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STERILISATION

**Detailed study of the following
sterilization process**

Sterilization with moist heat

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Method of Sterilization

☐ **PHYSICAL METHODS :**

1. Dry Heat Sterilization
2. Moist Heat Sterilization
3. Radiation Sterilization
 - a. Use of U.V rays
 - b. Ionizing radiation

☐ **CHEMICAL METHODS :**

1. Sterilization by heating with bactericide.
2. Gaseous Sterilization

☐ **MECHANICAL METHODS : (Parenteral preparation)**

1. Ceramic filters 2. Seitz filter
3. Sintered glass filters 4. Sintered metal filters
5. Membrane filters



MOIST HEAT STERILISATION :

- The moist heat sterilization is more effective than dry heat sterilization because the steam has more penetration power than dry heat sterilization.
- This method is very useful for killing of bacterial spore because they have high thermal capacity.
- The moist steam penetrates the spores & capsules of bacteria, rupture it & escaping protoplasm is coagulated.
- Generally for moist heat sterilization is carried out in autoclave.



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Combination of temperature & time in Autoclave

HOLDING TEMPERATURE	TIME IN MINUTES
115 to 118 ^o C	30
121 to 124 ^o C	15
126 to 129 ^o C	10
134 to 138 ^o C	5



AUTOCLAVE

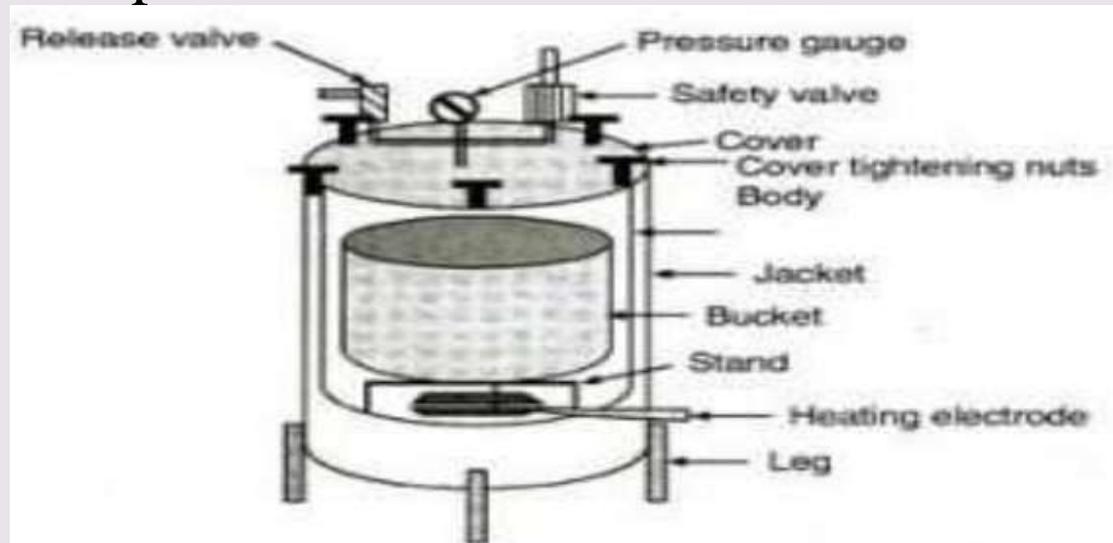
- It is made up of stainless steel.
- It has a cover fitted with a steam vent, a pressure gauge & safety valve.
- Rubber gasket is fitted on the inner side of the lid in order to make autoclave air tight.
- The cover is fitted with wing nuts & bolts.
- The heated elements or heating coils are fitted at the bottom to heat the water to convert into steam.
- The perforated inner chamber is placed on the stand.
- A sufficient quantity of water is poured into the chamber & level of the water adjusted in a such way that the bottom of the perforated chamber does not touch.
- Then lid is then closed with wing nuts & bolts.



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- After switch on autoclave, the vent is opened & safety valve is set.
- When steam starts coming out from the vent & it continues for 5 minutes, it is then closed.
- The steam pressure starts raising & it comes to the desired pressure i.e. 15 lbs/Sq.inch with corresponding temperature 121°C
- After stated period, switch off the autoclave.
- Allow to cool to about 40°C before opening the vent.
- When whole of the steam inside the autoclave is removed, the lid is opened & sterilized material is taken out.





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Advantages of Autoclave

- ❑ It destroys microorganisms more efficiently than dry heat & hence the material is exposed to a lower temperature for a shorter period.
- ❑ Equipments or parts of rubber & plastic such as, nylon can withstand the temperature & the pressure required for sterilisation.
- ❑ A large quantity of material can be sterilized in one batch using a big autoclave.
- ❑ It is used for sterilisation of surgical dressings & surgical instruments.

Disadvantages of Autoclave

- ❑ It is unsuitable for powders & oils.
- ❑ It cannot be used for sterilisation of injections & articles, such as, plastics which get spoiled at 115-116⁰C for 30 minutes.



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Other methods for sterilisation by moist heat

- Tyndallisation
- Pasteurisation
- Sterilisation of vaccines

TYNDALLISATION

- This method is official method in B.P. 1932
- For those medicaments which are unstable at temp. 115°C . but able to withstand low temper. heating.
- In this method the solution to be sterilized is packed & sealed in its final container & heated at 80°C . For one hr on each of three successive days.
- The first day destroys the vegetative cells but not spores.



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- These bacterial spores germinate into the vegetative forms in the interval between the first & second heating & are killed in the second heating.
- The third heating provides safeguard against any spore which may not germinate until the second heating.
- This method was deleted from B.P.1932 by the 4th addendum (1941) & replaced by heating with a bactericide. Other methods for sterilization by moist heat.

PASTEURISATION

- It is a partial sterilization method used for make milk safe.
- In that process only 97 to 99 % microorganisms kills but does not kills the spores.

Holder method:

In that method 62.80C for 30 mint. milk is heated in a steam jacket made from stainless steel with containing agitators. This provides correct exposure throughout the milk & prevents skin formation.



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Flash method:

In this method milk is heated at 71.60C for 15 sec. & then quickly cooled. The milk is heated by passing through narrow horizontal pipes inside large ones through which water passes in the opposite direction. This method is commonly used by most of the firms.

STERILISATION OF VACCINES :

- In case of vaccine which is a suspension of dead bacteria, the organism are killed in such a manner that its antigenic power is preserved.
- Sterilization is carried out by immersing the container in a thermostatically controlled water bath at temp between 55 to 60⁰C. for one hour.
- The strick aseptic precautions are observed to exclude any possibility of contamination.