Humidity in Laboratories

Laboratories in general

A laboratory is a facility or workplace that provides controlled conditions in which scientific research, experiments, and measurement may be performed. In contrast to the office, the work in a lab is more hands-on with various experiments, process controls and quality controls being carried out simultaneously. Laboratories or labs are common in many different industries such as pharmaceuticals, medicine and engineering. Labs are widespread in industrial manufacturing plants for the purposes of quality control of incoming materials as well as quality control of the production process and manufactured product.

Facts & Figures

Largest pharmaceutical and biotech companies ranked by total revenue according to their 2013 annual reports (USD billions)

1. Johnson & Johnson – US 71.3
2. Pfizer – US
3. Roche – Switzerland 52.1
4. GlaxoSmithKline – UK 45.4
5. Novartis – Switzerland 57.9
6. Sanofi – France
7. AstraZeneca – UK/Sweden 25.7
8. Abbott Laboratories – US 21.8
9. Merck & Co – US
10. Bayer Healthcare – German 54.2
11. Eli Lilly – US 23.1
12. Bristol-Myers Squibb – US 16.4
Source: Wikipedia and Fortune 500 magazine



Labs are also used for scientific research and may be equipped in various configurations depending on the type of research. A physics lab might contain a particle accelerator or vacuum chamber. A metallurgy lab could have apparatus for casting or refining metals or for testing strength of materials. A chemist or biologist might use a wet laboratory, while a psychologist's lab might be a room with one-way mirrors and hidden cameras in which to observe behavior.

However, the most common laboratories requiring control of humidity and temperature are found in pharmaceutical laboratories. Equipment such as chambers, autoclaves, incubators or clean rooms require strict measurement and control of humidity and temperature.

Typical equipment requiring measurement and control of humidity and temperature

Incubators

What is an incubator? An incubator is a device used to grow and maintain microbiological or cell cultures.

Why the need for an incubator? Incubators are essential for experimental work in cell biology, microbiology and molecular biology often used to culture bacterial as well as eukaryotic cells.

Why the need to measure humidity & temperature?

The incubator maintains optimal temperature, humidity and other

continued



Typical equipment . . .

Incubators

(continued)

conditions such as the carbon dioxide (CO_2) and oxygen content of the internal environment.

Climatic Chambers

What is an environmental chamber? An environmental chamber is an enclosure used to test the effects of specified environmental conditions on biological items, industrial products, materials, and electronic devices and components.

Why the need for an environmental chamber?

An environmental test chamber artificially replicates the conditions under which machinery, materials, devices or components might be exposed. It is also used to accelerate the effects of exposure to the environment, sometimes at conditions not actually expected. These conditions may include extreme temperatures, sudden and extreme temperature variations, extremely wet or dry relative humidity, dynamic vibrations, electromagnetic radiation, and more.

Why the need to measure humidity & temperature?

Manufactured samples, specimens, or components are placed inside the chamber and subjected to one or more of these environmental parameters to determine reliability or to measure after-effects.

Autoclaves

What is an autoclave? An autoclave is an instrument used to sterilize equipment and supplies



Incubator . . . Autoclave . . . Laboratory Freezer

by subjecting them to high pressure saturated steam at high temperatures for a certain period of time depending on the size of the load and the contents.

Why the need for an autoclave? Autoclaves are found in many medical settings, laboratories, and other places that need to ensure sterility of an object. Typical equipment and materials placed into an autoclave include laboratory glassware, surgical instruments, medical waste, patient care utensils, animal cage bedding, and Lysogeny broth.

Why the need to measure humidity & temperature?

A medical autoclave is a device that uses steam to sterilize equipment and other objects. This means that all bacteria, viruses, fungi, and spores are inactivated.

Refrigerators and Freezers

What is a refrigerator? A refrigerator is an appliance that consists of a thermally insulated compartment and a heat pump which transfers heat from the inside *continued*

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Typical equipment . . .

Refrigerators and Freezers *(continued)*

of the fridge to its external environment so that the inside of the fridge is cooled to a temperature below the ambient temperature of the room.

Why the need for a refrigerator? Cooling is an efficient means to decrease the reproduction rate of bacteria.

Why the need to measure humidity & temperature? Measurement is needed to monitor

and trace stabilized conditions.

Clean Rooms

What is a clean room?

A clean room is an environment, typically used in manufacturing or scientific research, which maintains a low level of environmental pollutants such as dust, airborne microbes, aerosol particles and chemical vapors.

Why the need for a clean room? Entire manufacturing facilities can be contained within a clean room. They are used extensively in semiconductor manufacturing, biotechnology, the life sciences and other fields that are very sensitive to environmental contamination.

Why the need to measure humidity & temperature?

The effects caused by humidity can be expansion, contraction, hardening and softening of materials, viscosity change of liquid, growth of microbes, increase in static electricity, corrosion and rust.

Shakers

What is a shaker?

A shaker is a device used in chemistry and biology laboratories to stir liquids.

Why the need for a shaker? A shaker is used to homogenize liquid samples or reagents and for cell cultivation.

Why the need to measure humidity & temperature?

Humidity control is important for cultivation in microtiter plates, reducing water loss from the wells. The high shaking speed ensures enough oxygen is provided for cultivation of microorganisms.

Drying Cabinets

What is a drying cabinet? A drying cabinet is an electronic machine designed to expedite the drying of items.

Why the need for a drying cabinet? A drying cabinet provides for storage of experiments, tablets, medicine in powder form, slide specimens, delicate instruments, inoculants or germinating seeds in a humiditycontrolled environment.

Why the need to measure humidity & temperature?

Measurement provides the regulation and recording of the required temperature and humidity.



Clean Room . . . Drying Cabinet

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