Model 307 Sample Oxidizer

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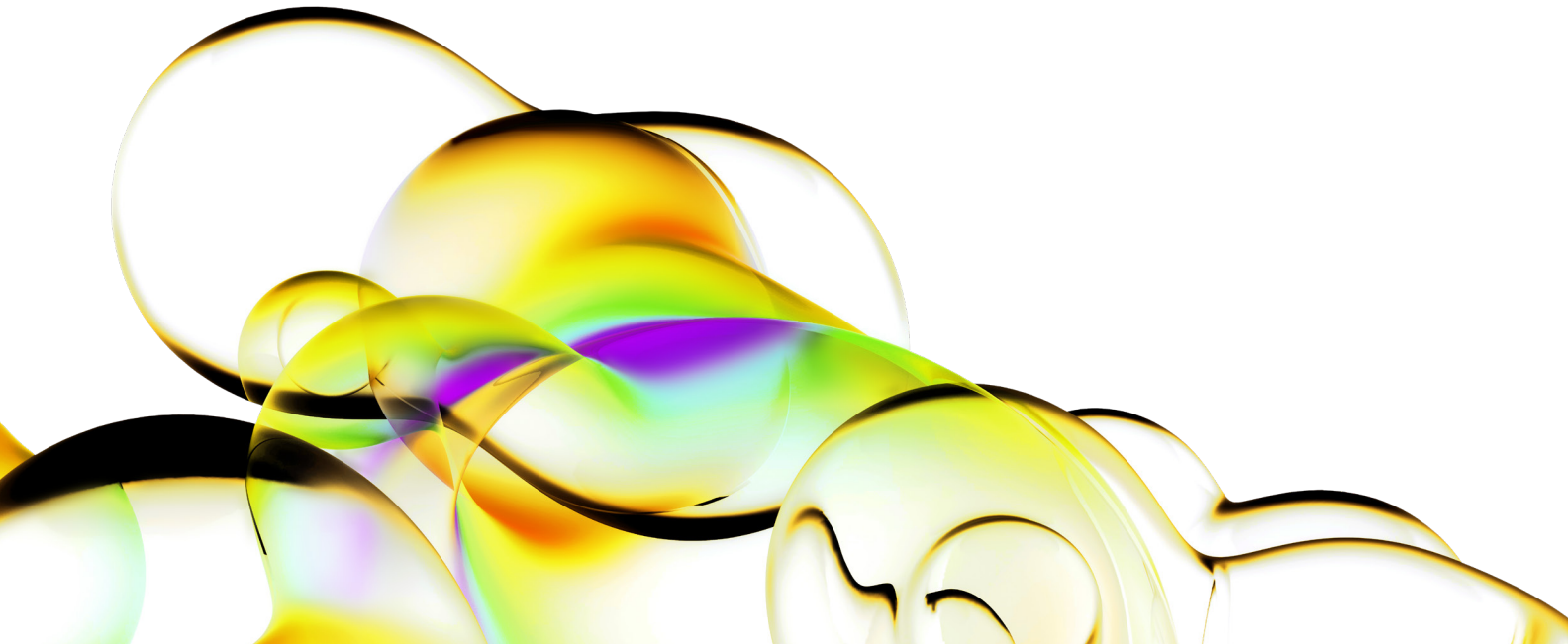
Standard features

The Model 307 Sample Oxidizer is an automatic preparation and oxidization system for both single and dual radiolabeled samples containing ^{3}H and/or ^{14}C for use in liquid scintillation counting. The 307 Sample Oxidizer ensures reliable combustion of biological, environmental and industrial samples. This system includes the following standard features and benefits:

- Single “push button” operation initiates automatic cycle, positioning of vials and ignition basket, non-catalytic combustion, dispensing of scintillation cocktails and carbon dioxide trapping agent, and system cleaning.
- Physical separation of ^{3}H and ^{14}C radionuclides from dual labeled sample material for ease of sample analysis.
- Minimizes optical and chemical quenching. Reduces chemiluminescence in most sample preparations, increases statistical accuracy of liquid scintillation counting results. Eliminates self-absorption.
- Observation of combustion allows for visual inspection during sample burn.
- Complete combustion of liquid, wet or dry samples eliminates the need for chemical solubilization.
- Ensures maximum radionuclide recovery for ^{14}C with sample size equivalent up to 40 millimoles of carbon dioxide and up to 85 millimoles of water for samples containing ^{3}H (up to 1.5 grams).



- Radionuclide recovery for both ^{3}H and ^{14}C of >97% maximizes radionuclide separation for single label analysis using liquid scintillation counting techniques and an efficiency quench correlation curve for each radionuclide.
- Radionuclide memory of less than 0.08% for most ^{3}H and ^{14}C labeled sample materials.
- Non-catalytic combustion eliminates catalyst usage, cost and replacement.
- Accommodates 20 mL glass or low cost polyethylene vials.
- Capacity to process up to 60 samples per hour for each radionuclide.
- Unique design bellows-type reagent metering pumps. Pumps adjustable from 0 to 18 milliliters, automatically dispense accurate volumes of both ^{3}H and ^{14}C scintillation cocktails and carbon dioxide trapping agent.
- Long life, removable platinum ignition basket.
- Non-pressurized reagent storage tank capacity of five liters for each reagent allows up to 500 sample combustions between refills.
- Ambient temperature trapping of water and carbon dioxide provides safe and clean operation.
- Accessory kit with spare parts; included are additional O-rings, glass combustion flask, wrench, seals, and assorted small parts.

Options

- Performance verification kit includes both standardized ^{3}H and ^{14}C labeled material used to determine system performance.
- Chemicals and supply kit which includes a starter supply of the necessary reagents and material.

Sample combustion

The Model 307 Sample Oxidizer provides a simple, automatic method of preparation for samples that are otherwise difficult to prepare for liquid scintillation counting. The instrument combusts the sample material in an oxygen-enriched atmosphere with a continuous flow of oxygen to constituent water vapor and carbon dioxide using a patented process to achieve physical separation of ^{3}H and ^{14}C radionuclides into two separate counting vials.

1. Sample material is placed into a Combusto-Cone™ and may be either dry, wet or liquid. The Combusto-Cone with sample is placed into the platinum ignition basket.
2. For single labeled ^{14}C samples or dual labeled $^{3}H/^{14}C$ samples, the system will accommodate a sample size equivalent up to 40 millimoles of CO_2 (approximately 1.2 g of filter paper) and will meet all performance specifications.
3. For ^{3}H samples, the system will accommodate a sample size equivalent of up to 85 millimoles of H_2O (approximately 1.5 mL of water). Larger ^{3}H samples may be handled by burning multiple samples and trapping the water vapor in the same counting vial.
4. System includes a combustion timer for setting combustion time from 0 to 5 minutes. Up to 60 samples per hour of each nuclide can be prepared.
5. Combustion flask enclosure is heated to approximately 125°C to avoid condensation of $^{3}H_2O$ vapor.
6. A double safety window is provided for visual inspection of sample combustion.
7. The combustion flask compartment door is interlocked so that the automatic cycle cannot be initiated if the door is open.
8. The combustion flask and ignition basket are easily removed for cleaning.

Reagents

1. The three non-pressurized reagent storage tanks are accessible for setting dispensing volumes, measuring the liquid level in the tanks, and filling.
2. Each reagent tank has a capacity of five liters, which is sufficient for up to 500 sample combustions.
3. Each tank has a measuring dipstick marked in one liter increments.
4. Reagent tanks are completely accessible by removing the snap-in front panels.
5. Each tank has a bellows-type metering pump which is adjustable from 0-18 mL by simple dial settings. If samples containing only ^{3}H labeled material are to be combusted, the two ^{14}C reagent pumps can be deactivated by setting the toggle valve to “off”. For samples containing only ^{14}C labeled material, the ^{3}H reagent pump can be similarly deactivated.

6. The four tanks are arranged left to right as follows (when viewed facing the front of the instrument) and are labeled on the front:

   a. Distilled water only.

   b. Monophase® S (liquid scintillator for ^{3}H).

   c. Carbo-Sorb E (carbon dioxide absorber).

   d. Permafluor® E+ (liquid scintillator for ^{14}C).

Additional features

1. A pressurized five liter, distilled water reservoir is provided for the automatic cleaning, steam injection, and pre-coating of the ^{3}H exchange column.
2. The distilled water reservoir has a vent valve for depressurizing the tank when the system is turned off, or when checking the distilled water level with the dipstick.
3. The system has built-in pressure regulators and filters for nitrogen, oxygen, and water.
4. A specially constructed reaction column eliminates loss of carbon dioxide absorber.
5. A "reset button" to reset the combustion timer prior to "restart" of the program while the sample is still burning.
6. "Override" button to cut off excessive combustion time after combustion has been completed.
7. A "backpressure" indication gauge to monitor pressure in the trapping device during combustion.
8. A "Test/Run" toggle valve. In the "Test" mode the entire system will be checked for leak tightness. Normal operation is in the "Run" mode.

Performance specifications

^{3}H Recovery: >97% ^{3}H Memory: <0.08%

^{14}C Recovery: >97% ^{14}C Memory: <0.08%

The performance is based on the use of: Monophase-S as the ^{3}H liquid scintillator, Carbo-Sorb E as the CO_2 absorber, Permafluor E+ as the ^{14}C liquid scintillator, and filter paper (or similar) as sample material. Use of other reagents may yield lower recoveries and higher memories.

Physical data

Weight: 220 lbs (100 kg) net weight
300 lbs (135 kg) shipping weight

Air Velocity: 265 cfm

Dimensions: 32 in (81 cm) high x 37 in (94 cm) wide x 18 in (45 cm) deep

Power requirements: 100-122 V @ 10A, 200-244 V @ 5A; 50/60 Hz

Gas connections:

Oxygen: 45-60 psig. (3.1-4.1 kg/cm^2)

Nitrogen*: 45-60 psig. (3.1-4.1 kg/cm^2)

**Note: Compressed house air can be used as a substitute for nitrogen.*

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