



Autoclave

Introduction: Is an instrument used moist heat sterilization techniques by using steam in the range of **121-134°C**. Steam under pressure is used to generate high temperature needed for sterilization.

Saturated steam (steam in thermal equilibrium with water from which it is derived) acts as an effective sterilizing agent. Steam for sterilization can be **either** wet saturated steam (containing entrained water droplets) **or** dry saturated steam (no entrained water droplets).

Autoclaves use pressurized steam to destroy microorganisms, and are the most dependable systems available for the decontamination of laboratory waste and the sterilization of laboratory glassware, media, and reagents.

This method of sterilization works well for many metal and glass items but is **not** acceptable for rubber, plastics, and equipment that would be damaged by high temperatures



Fig 1 autoclave



Why is it called an autoclave?

Because it describes a device that automatically locks shut when the pressure rises (to avoid steam spraying out if you open it by accident). The word is French, and comes from the Greek "auto" for automatic and the Latin "civis," for key (as in lock and key).

Theory of Operation

An autoclave is a large pressure cooker; it operates by using steam under pressure as the sterilizing agent. *High pressures enable steam to reach high temperatures*, thus increasing its heat content and killing power. Most of the heating power of steam comes from its latent heat of vaporization. This is the amount of heat required to convert boiling water to steam. Ensure that there should be sufficient water in the autoclave to produce the steam. The stages of operation of autoclaves include air removal, steam admission and sterilization cycle (includes heating up, holding/exposure, and cooling stages).

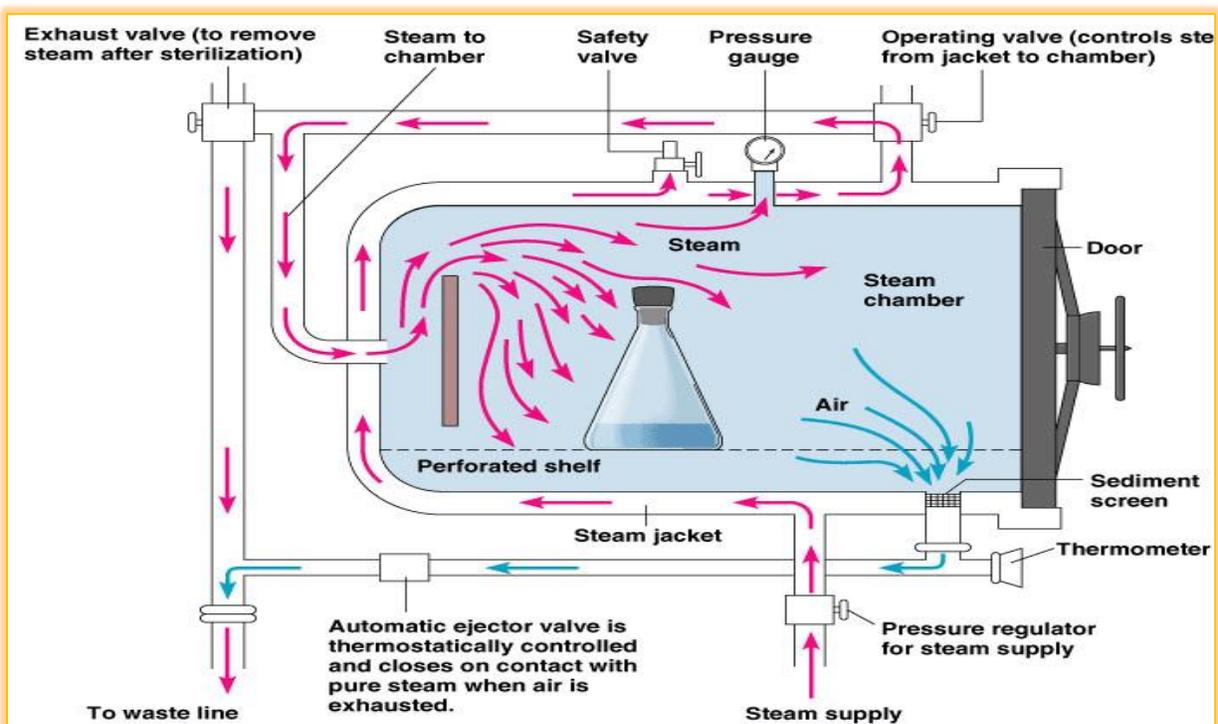


Fig 2 An autoclave system



Autoclaves, or steam sterilizers essentially **consist of** the following:

1. A cylindrical or rectangular chamber, with capacities ranging from 400 to 800 liters, usually made of stainless steel to carry out the high level of pressure and heat.
2. Water heating system or steam generating system
3. Steam outlet and inlet valves
4. Single or double doors with locking mechanism.
5. Thermometer or temperature gauge
6. Pressure gauges
7. Safety valve: it is a system simply contain valve with mechanical principles that work on spring push to the lever that close pipe which out from it steam.

Principle of Operation

The diagram of an autoclave (figure 2) shows the simplicity of its operation:

1. The steam enters the chamber, passes through an operating valve and enters the rear of the chamber behind a baffle plate.
2. It flows forward and down through the chamber and the load, exiting at the front bottom.
3. A pressure regulator maintains the chamber pressure at a minimum of 15 psi, the pressure required for steam to reach 121°C (250° F).
4. Overpressure protection is provided by a safety valve.
5. The conditions inside are thermostatically controlled so that heat (more steam) is applied until 121°C is achieved, at which time the timer starts, and the temperature is maintained for the selected time.



What is the standard temperature and pressure of an autoclave?

Processes conducted at high temperatures for short time periods are preferred over lower temperatures for longer times.

Some standard temperatures/pressures employed are 115 °C/10 p.s.i., 121 °C/ 15 p.s.i., and 132 °C/27 p.s.i. (psi pounds per square inch). Autoclave, autoclaving generally involves heating in saturated steam under a pressure of approximately 15 psi, to achieve a chamber temperature of a least 121°C (250°F) but in other applications in industry, for example, other combinations of time and temperature are sometimes used. Please note that after loading and starting the autoclave, the processing time is measured after the autoclave reaches normal operating conditions of 121°C (250°F) and 15 psi pressure, NOT simply from the time you push the "on" button