



AL- MUSTAQBAL UNIVERSITY COLLEGE
DEPARTMENT OF BIOMEDICAL ENGINEERING

Bio-Electronics Design Lab

BME 515

Lecture 6

- Autoclave -

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Autoclave

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- The medical steam autoclave is a device that uses pressurized, high temperature steam to sterilize medical instruments.
- It is work by subjecting them to high-pressure saturated steam (in the range of 121-134°C).
- Used moist heat sterilization techniques.



- Saturated steam (steam in thermal equilibrium with water from which it is derived) acts as an effective sterilizing agent.

- Steam for sterilization can be
 - Wet saturated steam (containing entrained water droplets).

 - 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.
- 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.
- The device automatically locks shut when the pressure rises (to avoid steam spraying out if you open it by accident).



- 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.



- The amount of heat required to convert boiling water to steam.
- 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).



Autoclaves, or steam sterilizers essentially consist of the following:

1. A cylindrical or rectangular chamber, with different capacities liters rang, 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.

Autoclaves Consist



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 that used for removing the steam.

Principle of Operation



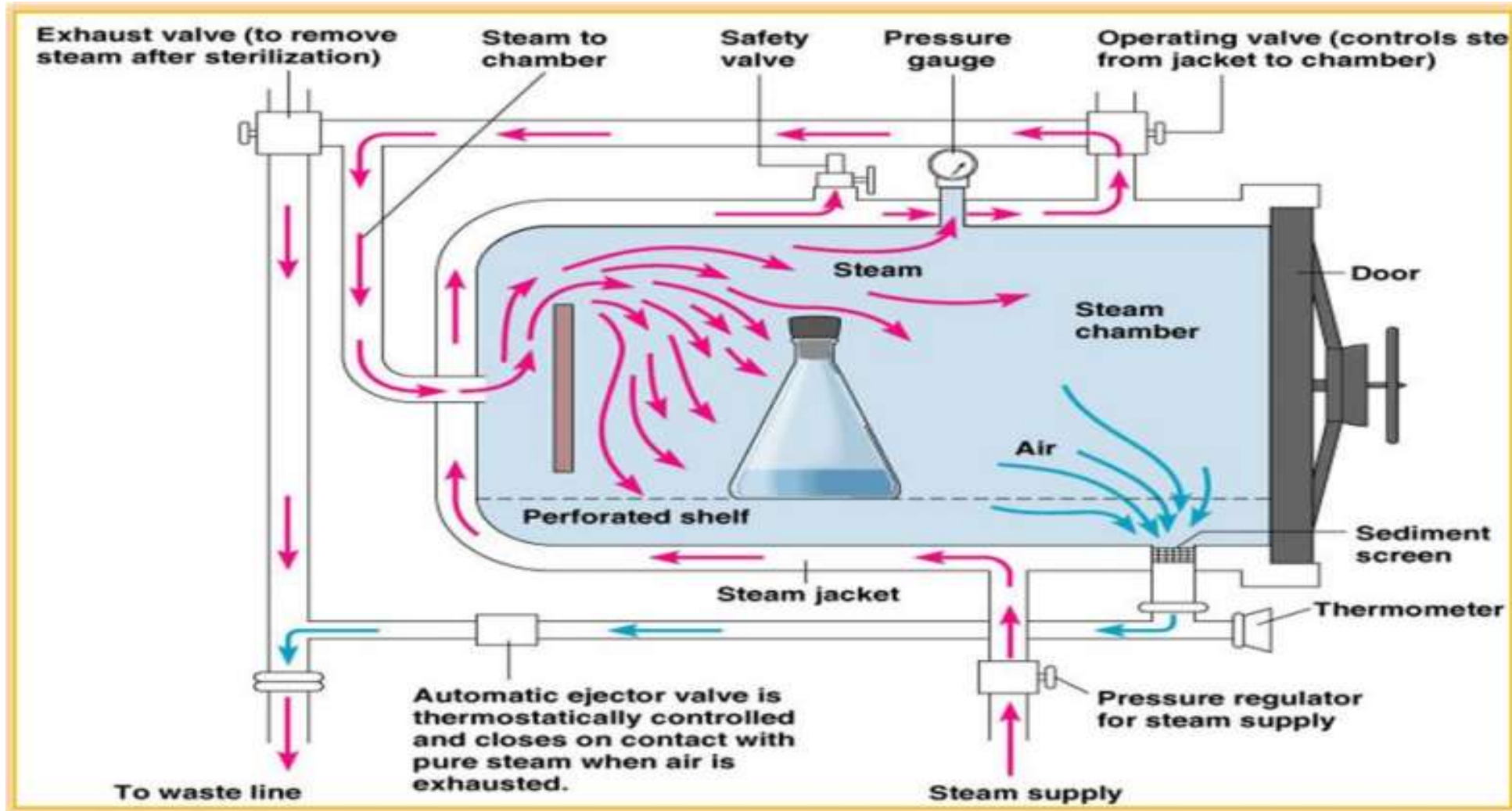
1. The steam enters the chamber, passes through an operating valve and enters the rear of the chamber behind a baffle plate.
2. It flows forward and down through the chamber and the load, exiting at the front bottom.
3. A pressure regulator maintains the chamber pressure at a minimum of 15 psi, the pressure 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.

Principle of Operation



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).
- 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.

