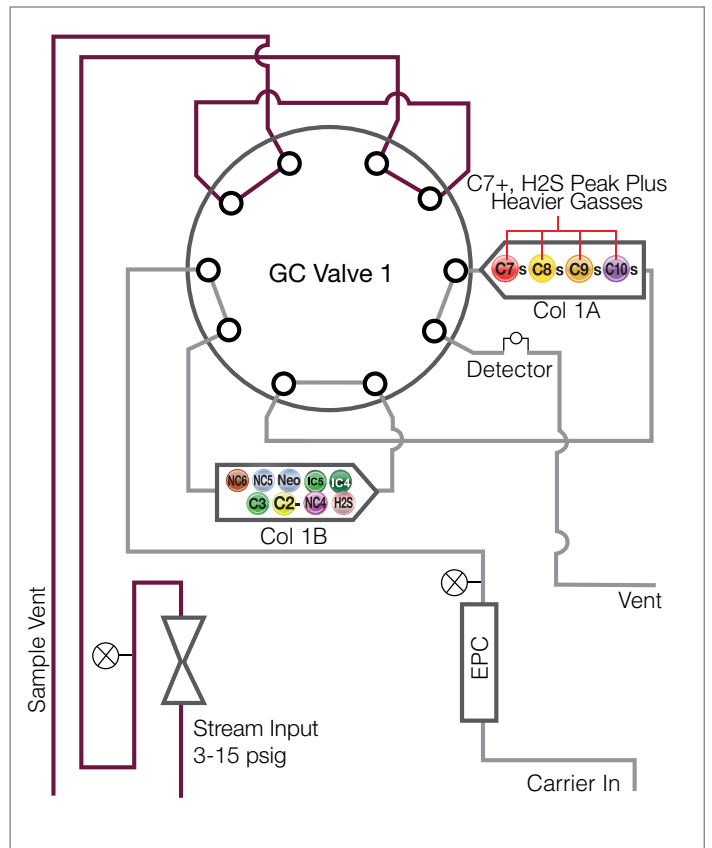
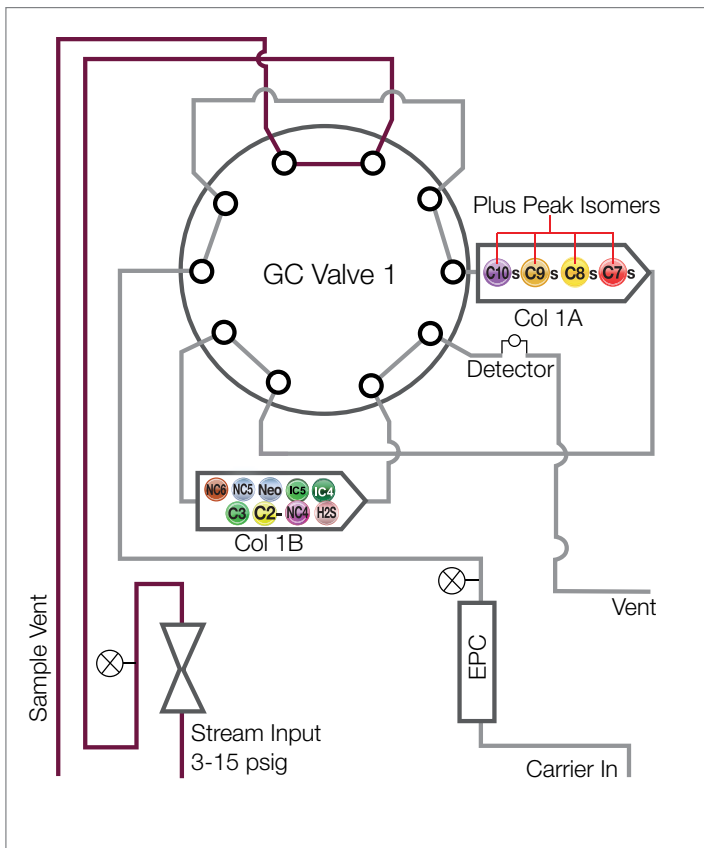
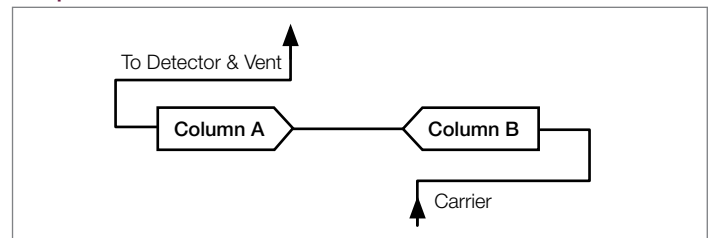
Backflush mode

In column A, the gasses heavier than hexane group back into one peak. These are labeled C7+. The plus (+) signifies heavier gasses such as C8s, C9s and C10s. These heavier gasses may be in the cal or stream gas. During backflush, the gasses come off the column (elute) and cross the detector bead. When this takes place, each gas changes the amount of energy required to maintain the temperature level of the bead. This change in energy is what causes the peak generation for each of the gasses.

Simplified view

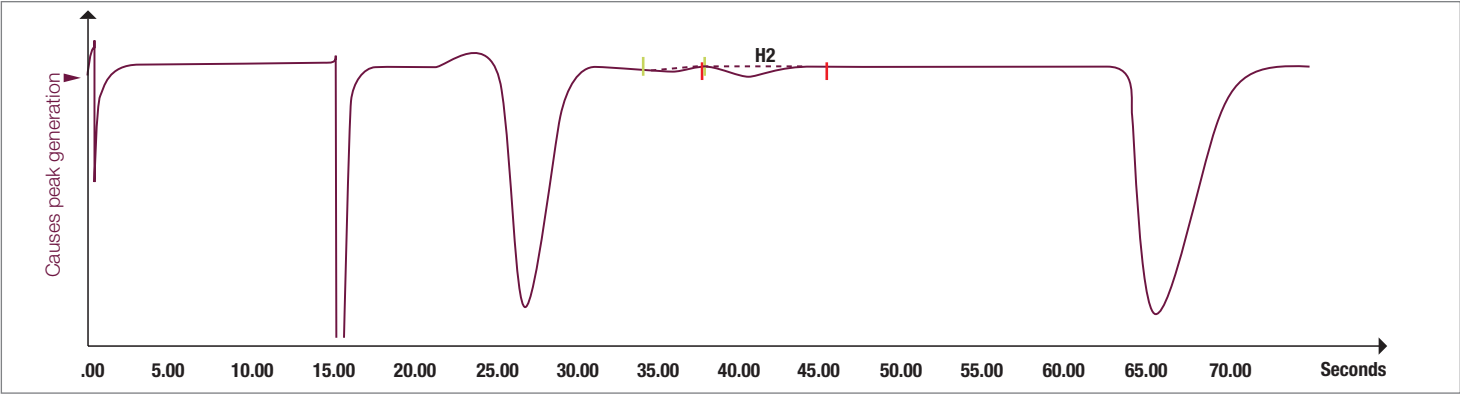


Simplified view





BCJ/BCP train (nitrogen carrier)



Sample chromatogram is reflective of the BCJ Train. BCP will look similar but with a longer cycle time.

BCJ train ~ Typical settings (individual analyzers may vary)

Cycle time	75 seconds	Inject time variance	± 10%
Sort order	281	Carrier pressure	7.5 psig
Sample size	20 ul	Carrier pressure variance	± 15%
Target component	H2	Flow rate	3.1 ml/min
Target retention time	45 seconds	Flow rate variance	± 15%
Inject time	15 seconds	Oven temperature	60° C

NOTE: Restricts second train to the same carrier, nitrogen (N2).

BCP train ~ Typical settings (individual analyzers may vary)

Cycle time	30 seconds	Inject time variance	± 10%
Sort order	282	Carrier pressure	5 psig
Sample size	12 ul	Carrier pressure variance	± 15%
Target component	H2	Flow rate	8.6 ml/min
Target retention time	10 seconds	Flow rate variance	± 15%
Inject time	15 seconds	Oven temperature	60° C

NOTE: Nitrogen carrier requires that the paired train also use N2 carrier.

			Range (mol%)		%RSD												
Component number	Separated component	Minimum	Maximum		Minimum detectable limit (mol%)	Gate on	Peak retention time	Gate off	Slope (run)	Slope (rise)	Minimum peak area	Front height ratio	Peak detection method	Peak direction	Baseline segment start	Baseline segment end	
BCJ	0		0	0	0	0	0	0	0	0	0	3000	0.75	Auto	Negative	0	0
	1	Hydrogen	0.1	100	1	0.01	34	45	52	20	1	3000	0.75	Auto	Negative	0	0
BCP	1	Hydrogen	0.1	100	1	0.01	2.7	5.6	10	5	3	3000	0.75	Auto	Negative	0	0
	2	Methane plus	10	100	3	1	10	20	28	100	1	3000	0.75	Auto	Negative	0	0

Interfering component	Symbol	Max. tolerance	Notes
Water	H2O	0.01	Elutes with C4+

BCJ/BCP train

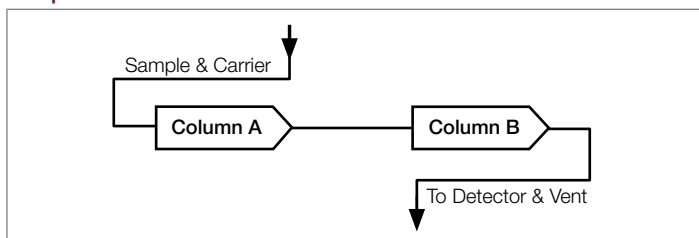
Inject mode 15 (±2) seconds

The provided illustration shows that during the inject mode, the lighter gasses have already moved through column A and into column B. The heavier gasses are retained on column A.

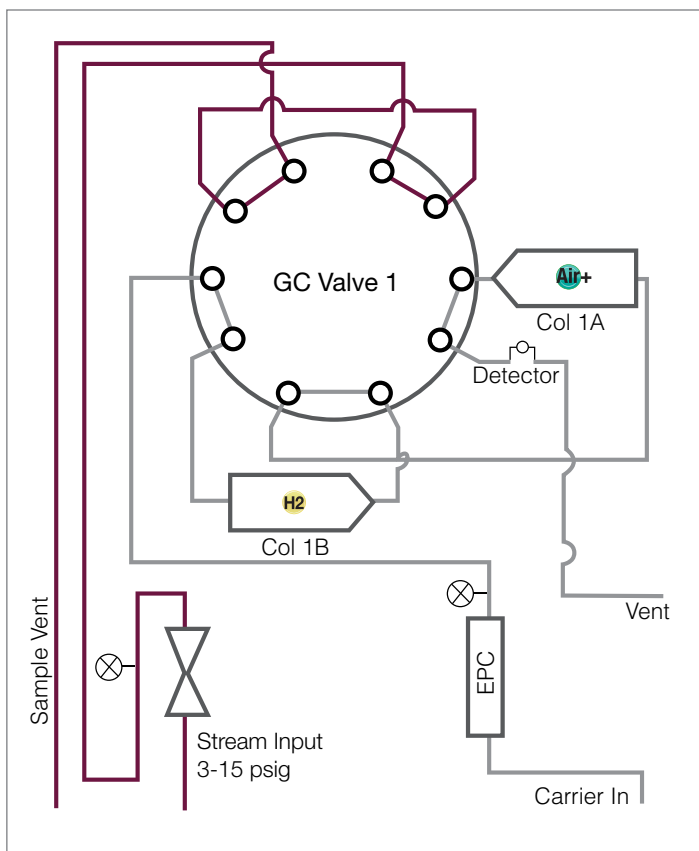
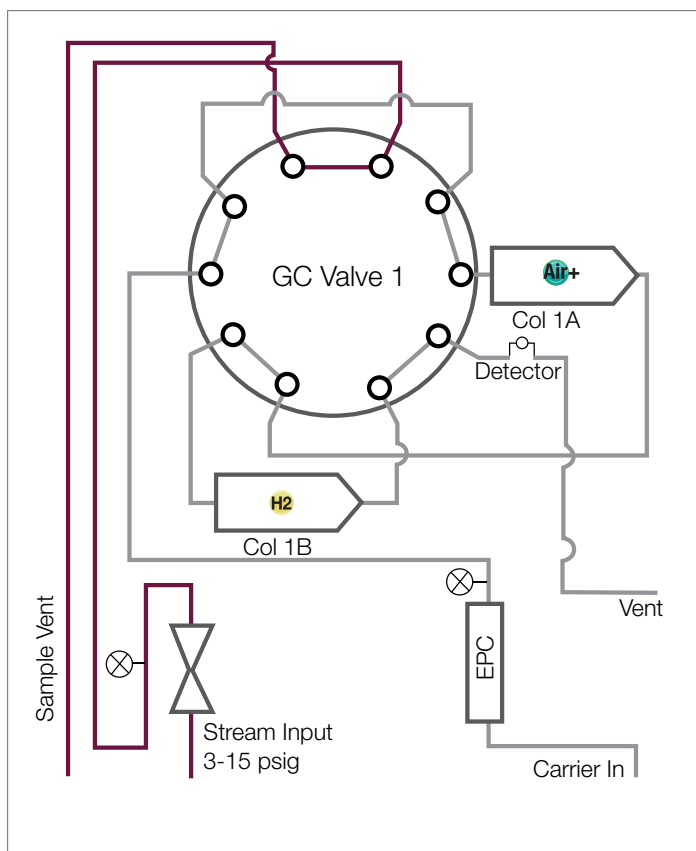
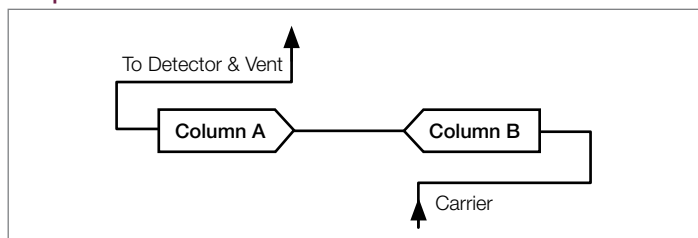
Backflush mode

In column A, N₂ and heavier gasses are combined into a group named Air+. The lighter gasses will continue through column B, pass through column A again and cross the detector bead. When the gasses cross the detector bead, they change the amount of energy necessary to maintain the temperature level of the bead. This change in energy is what causes the peak generation for each of the gasses.

Simplified view



Simplified view



BCK train (†helium carrier)

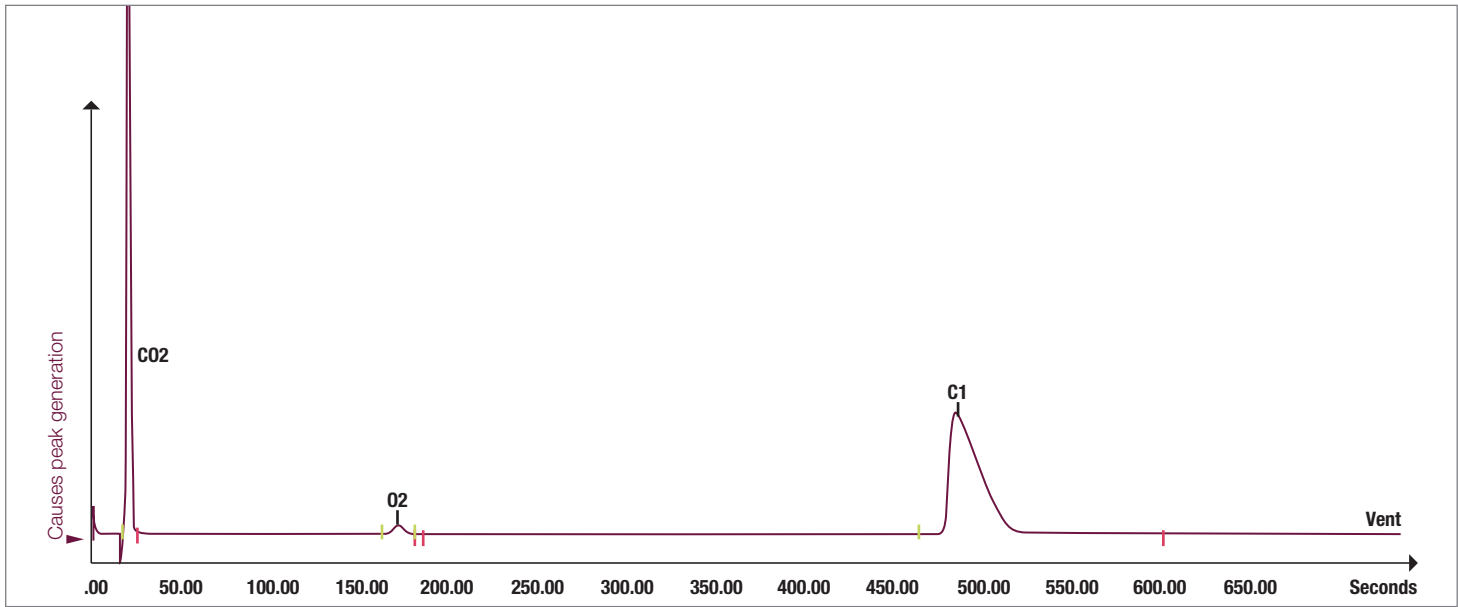


Typical settings (individual analyzers may vary)															
Cycle time				540 seconds				Inject time variance				± 10%			
Sort order				42				Carrier pressure				50 psig			
Sample size				20 ul				Carrier pressure variance				± 15%			
Target component				C1				Flow rate				7.5 ml/min			
Target retention time				482 seconds				Flow rate variance				± 15%			
Inject time				15 seconds				Oven temperature				60° C			

		Range (mol%)		%RSD												
Component number	Separated component	Minimum	Maximum		Minimum detectable limit (mol%)	Gate on	Peak retention time	Gate off	Slope (run)	Slope (rise)	Minimum peak area	Front height ratio	Peak detection method	Peak direction	Baseline segment start	Baseline segment end
1	Carbon dioxide plus	1	100	3	0.1	25	28	32	15	3	3000	0.75	Auto	Positive	0	0
2	Hydrogen	0.5	20	1	0.2	64.9	67.4	71.8	15	3	3000	0.75	Auto	Positive	0	0
3	Oxygen	0.2	20	1	0.01	158.6	165.4	169.7	15	3	3000	0.75	Auto	Positive	0	0
4	Nitrogen	0.1	100	1	0.01	169.7	174.8	191.2	15	3	3000	0.75	Auto	Positive	0	0
5	Carbon monoxide	0.2	100	2	0.02	215.4	225	233.8	15	3	3000	0.75	Auto	Positive	0	0
6	Methane	0.1	100	1	0.02	467.8	482	521	15	3	3000	0.75	Auto	Positive	0	0

†Hydrogen carrier gas cannot be used in a PGC1000 built for helium.
NOTE: Colored text within a table represents a difference between the carriers.

BCK train (hydrogen carrier)



Sample chromatogram is reflective of the helium carrier.

Typical settings (individual analyzers may vary)									
Cycle time					Inject time variance				
Sort order					Carrier pressure				
Sample size					Carrier pressure variance				
Target component					Flow rate				
Target retention time					Flow rate variance				
Inject time					Oven temperature				

Component number	Separated component	Range (mol%)		%RSD	Minimum detectable limit (mol%)	Gate on	Peak retention time	Gate off	Slope (run)	Slope (rise)	Minimum peak area	Front height ratio	Peak detection method	Peak direction	Baseline segment start	Baseline segment end
		Minimum	Maximum													
1	Carbon dioxide plus	1	100	2	0.1	25	28	32	15	3	3000	0.75	Auto	Positive	0	0
2	Helium	0.5	20	1	0.2	32.6	36	37.4	15	3	3000	0.75	Auto	Positive	0	0
3	Oxygen	0.1	20	1	0.01	103.4	107	155	15	3	3000	0.75	Auto	Positive	0	0
4	Nitrogen	0.1	100	1	0.01	109	112	155	15	3	3000	0.75	Auto	Positive	0	0
5	Carbon monoxide	0.2	100	2	0.02	139	144	155	15	3	3000	0.75	Auto	Positive	0	0
6	Methane	0.1	100	1	0.02	291	304	155	15	3	3000	0.75	Auto	Positive	0	0

BCK train

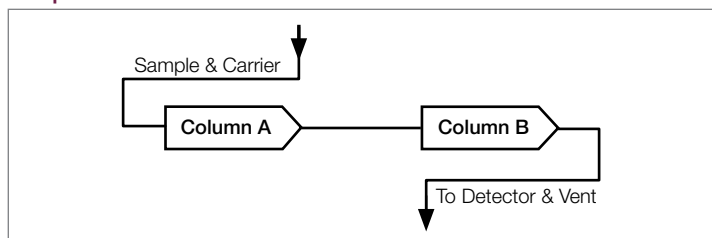
Inject mode 15 (±2) seconds

The provided illustration shows that during the inject mode, the lighter gasses have already moved through column A and into column B. The heavier gasses are retained on column A.

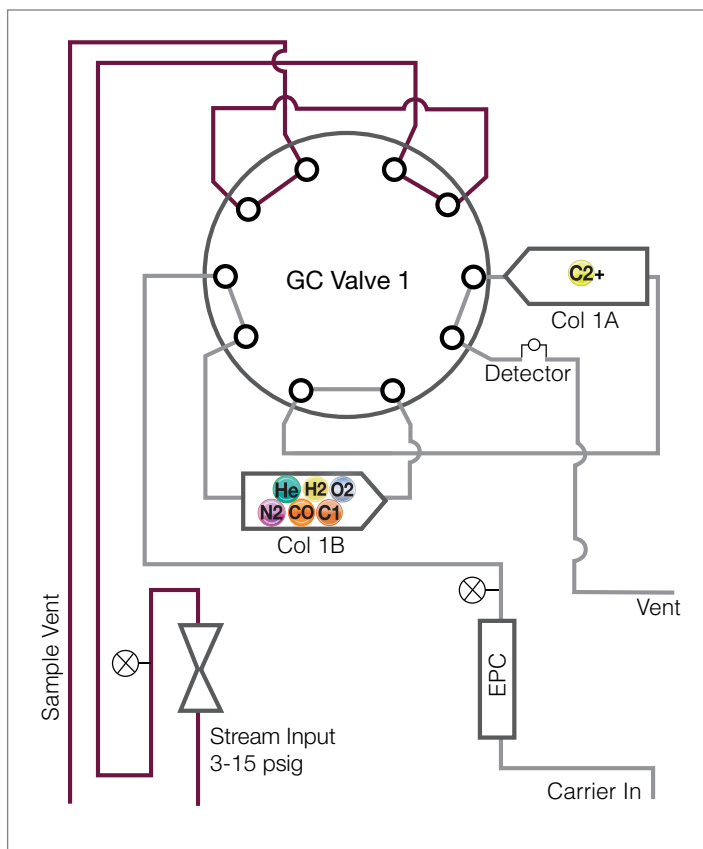
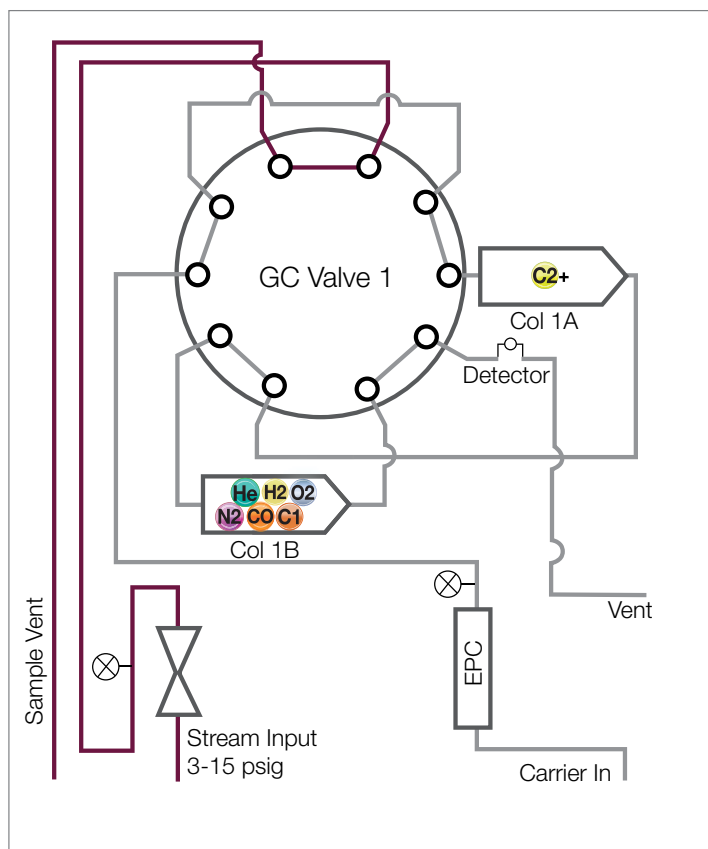
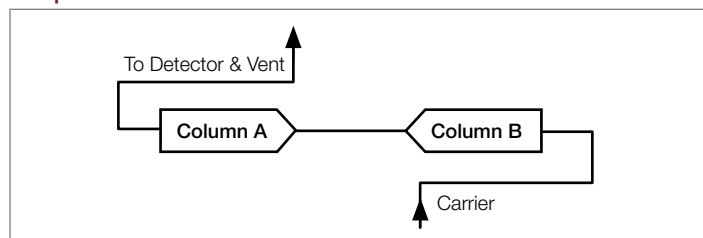
Backflush mode

In column A, C2 and heavier gasses are combined into a group named C2+. The lighter gasses will continue through column B, pass through column A again and cross the detector bead. When the gasses cross the detector bead, they change the amount of energy necessary to maintain the temperature level of the bead. This change in energy is what causes the peak generation for each of the gasses.

Simplified view

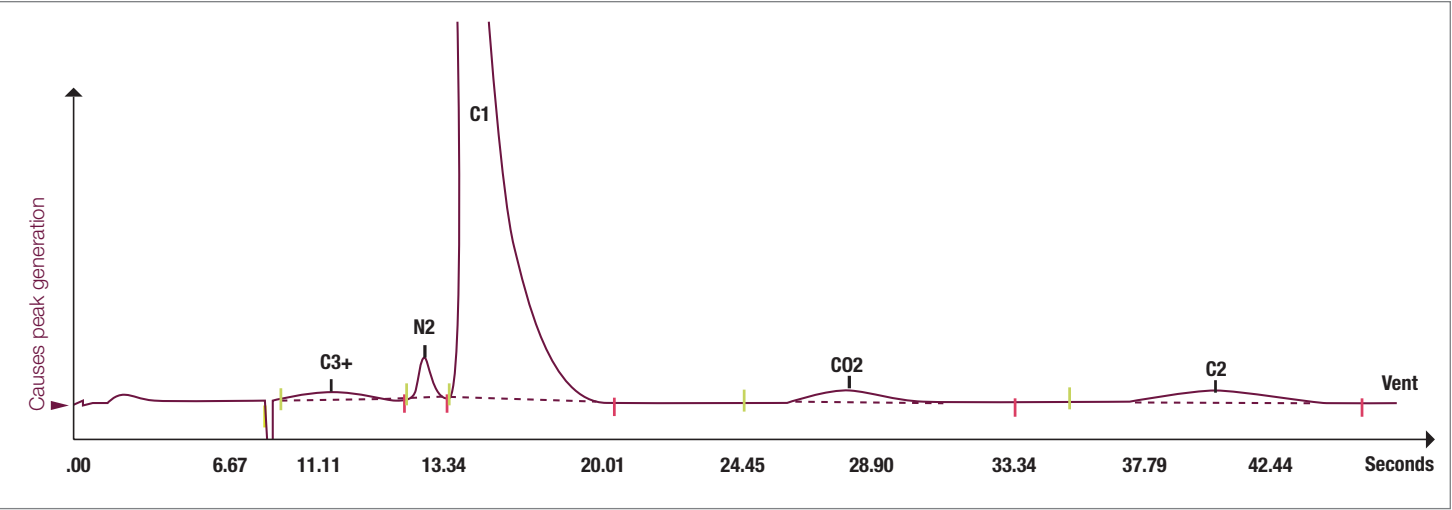


Simplified view





BCS (C3+) one minute train (†helium carrier)



Typical settings (individual analyzers may vary)			
Cycle time	60 seconds	Inject time variance	± 10%
Sort order	85	Carrier pressure	35 psig
Sample size	40 ul	Carrier pressure variance	± 15%
Target component	C2	Flow rate	14 ml/min
Target retention time	40 seconds	Flow rate variance	± 15%
Inject time	5 seconds	Oven temperature	60° C

NOTE: If BCT-BCS are configured together, a ± 1 Btu calculation can be performed every minute.

		Range (mol%)		%RSD												
Component number	Separated component	Minimum	Maximum		Minimum detectable limit (mol%)	Gate on	Peak retention time	Gate off	Slope (run)	Slope (rise)	Minimum peak area	Front height ratio	Peak detection method	Peak direction	Baseline segment start	Baseline segment end
1	Propane plus	0.1	100	2	0.02	9	8.1	12	15	3	3000	0.75	Auto	Positive	0	0
2	Nitrogen	0.1	100	2	0.02	10.5	12	13.5	15	3	3000	0.75	Auto	Positive	0	0
3	Methane	0.1	100	2	0.02	12.5	13.5	19	5	5	3000	0.75	Auto	Positive	0	0
4	Carbon dioxide	0.1	100	2	0.02	23.5	27	34	10	10	3000	0.75	Auto	Positive	0	0
5	Ethylene	0.1	100	2	0.02	30	34	37	15	3	3000	0.75	Auto	Positive	0	0
6	Ethane	0.1	100	2	0.02	33.5	40.8	47	60	3	3000	0.75	Auto	Positive	0	0

Interfering component	Symbol	Max. tolerance	Notes
Water	H2O	0.02	Elutes with H2S
Acetylene	C2*	0.01	Co-elutes with C2=

†Hydrogen carrier gas cannot be used in a PGC1000 built for helium.

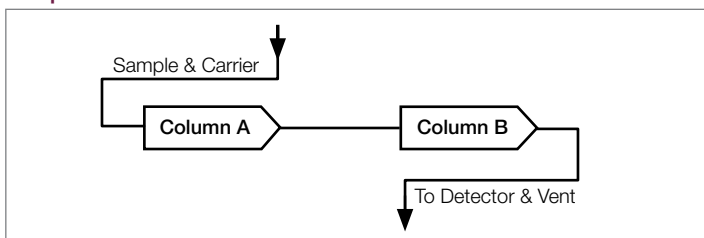
BCS (C3+) one minute train

Inject mode 15 (±2) seconds

The provided illustration displays the isomers of hexane, pentane, butane and propane moving through column A. The lighter gasses have already passed through column A and are now moving through column B. The user should note that if the injection is too long, the propane will get into column B. Once there, it will elute during a later cycle and give a faulty value. The factory sets the optimal inject time and pressure. This is undertaken so that propane does not get into column B.

NOTE: Hydrogen carrier gas cannot be used in a PGC built for helium.

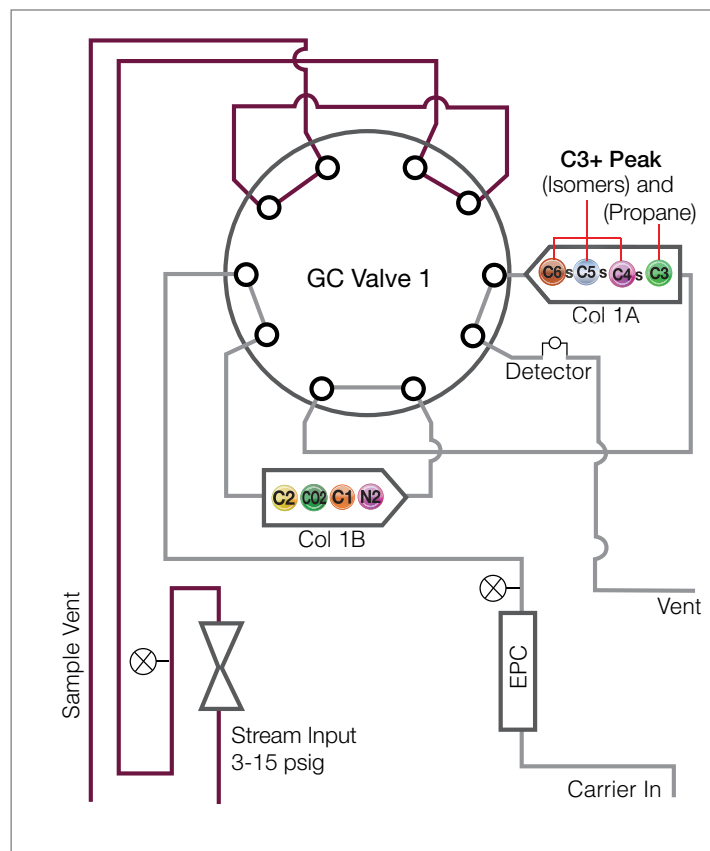
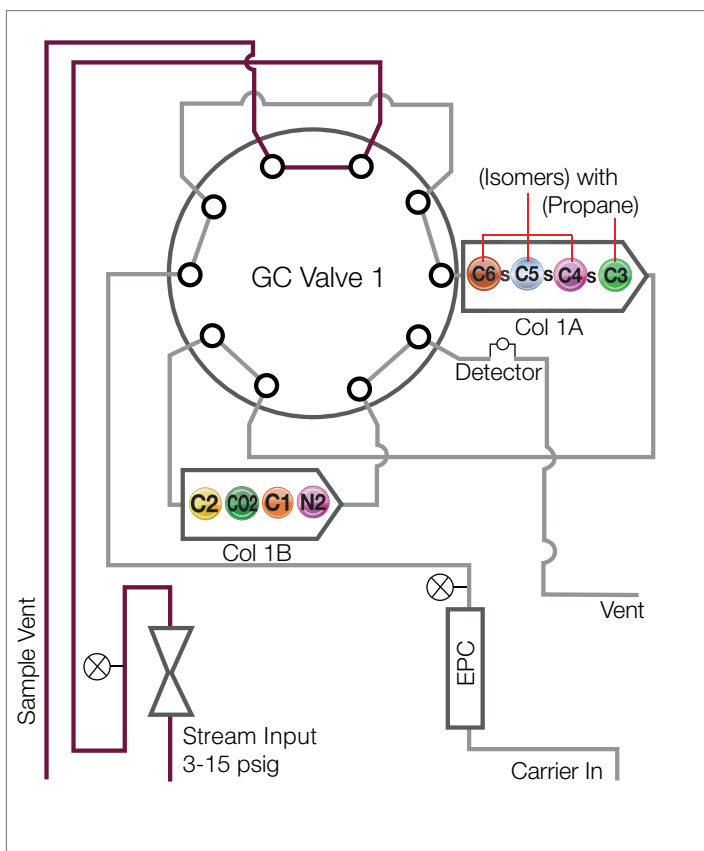
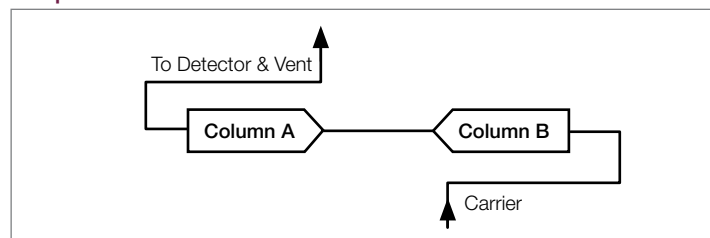
Simplified view



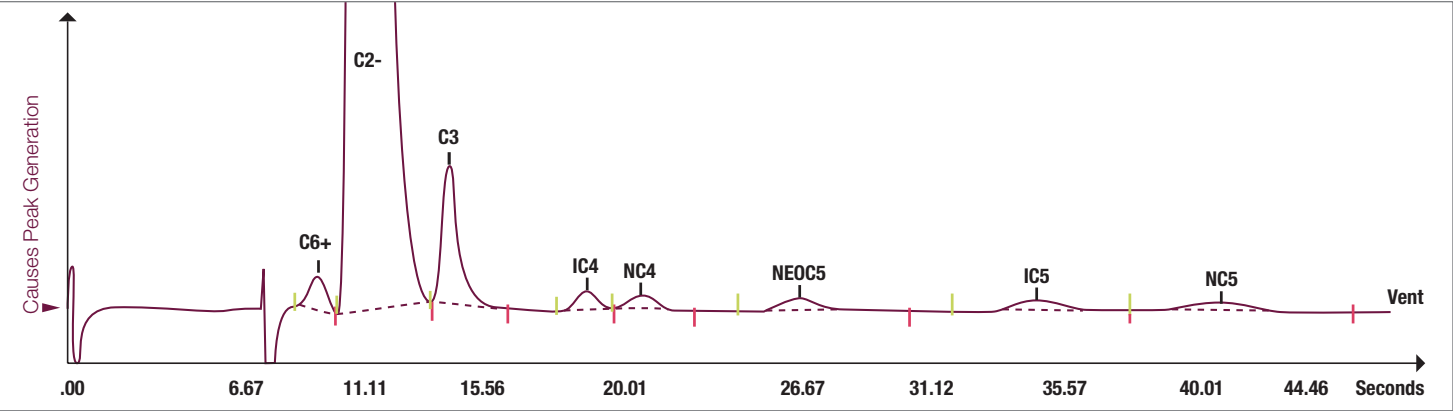
Backflush mode

In column A, the isomers and C3 group back into one peak and are labeled C3+. The (+) represents heavier gasses like C4s, C5s and C6s that may be in the cal or stream gas. During backflush, the gasses come off the column and cross the detector bead. When this happens, each gas changes the amount of energy required to maintain the temperature level of the bead. This change in energy is what causes the peak generation for each of the gasses.

Simplified view



BCT (C6+) one minute train (†helium carrier)



Typical settings (individual analyzers may vary)			
Cycle time	60 seconds	Inject time variance	± 10%
Sort order	24	Carrier pressure	55 psig
Sample size	40 ul	Carrier pressure variance	± 15%
Target component	NC5	Flow rate	7 ml/min
Target retention time	40 seconds	Flow rate variance	± 15%
Inject time	15 seconds	Oven temperature	60° C

NOTE: If BCT-BCS are configured together, a ± 1 Btu calculation can be performed every minute.

		Range (mol%)		%RSD												
Component number	Separated component	Minimum	Maximum		Minimum detectable limit (mol%)	Gate on	Peak retention time	Gate off	Slope (run)	Slope (rise)	Minimum peak area	Front height ratio	Peak detection method	Peak direction	Baseline segment start	Baseline segment end
1	Hexane plus	0.02	10	2	0.004	8	8.4	9.6	15	3	3000	0.75	Auto	Positive	0	0
2	Propane	0.1	100	2	0.002	12.85	14	15	15	3	3000	0.75	Auto	Positive	0	0
3	Isobutane	0.1	40	2	0.002	15	19.2	19.3	15	3	3000	0.75	Auto	Positive	0	0
4	Normal butane	0.1	40	2	0.002	18.3	20.8	21.5	30	20	3000	0.75	Auto	Positive	0	0
5	Neopentane	0.1	15	2	0.002	23.5	26.2	48	60	3	3000	0.75	Auto	Positive	0	0
6	Isopentane	0.1	15	2	0.002	23.5	34.3	48	60	3	3000	0.75	Auto	Positive	0	0
7	Normal pentane	0.1	15	2	0.002	23.5	40.3	48	60	3	3000	0.75	Auto	Positive	0	0

Interfering component	Symbol	Max. tolerance	Notes
Water	H2O	0.03	Elutes <1 min behind NC5 RT
Propylene	C3=	0.005	Co-elutes with C3
Butene-1	B-1	0.0025	Elutes between IC4 and NC4
Isobutylene	IC4=	0.0025	Elutes between IC4 and NC4

Interfering component	Symbol	Max. tolerance	Notes
Trans-Butene-2	tB-2	0.0025	Co-elutes with NC4
Cis-Butene-2	cB-2	0.0025	Co-elutes with NC4
1,3-Butadiene	1,3-BD	0.0025	Co-elutes with NC4

†Hydrogen carrier gas cannot be used in a PGC1000 built for helium.

BCT (C6+) one minute train

Inject mode 15 (±2) seconds

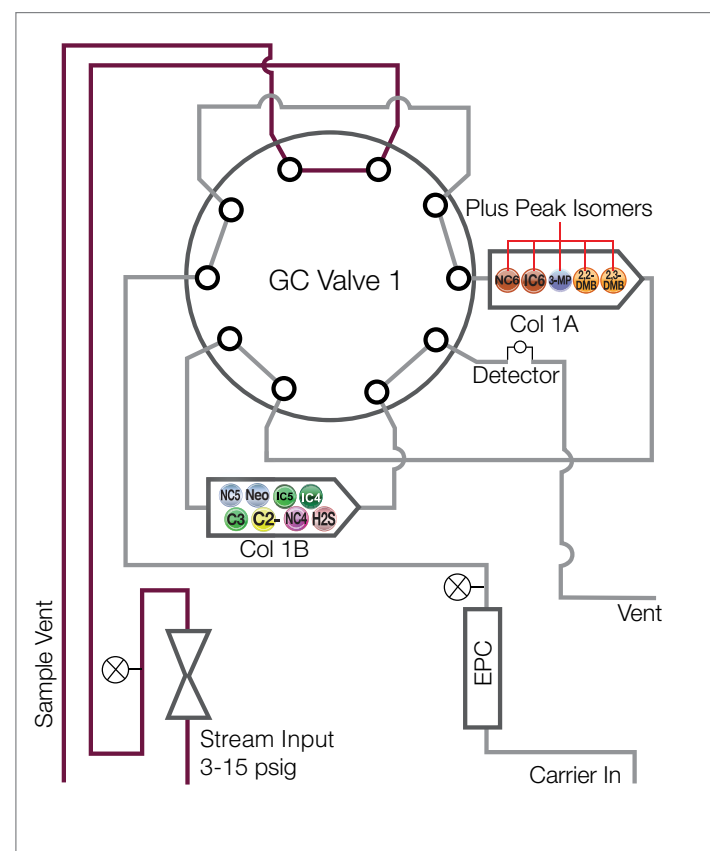
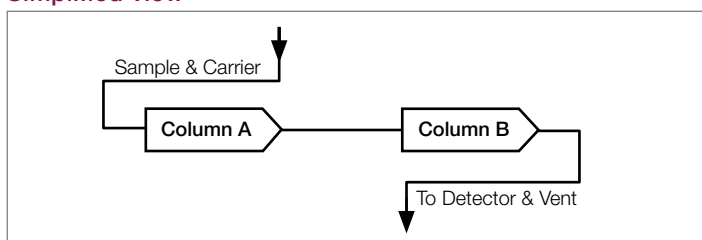
This example shows isomers of hexane moving through column A. The lighter gasses have already passed through column A and are now moving through column B. The user should note that if the injection period is too long, the 2,2-Dimethylbutane will get into column B, or if the injection duration is too short, not all of NC5 will be injected into column B.

The factory sets the optimal retention and injection times for each train.

 2,3-Dimethylbutane comes through column B first but is not in the cal gas.

NOTE: Hydrogen carrier gas cannot be used in a PGC built for helium.

Simplified view

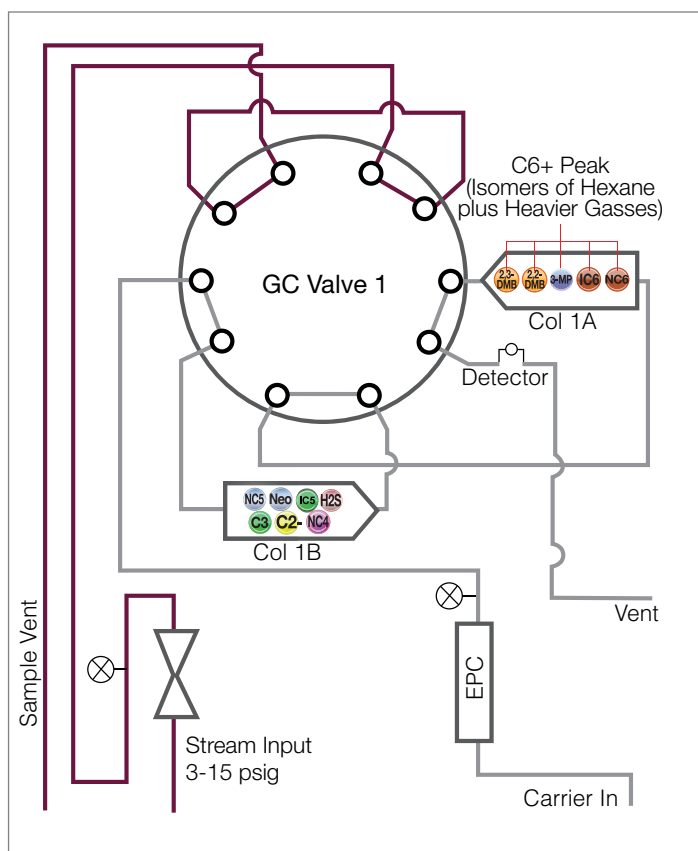
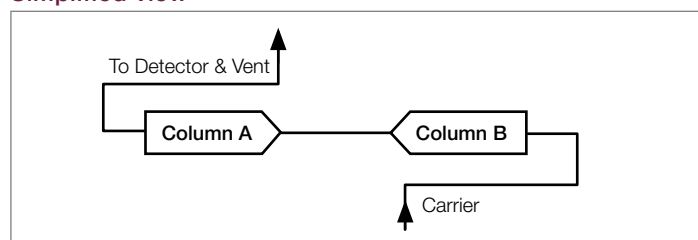


Backflush mode

In column A, the isomers of hexane group back into one peak and are labeled C6+. The (+) represents heavier gasses like C7s, C8s and C9s that may be in the cal or stream gas.

During backflush, the gasses elute from the columns and cross the detector bead. When this occurs, each gas changes the amount of energy required to maintain the temperature level of the bead. This change in energy is what causes the peak generation for each of the gasses.

Simplified view



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Disclaimer:

The settings used in this book are typical of most analyzers. Individual analyzers may vary.

Note:

Hydrogen carrier gas cannot be used in a PGC1000 built for helium. It is very important that only clean stainless steel, sulfinert, or silcosteel tubing be used for sample transport and carrier lines. Teflon tubing will not perform well because gasses permeate through the walls of the tubing and give erroneous readings.

Due to the low levels of H₂S measured, the following items are recommended in order to ensure proper performance:

- Calibration and carrier regulators should be stainless steel with stainless steel diaphragms.
- Connective tubing for calibration gas and streams should be sulfinert or the equivalent.
- Brass parts cannot be used in sample, wetted paths.
- At startup, the system should be leak tested.
- A moisture trap is recommended for the carrier bottle(s).
- Liquid leak detection fluids should not be used on this system.
- Electronic leak detectors or a pressure method are recommended.

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