

H-6290 Gas/Liquid Absorption Column

Purpose

In modern industrial plants, the by-products of a process cannot be dumped into the environment. With gaseous effluents, harmful gases can be removed from effluent streams with a gas absorption column. The Hampden **Model H-6290** Gas/Liquid Absorption Column is a pilot plant scale unit which shall be designed to allow students to investigate the principles of packed tower absorption processes and hydrodynamics. In modern process plants, gas absorption columns find applications in gas scrubbers, e.g. treating flue gas; and in gas/liquid reactions, e.g. removing of caustic soda from a water stream.

Experiment Capabilities

The Hampden **Model H-6290** Gas/Liquid Absorption Column allows students to investigate the characteristics of packed tower hydrodynamics including:

- a. Flooding and loading points.
- b. Effect of tower packing material for:
 - i. Raschig rings - glass
 - ii. Raschig rings - Teflon TFE®
 - iii. Saddles
 - iv. Glass beads
 - v. Teflon TFE balls
- c. Effect of tower packing material size.
- d. Relation of liquid hold-up to the gas flow rate.
- e. Determination of gas mass transfer rates for changing:
 - i. gas flow rates
 - ii. liquid flow rates
- f. Mass balance calculations.
- g. Pressure drop of the absorption column for different:
 - i. gas flow rates
 - ii. liquid flow rates
 - iii. tower packing materials
- h. Temperature effects.

Model H-6290
Gas/Liquid Absorption Column
Dimensions: 132"H x 58.5"W x 34"D
Shipping Weight: 550 lbs.



All Hampden units are available for operation at any voltage or frequency

Hampden
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Chemical Engineering Systems

Educational Training Equipment for the 21st Century

Specifications

The trainer utilizes the following instrumentation:

- Apparatus for gas analysis
- Three (3) flowmeters with control valves
- Model H-6927-10 Digital Manometer

This trainer shall be designed to absorb carbon dioxide from an air/carbon dioxide mixture into water flowing down the column. In addition, this trainer shall allow the study of other gas/liquid systems where mass transfers occur.

Instrumentation

- Gas absorption column packed with Raschig rings, 3-inch diameter, 72-inch height, glass construction.
- Water calibrated flowmeter
- Air flow calibrated flowmeter
- Carbon dioxide calibrated flowmeter
- Air flow oil-less compressor with on/off switch
- Water pump with on/off switch, tank, and control valve
- Gas analysis apparatus with goggles, safety gloves, funnel and tubing
- Digital Manometer
- Column temperature fittings
- Pressure taps
- Sampling ports

Equipment Overview

The unit shall consist of a 3 inch (76.2mm) diameter glass column in which there are two-36 inch (914.4mm) lengths of Raschig ring packing material. Pressure taps are located at the bottom, middle and top of the column. They are connected to a manometer which is used to determine the pressure drop across the column. Sampling ports are included at top, middle and bottom of the column as well as the feed inlet and liquid outlet. Temperature access fittings are provided on the column.

Water is pumped from the tank via the calibrated flowmeter to the top of the absorption column where it is allowed to flow through it via gravity. Air flow is developed by an oil-less air compressor through a calibrated flowmeter and mixed via a predetermined ratio with carbon dioxide. The carbon dioxide is supplied from a cylinder (supplied by owners) through a calibrated flowmeter and mixed with the air supply. This gas mixture is fed to the base of the absorption tower through a liquid seal. The gas goes to the top of the absorption tower and is exhausted to the outside atmosphere via exhaust ducts (supplied by owners).

The concentration of carbon dioxide in the outlet effluent gas mixture is measured utilizing the apparatus for gas analysis.

Exclusions

- Gas cylinder with regulator.
- Glassware for titrations.
- System to exhaust the gas to the outside of the building

Services Required

- **Electrical Supply:** 120V AC-1 ϕ -60Hz
- **Water Supply:** 1 GPM

Options

Model H-6290-10

Liquid Effluent Sump Tank, 80 gallons

Model H-6290-20

Temperature Probes - dial type

Model H-6290-30

Ladder to access top of the column

Model H-6290-CDL

Computer Data Logging

Model H-6290-CDLC

Computer Data Logging and Control

Computer Data Logging & Control Option

This feature adds two thermocouples, two differential pressure transmitters, and three flow transducers into the system. One interface package consisting of National Instruments I/O modules is provided for interfacing into a PC computer through the USB port. Templates for LabVIEW® control software are included. Computer is included.

Specify **Model H-6290-CDLC**. ♦

Computer Data Option

Logging only (no control)

Specify **Model H-6290-CDL**. ♦

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