

AUTOBLEND™

Complex Mixture Generator

The AUTOBLEND™ is a computer-controlled gas blending system designed to create flowing, adjustable concentration complex gas mixtures and test atmospheres. As a tool for chemical effects and other testing, the system introduces precisely controlled trace concentration components into a flowing, high purity matrix gas. Permeation tubes are used as a controlled source of each trace level component.



APPLICATIONS

- Evaluating sensor response
- Validating analytical methods
- Testing catalytic systems for sensitivity to contaminants
- Biological testing for effects of inhaled vapors
- Research and development
- And much more

Operation

The system features six independently-controlled permeation ovens. The base gas mixture created in each oven can contain up to eight different analyte components so that a test atmosphere can be spiked with up to 48 components simultaneously.

A variable portion of each base gas mixture is added to a main dilution flow to create a primary mixture with variable concentration ratios. Two optional dynamic headspace saturation modules can be added (as shown in bottom cabinet) to allow the addition of vapors from potential transient interfering compounds such as cleaning solutions, fuels or paints. A secondary dilution feature provides a large dynamic concentration range. The resulting test atmosphere can be supplied either dry or at variable humidity levels.

AUTOBLEND™ Server Software

Designed for use with the AUTOBLEND™ instrument, the Microsoft® Windows PC-based AUTOBLEND™ Server software:

- Manages an inventory of methods, permeation tubes and headspace mixtures.
- Analyzes the feasibility of creating a specified mixture.
- Calculates the setpoint data required to adjust the system to achieve the mixture.
- Dynamically maintains the mixture under changing conditions.
- Logs operating data and test mixture results.

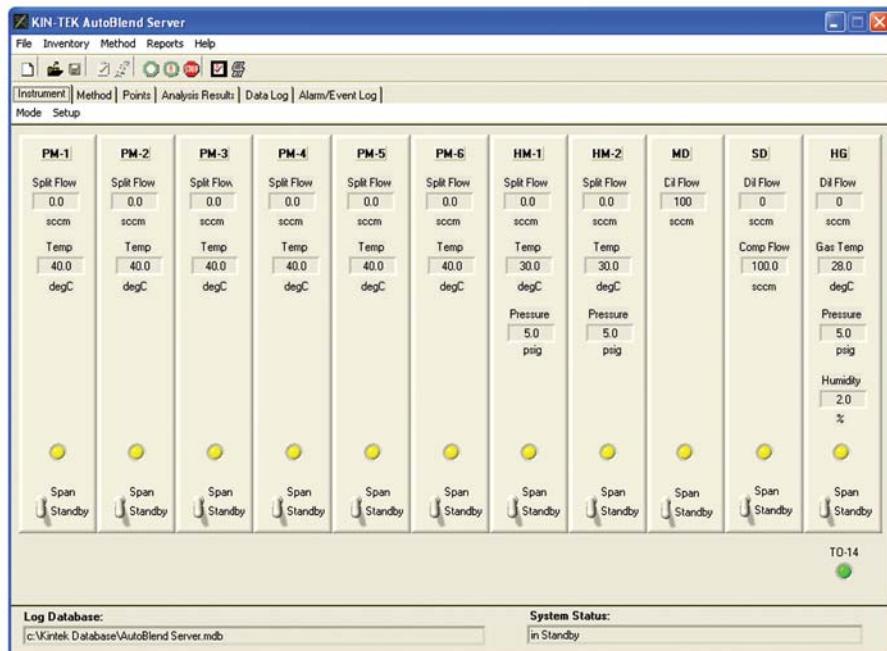


Fig. 1 – Virtual Instrument of the AutoBlend™ System

Features

Permeation Tube and Headspace Inventory Management

The AUTOBLEND™ Server software contains a database of the user's permeation tube and optional headspace inventory including tube ID and serial number, compound name, emission rate data, temperature alarm criteria, and expiration date (see Fig. 2). As the expiration date approaches, the tube is highlighted to warn the user to reorder or recertify.

The following figure shows an example inventory of permeation tubes.

	PermeationTube Name	ID	Serial Number	MW	Alarm Temp (degC)	Min Temp (degC)	Max Temp (degC)	Ideal Temp (degC)	Expire
1	H2S	1003	38389	34.1	53	30	55	50	04/12
2	tert-Butyl mercaptan	1019	24182	90.2	113	30	115	110	03/01
3	Thiophene	1021	24889	84.1	53	30	55	50	09/15
4	CEEs	1027	37818	124.6	63	30	65	60	05/06
5	Methyl isocyanide	3030	38254	57.0	33	30	35	20	02/14
6	Cyanogen chloride	2040	38307	61.5	35	30	35	30	02/15
7	DMAC	2042	38881	87.1	125	30	125	120	12/23
8	Methanol	3020	37985	32.0	53	30	55	50	04/15
9	Formaldehyde	3024	37888	30.0	93	30	95	90	03/16
10	Methyl salicylate	3074	3792	152.1	123	30	125	120	07/23
11	Methyl salicylate	3074	3892	152.1	123	30	125	100	07/23
12	Water	5011	38154	18.0	63	30	65	60	08/04
13	DIMP	5016	3794	186.2	123	30	125	100	07/01
14	DMMMP	5017	37258	124.1	103	30	105	100	02/26
15	DMMMP	5017	38052	124.1	123	30	125	100	03/30
16	DMMMP	5017	3891	124.1	123	30	125	100	09/30

Fig. 2 – Permeation Tube Inventory

Method Inventory Management

As specific complex gas mixture sets are defined, the details of the components (permeation tubes and headspaces) and required concentrations of up to 20 span points are saved as a method. These methods are saved in an inventory for easy recall and duplication of the mixture at a later date.

Data Logging

During a method run, the AUTOBLEND™ Server software periodically logs generated concentrations for each point in the method (see Fig. 3) and logs measured values of all operating parameters. Should an unexpected test result occur, the historical data can be checked to verify the mixture and operating conditions such as oven temperature, flow rates, pressures and so forth.

Scenario Analysis

The AUTOBLEND™ Server software set includes a “Scenario Analyzer” CD that allows the user to establish offline the feasibility of achieving a desired mixture. Given desired concentrations, the “Scenario Analyzer” software tests the possibility of creating the mixture from specific permeation tubes and headspaces under specific operating conditions. This feedback is invaluable in creating a workable method and can be a major time saver.

System Monitoring

AUTOBLEND™ system functions are monitored in the software and “out-of-specification” values are reported. For example, the software warns of “over temperature” conditions in the permeation ovens, impossible flow settings, out of range temperature setpoints (for the installed permeation tubes), etc.

KIN-TEK AutoBlend Server - Method: Method001 ID: M001										
File Inventory Method Reports Help 										
Instrument Method Points Analysis Result: Data Log Alarm/Event Log										
Method Name: Method001 ID: M001 Print										
Data Log:										
	Date/Time	ID	S/N	Target Temp (degC)	Target Conc	Target Hum (%)	Std Temp (degC)	Std Conc	Std Hum (%)	Conc Unit
Point 1 [Zero]: Log 1 of 1 Point 2 [Span]: Log 1 of 1 <ul style="list-style-type: none"> PM-1: pm001 Water <ul style="list-style-type: none"> Methanol Thiophene Cyanogen chloride PM-4: PM002 Water <ul style="list-style-type: none"> Methanol PM-6: Hydrogen Sulfide h2s <ul style="list-style-type: none"> DMMP DMAC 	6/25/2007 14:58:44 6/25/2007 15:00:00	pm001	37985 1021 2040 38307	40.0 50.000	40.0 40.0 40.0	50.007 100.443 1105.565	ppbv ppbv ppbv			
Point 3 [Span]: Log 1 of 1 <ul style="list-style-type: none"> PM-1: pm001 Water <ul style="list-style-type: none"> Methanol Thiophene Cyanogen chloride PM-4: PM002 Water <ul style="list-style-type: none"> Methanol PM-6: Hydrogen Sulfide h2s <ul style="list-style-type: none"> DMMP DMAC 	6/25/2007 15:01:18	pm001	37985 1021 2040 38307	40.0 200.000	40.0	199.690 401.093 4414.732	ppbv ppbv ppbv			
			5011 38154 37985 38307	40.0 30.000	40.0	30.148 19.627	ppbv ppbv			
			1002 xyz 1002	40.0 1.000	40.0	0.996	ppmv			

Fig. 3 – Data Log

Enhanced Functionality

The actual permeation rate from each tube varies with temperature. The AUTOBLEND™ Server software can correct to actual or estimated temperature depending on supporting data available for the tube. When multi-point certification data is available, the correction is exact at the temperature of the defined certification point, and estimated with a linear or log-linear algorithm when at an uncertified temperature point.

Remote Access Software

The AUTOBLEND™ Server software can be configured to allow remote monitoring and remote control of the AUTOBLEND™ instrument from another workstation within an Ethernet network. KIN-TEK provides AUTOBLEND™ Remote Access software and source code developed with National Instruments LabVIEW.

System Requirements

The AUTOBLEND™ Server software runs on Microsoft® Windows 2000 or XP with an RS-232 serial port (or USB-to-RS232 adapter) connected to the AUTOBLEND™ Complex Gas Mixture Generator. The AUTOBLEND™ Inventory and data logs are stored in a Microsoft Access database (Microsoft Access is not required to be installed). The software requires about 15 MB of hard disk space plus extra storage space for the database.