the growth of from four to six billion organisms per cubic centimeter is ready for recovery.

RECOVERY OF THE ORGANISMS.

This is accomplished by piping the growth to a battery of Sharpless super centrifuges, where it is centrifuged at 30,000 revolutions to the minute, which removes practically all the organisms from the medium.

The packed organisms are removed from the bowls of the machine and packed in glass containers, which are then placed at a temperature of minus five degrees C.

Organisms so obtained retain their morphology and staining characteristics, and are as useful for immuniological work as those obtained from the ordinary media employed.

This method has been in constant use for over a year and has proved satisfactory.

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The physiologic properties of some unsaturated hydrocarbons.

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The recent introduction of ethylene and acetylene as anesthetics into medical practice has made it appear desirable that a general study of the physiologic properties of the unsaturated hydrocarbons be undertaken. Studies have therefore been carried out on hydrocarbons of the olefine, diolefine and acetylene series. Each hydrocarbon has been studied from the following points of view: 1. Symptoms produced in experimental animals by the inhalation of various concentrations of each hydrocarbon studied. 2. The toxicity of the various hydrocarbons when administered by inhalation. 3. An attempt has been made to relate quantitatively the anesthetic potency and the toxicity of the various hydrocarbons studied.

In order that these studies might be made as strictly comparable as possible a single strain of white rats of uniform weight was used.

The following concentrations of hydrocarbons induce anesthesia in fifteen minutes, and are hence considered to be of equal anesthetic potency: ethylene 90 per cent, propylene 40 per cent, butylene 20 per cent, amylene 6 per cent and acetylene 78 per cent. If the anesthetic potency of ethylene is taken as unity, the potencies of the others then become, propylene = 2.25, butylene = 4.50, amylene = 15.0 and acetylene = 1.15. On the basis of the potency of propylene as unity, the potencies of ethylene, propylene, butylene, amylene and acetylene then become 0.44, 1.0, 2.0, 6.6 and 0.52 respectively. Butylene and amylene cause a marked excitement stage, while ethylene, propylene and acetylene do not. Animals are prostrated by 20 per cent propadiene and by 5 per cent methyl acetylene in about 15 minutes, but the nervous symptoms produced by these hydrocarbons are so violent that they can scarcely be said to possess anesthetic properties.

The following concentrations of hydrocarbons cause respiratory failure in about two hours, and are hence considered to be of equal toxicity: propylene 65 per cent, butylene 20 per cent, amylene 6 per cent, acetylene 90 per cent, methyl acetylene 5 per cent and propadiene 15 per cent. On the basis of the toxicity of propylene as unity, the toxicities of these hydrocarbons are as follows: butylene = 3.25, amylene = 10.8, acetylene = 0.73, methyl acetylene = 13 and propadiene = 4.3. The toxicity of 95 per cent ethylene is probably more due to oxygen privation than to the toxic action of ethylene. Methyl acetylene is 18 times as toxic as acetylene.

The relationship between the potency and toxicity of each hydrocarbon may be expressed in the form of a ratio, thus:

$$\frac{\text{Potency} \times 100}{\text{Toxicity}} = \text{Index}$$

The index thus obtained may be called the index of safety or anesthetic index. Making use of the figures given above for the toxicity and potency of the various hydrocarbons on the basis of potency of propylene as unity, and of toxicity of propylene as unity, we obtain the following indices:

Propylene $\frac{1 \times 100}{1} = 100$, butylene $\frac{2.0 \times 100}{3.25} = 61$, amylene $\frac{6.6 \times 100}{10.8} = 61$ and acetylene $\frac{0.52 \times 100}{.73} = 71$.