

MASS TRANSFER COEFFICIENT MAPS FOR THREE MODELS OF MEMBRANE BLOOD OXIGENATOR USING PERFLUOROCARBON EMULSION.

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In this work the dynamic method with perfluorocarbon emulsion was used, to determine the total mass transfer coefficient of three models of membrane blood oxygenators. Tridimensional maps were produced for the mass transfer coefficient and for the estimation of the standard deviation of the obtained data. The maps were used to seek for the optimum operating conditions, and to provide knowledge of the tendencies of the devices when there is some unexpected variation on the operational situation.

The experiments were performed with blood oxygenators with exchange areas of 0.25 , 0.7 , and 1.6 m². A planned variation of the experimental conditions was used working the flow rates of gas from 0.5 to 6 l/min. and the liquid from 0.5 to 2.5 l/min. The experiments were done in triplicate totalizing 300 runs. The liquid phase was formulated with Oxyperol FC 43 emulsion diluted with distilled water up to 18,5 % v/v.

It was possible to determinate how is the total mass transfer coefficient affected by variations in the gas and liquid flow rates. An empirical mass transfer correlation was adjusted for these mass transfer devices.

The determination of the total mass transfer coefficient for membrane kind blood oxygenators with perfluorocarbon emulsion provided data with a wider amplitude interval than with water. It is possible that the emulsion higher oxygen solubility decreases the mass transfer resistance at the liquid side of the membrane, that results in higher mass transfer rates for the same operational conditions.

Comparing the mass transfer coefficient maps obtained with water and perfluorocarbom emulsion, the use of the higher oxygen solubility compounds provides higher resolution maps for the studied devices, which are useful to help choosing an equipment for a given situation, to enhance the production quality control, to evaluate new devices under development, and as a marketing appeal, since it provides an impressive amount of information about the equipment's performance to the perfusionists.