

# Monitor and Control Freeze Drying with the HPR-30 Vacuum Process Monitor

# Topics

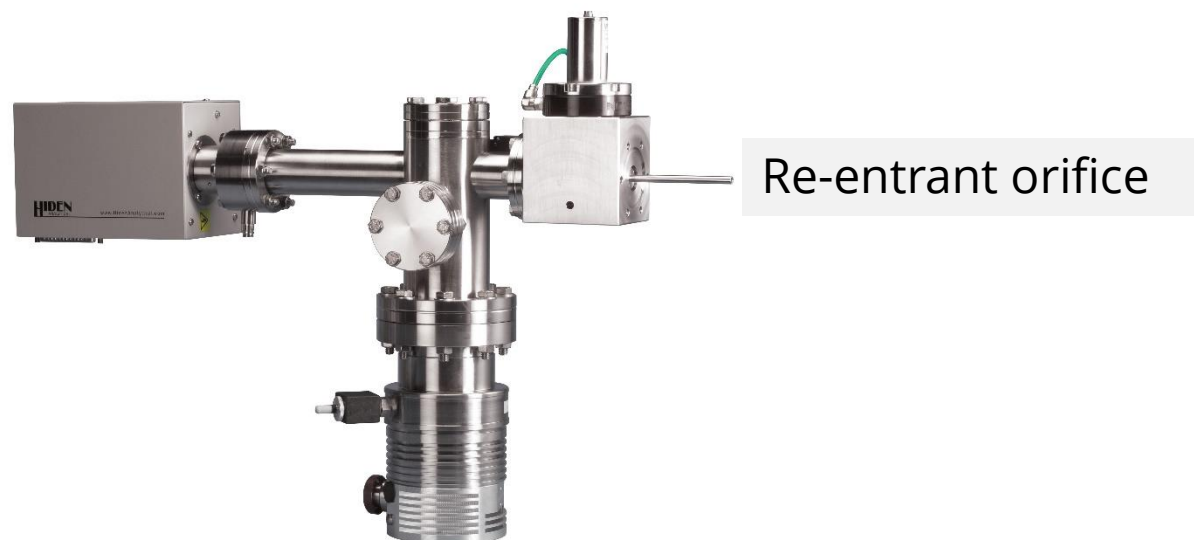
- ✓ HPR-30 System
- ✓ Sampling from a freeze dryer
- ✓ Applications of gas analysis
  - End Point Detection
  - Leak Detection
  - Contamination Detection

# HPR-30 Vacuum Process Gas Analyser

The HPR-30 system is a differentially pumped quadrupole mass spectrometer system with Re-entrant sampling orifice and Fail-safe auto shut-off valve.

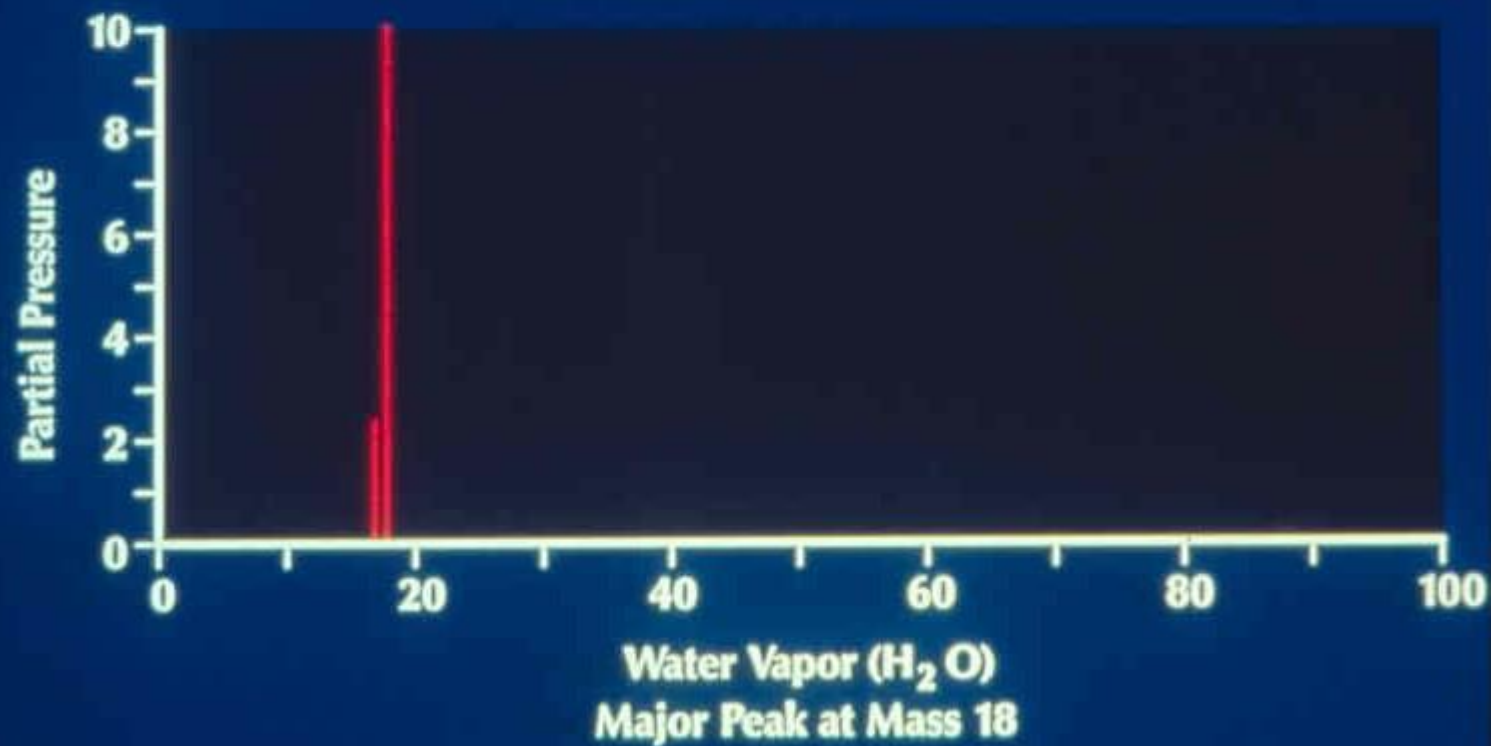
The HPR-30 system features:

- Real time analysis for water vapour, solvents and potential contamination
- Fast response
- Wide dynamic range



New  
screenshot  
needed

## *The Mass Spectrum*



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screenshot  
needed

## Simple Gases

Name	Major Peak
Helium	4
Water Vapor	18
Nitrogen	28
Oxygen	32
Argon	40
Carbon Dioxide	44

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screenshot  
needed

## Organic Vapors

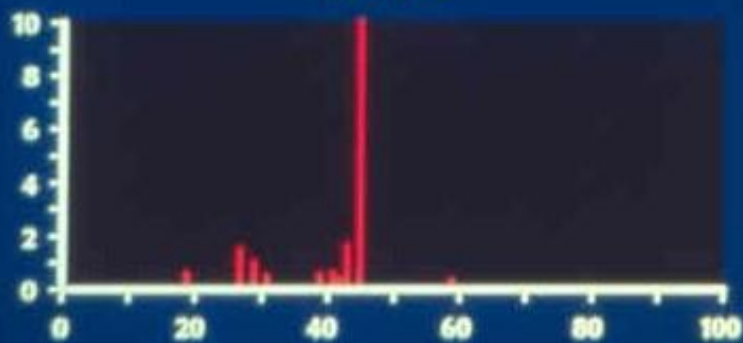
Acetone 43



TCE 95



IPA 45



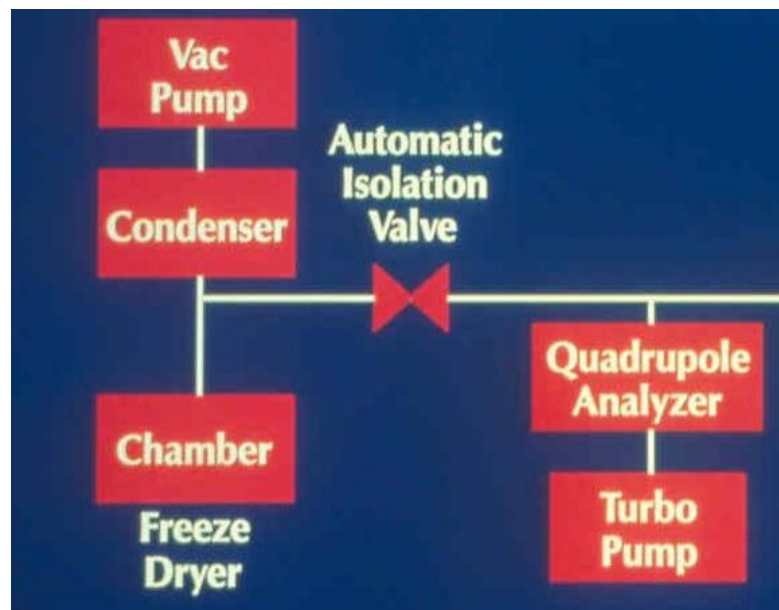
Lexsol 57



# HPR-30 Vacuum Process Gas Analyser Connection to the Freeze Dryer

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The HPR-30 system connects to the freeze dryer system with a KF type vacuum flange or similar. The connection is made to an available port on the main chamber or to a port between the main chamber and the condenser as shown on the schematic.



# HPR-30 Applications

- ✓ End Point Detection
  - ✓ Leak Detection
- ✓ Contamination Detection

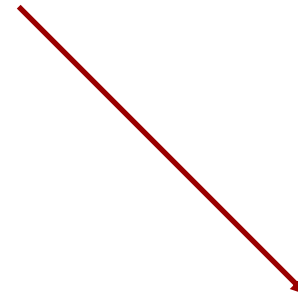
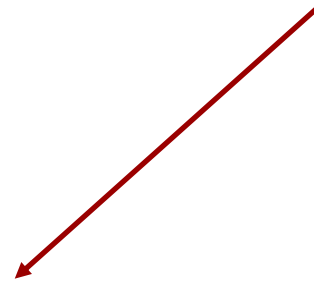


# HPR-30 Vacuum Process Gas Analyser

Monitor

Water

Vapour



## Production

- Reduce Cycle Time
- On-Line Monitor
- Document Process

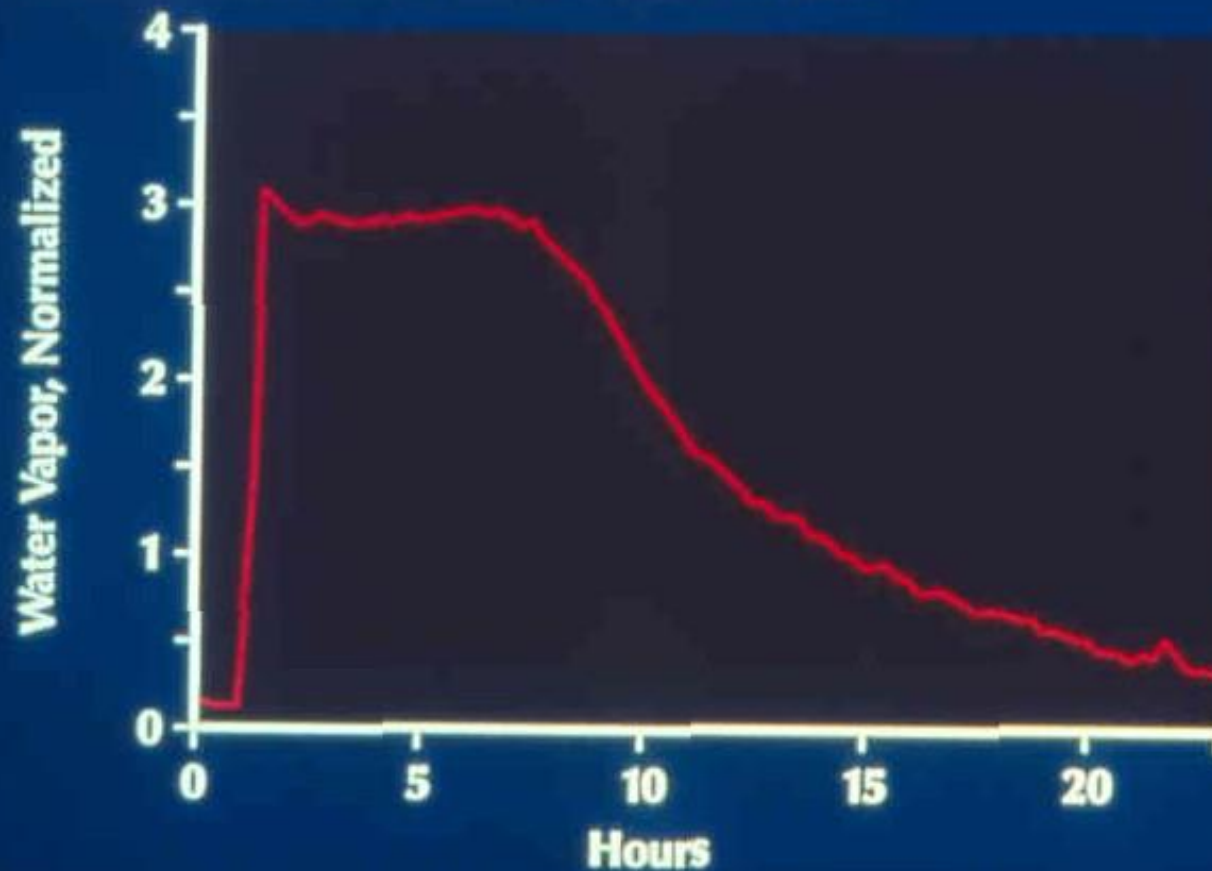
## R&D

- Cycle development
- Optimize Cycle
- Validation

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screenshot  
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## Lyophilization

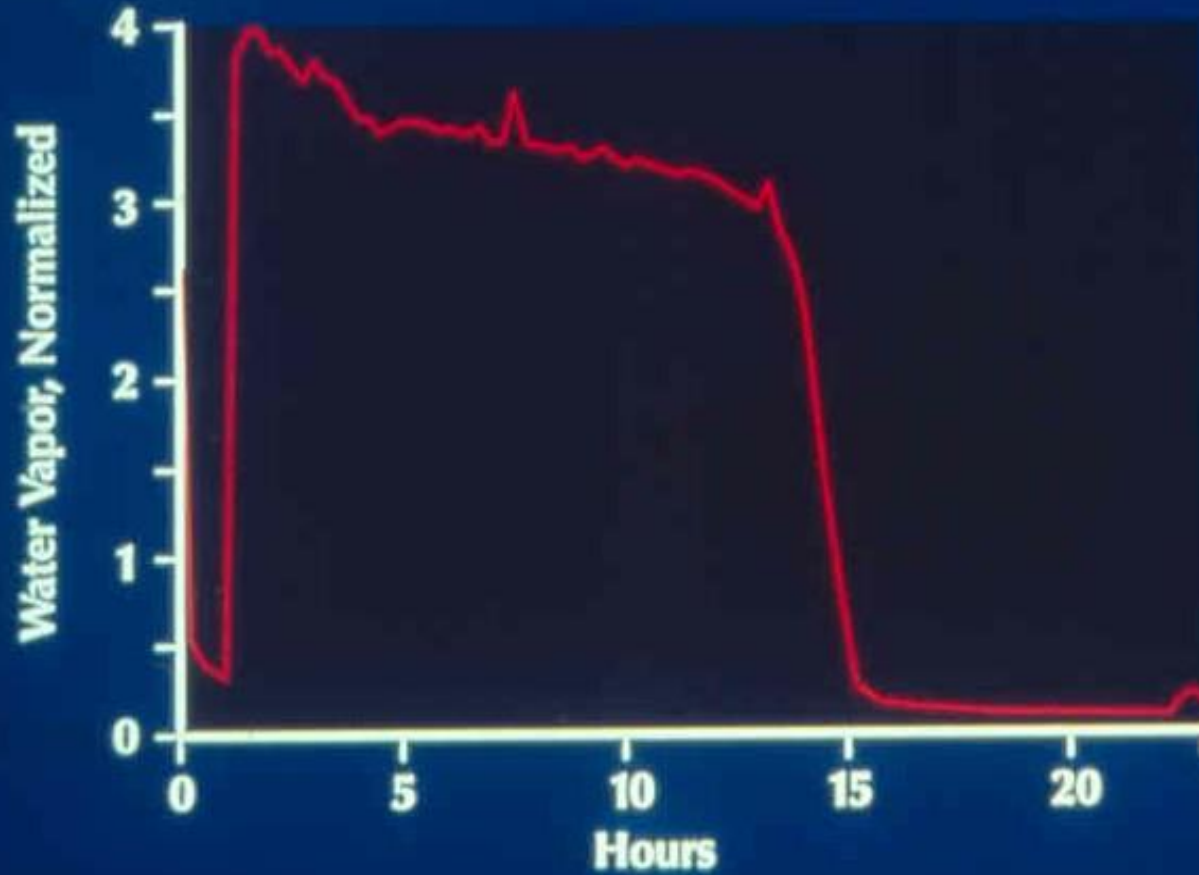
### 5% Bovine Serum Albumin



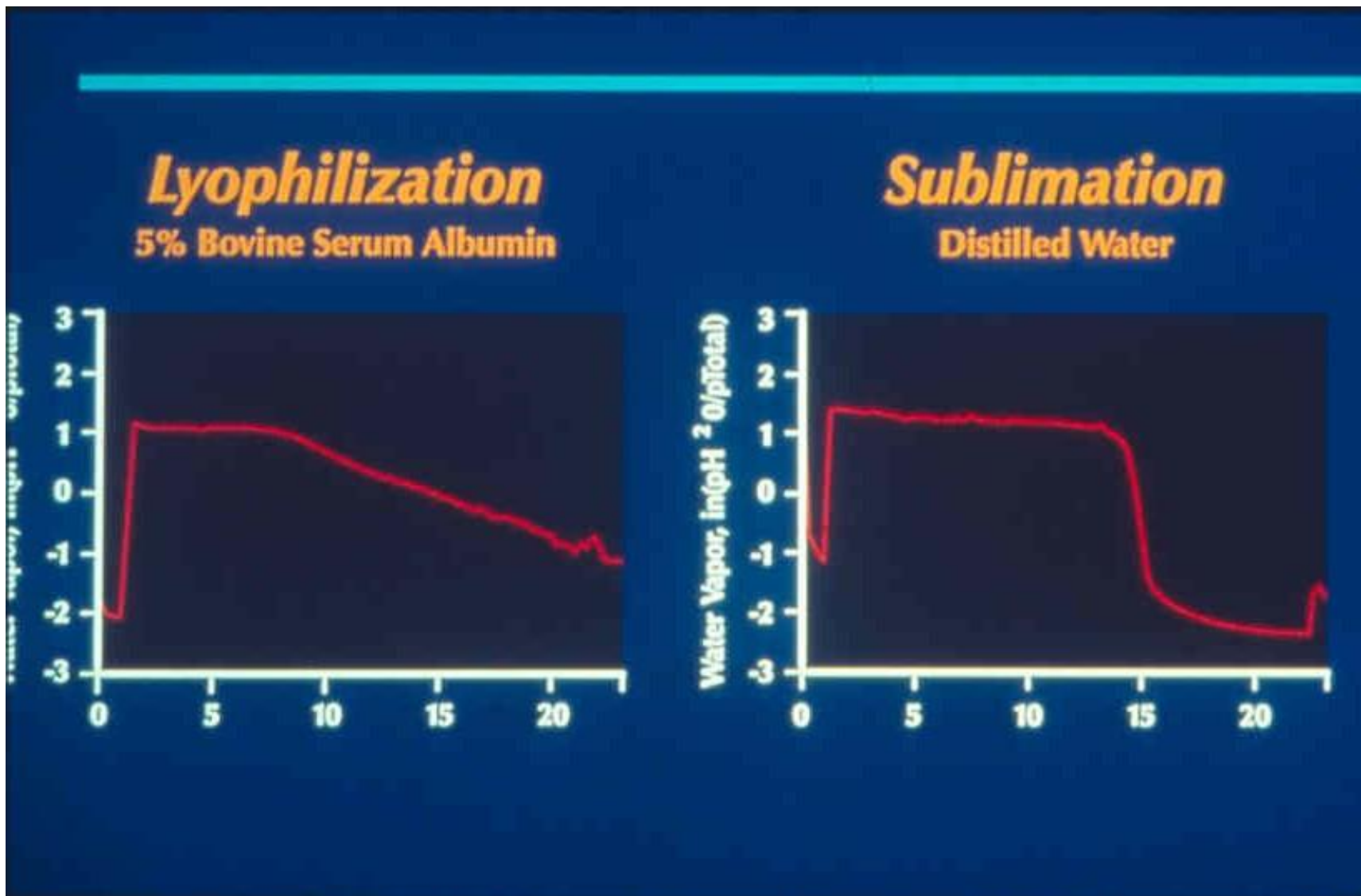
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## Sublimation

### Distilled Water



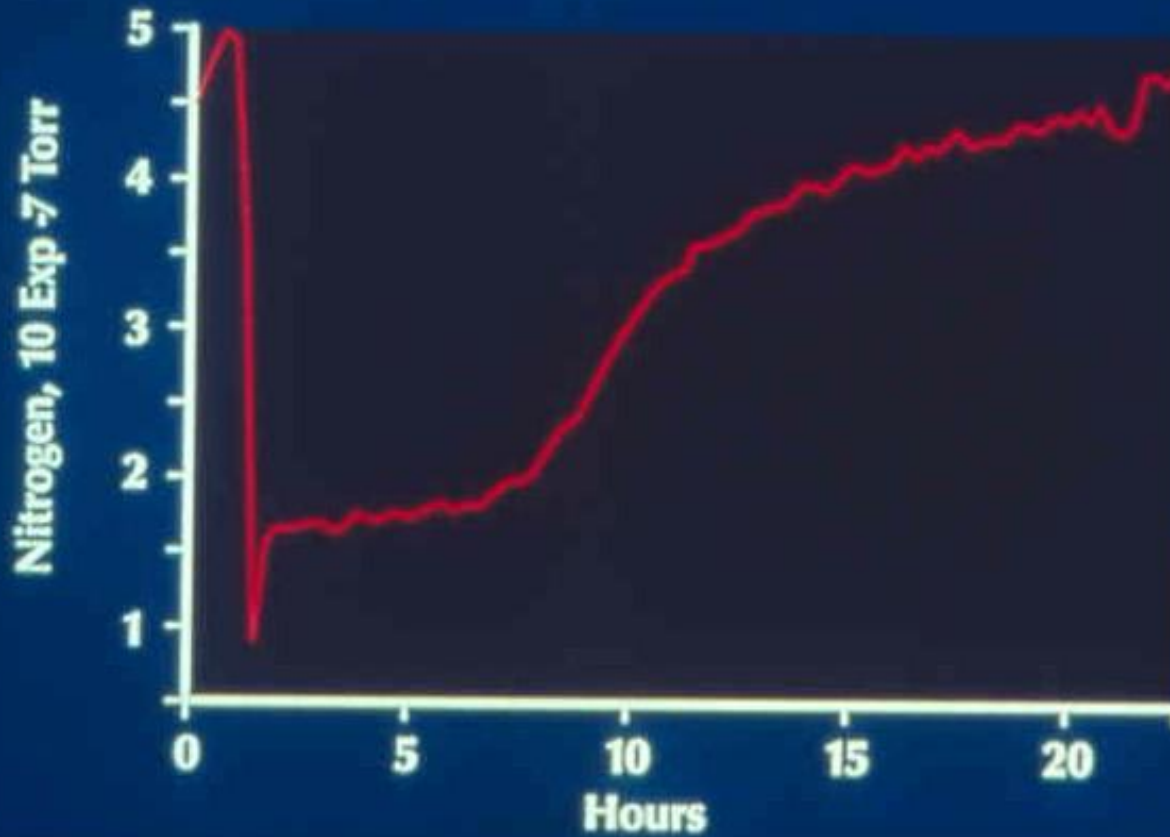
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screenshot  
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## Lyophilization

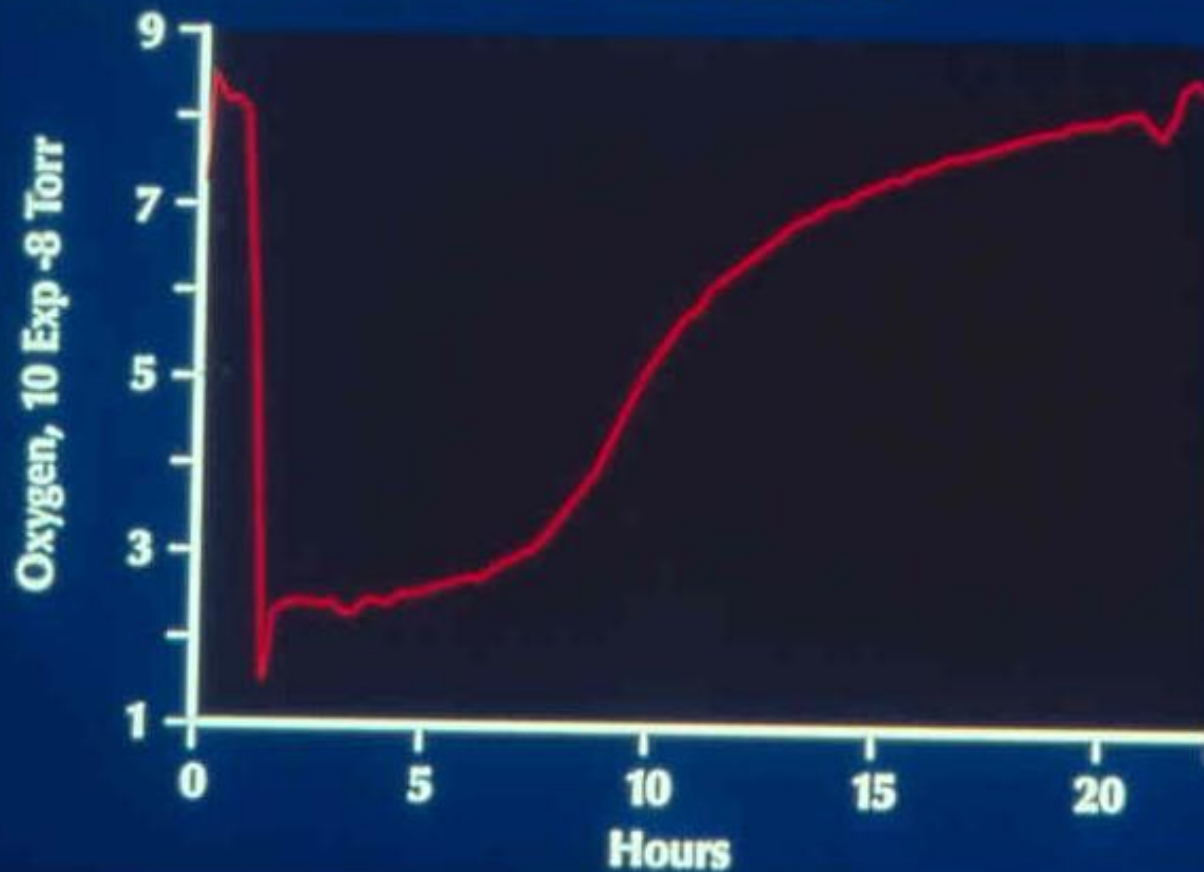
### 5% Bovine Serum Albumin



New  
screenshot  
needed

## Lyophilization

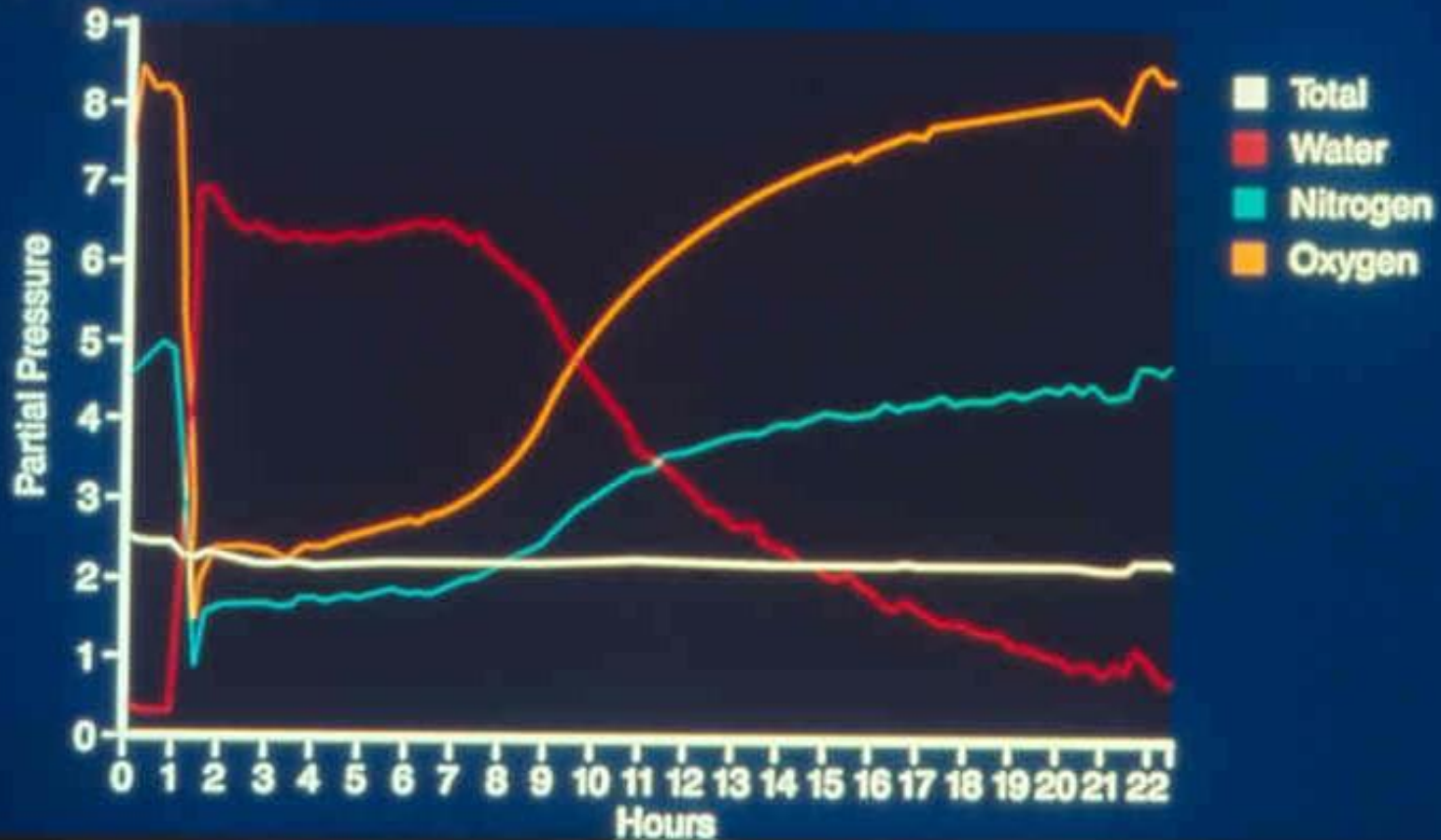
### 5% Bovine Serum Albumin



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screenshot  
needed

# Lyophilization

## 5% BSA



# Leak Detection

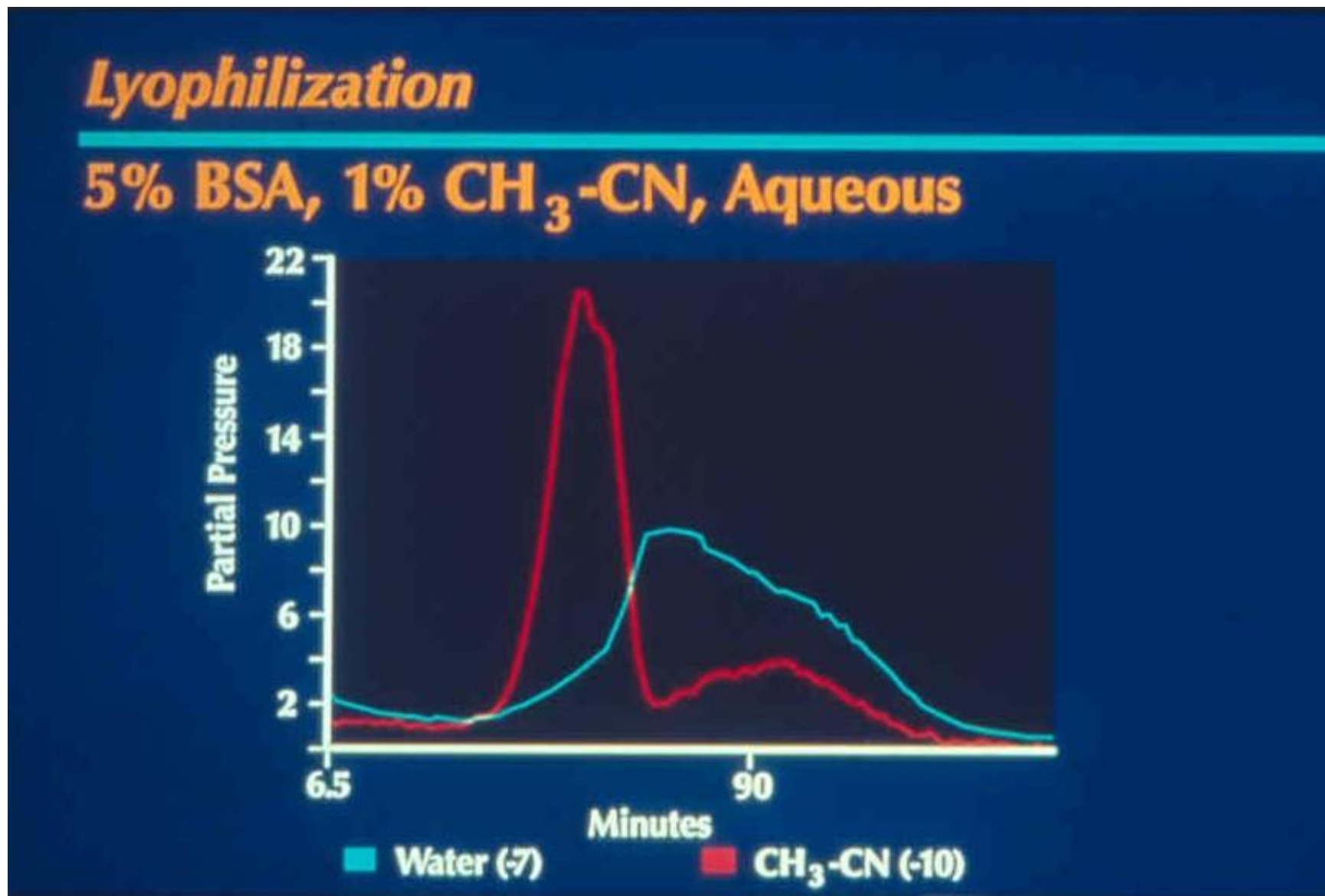
- Determine real & virtual leaks
- Helium and other tracer gas
  - Process go / no go I/O



# Contamination Detection

- Heat Transfer (shelf and condenser)
  - Oxygen and Nitrogen
- Cleaning solvents and disinfectants
  - HPLC solvents
- Volatile product components

New  
screenshot  
needed



# Summary

HPR-30 Vacuum Process Analyser:

- Contamination detection ensures product quality
  - Leak detection
  - Keeps freeze dryer in service
    - End Point Detection
- Optimizes cycle – increases production