Practice lecture of anaethetic equipements

VAPORIZER

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Vaporizer

A vaporizer is designed to add a controlled amount of an inhalational agent, after changing it from liquid to vapour, to the FGF. This is normally expressed as a percentage of saturated vapour added to the gas flow

Fig. 2.17 Tec Mk 5 vaporizers mounted on the back bar of an anaesthetic machine.

Percentage

Components:

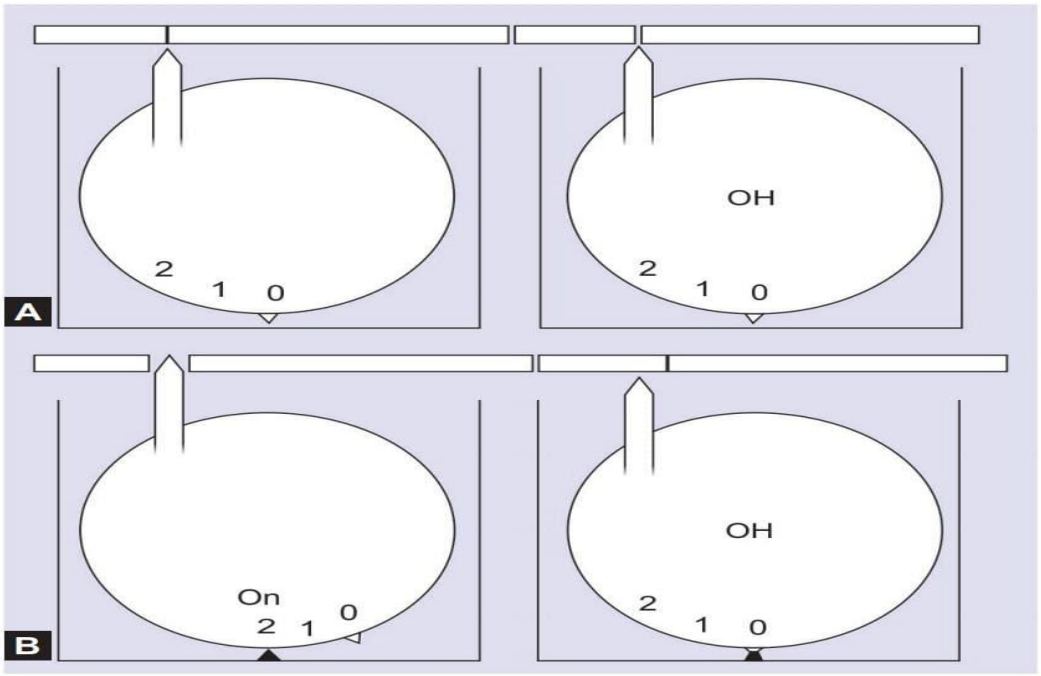
1-The case with the filling level indicator and a port for the filling device.

2- Percentage control dial on top of the case.

3-. The bypass channel and the vaporization chamber. The latter has wicks or baffles to increase the surface area available for vaporization.

4- The splitting ratio is controlled by a temperature-sensitive valve utilizing a bimetallic strip. It is positioned inside the vaporization chamber

5-The vaporizers are mounted on the back bar using the interlocking Selectatec system The percentage control dial cannot be moved unless the locking lever of the system is engaged The interlocking extension rods prevent more than one vaporizer being used at any one time, preventing contamination of the one downstream



Figs 14A and B Select-a-tec interlock system. A. When both vaporizers are off; B. When the first vaporizer is turned on

Mechanism of action:

1- The calibration of each vaporizer is agent-specific.

2- Fresh gas flow is split into two streams on entering the vaporizer. One stream flows through the bypass channel and the other, smaller stream flows through the vaporizing chamber. The two gas streams reunite as the gas leaves the vaporizer.

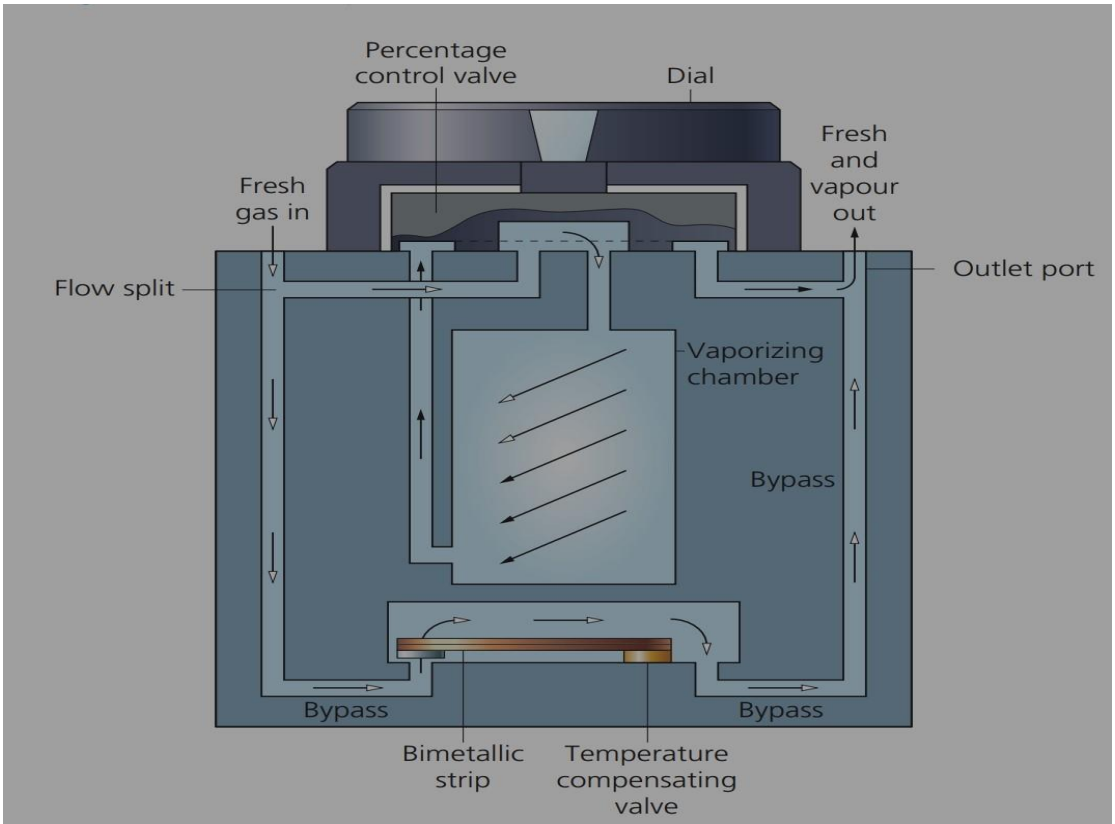


Fig. 2.18 A schematic diagram of the Tec Mk 5, an example of a plenum vaporizer.

3-The vaporization chamber is designed so that the gas leaving it is always fully saturated with vapour before it rejoins the bypass gas stream.

4- The desired concentration is obtained by adjusting the percentage control dial. This alters the amount of gas flowing through the bypass channel to that flowing through the vaporization chamber.

5-. During vaporization, cooling occurs due to the loss of latent heat of vaporization. Lowering the temperature of the agent makes it less volatile. In order to compensate for temperature changes:

a-) the vaporizer is made of a material with high density

b-) a temperature sensitive valve (e.g. bimetallic strip or bellows) within the body of the vaporizer automatically adjusts the splitting ratio according to the temperature.

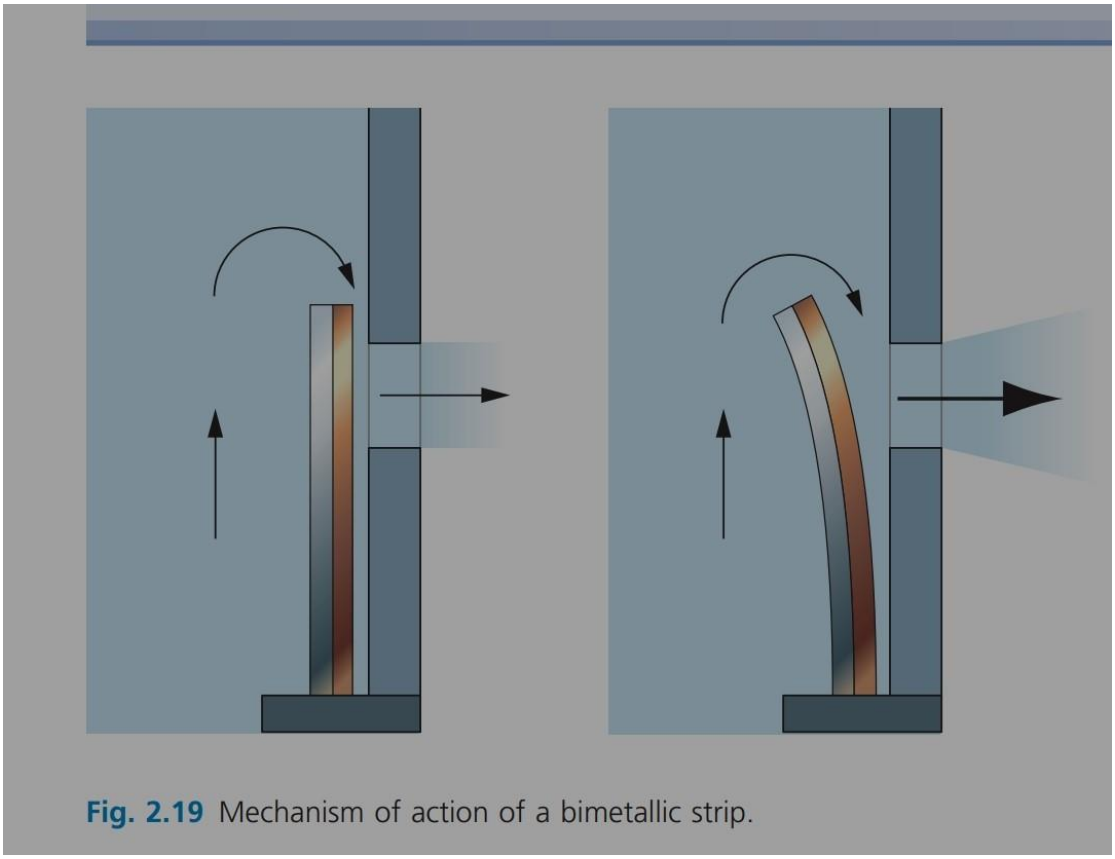


Fig. 2.19 Mechanism of action of a bimetallic strip.

Problems in practice and safety features:

1-. In modern vaporizers the liquid anaesthetic agent does not enter the bypass channel even if the vaporizer is tipped upside down due to an antispill mechanism.

2- The Selectatec system increases the potential for leaks. This is due to the risk of accidental removal of the O-rings with changes of vaporizers.

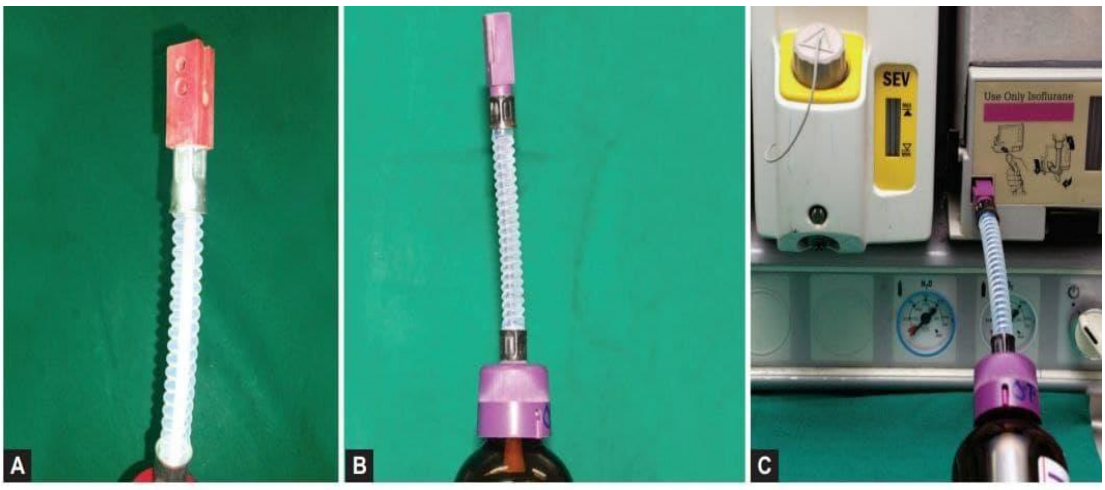
3- Preservatives, such as thymol in halothane, accumulate on the wicks

4-A pressure relief valve downstream of the vaporizer opens at about 35 kPa. This prevents damage to flowmeters or vaporizers if the common gas outlet is blocked.

5- The bimetallic strip has been situated in the bypass channel It is possible for the chemically active strip to corrode in a mixture of oxygen and the inhalational agent within the vaporizing chamber.

Vaporizing filling device

These are agent-specific being geometrically coded (keyed) to fit the safety filling port of the correct vaporizer and anaesthetic agent supply bottle



Key-Fill