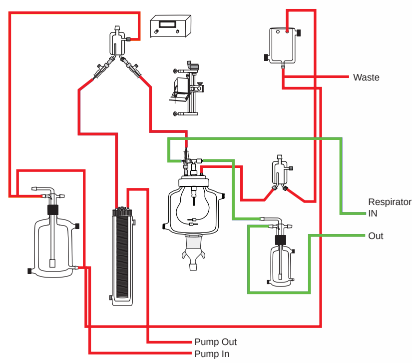
Radnoti

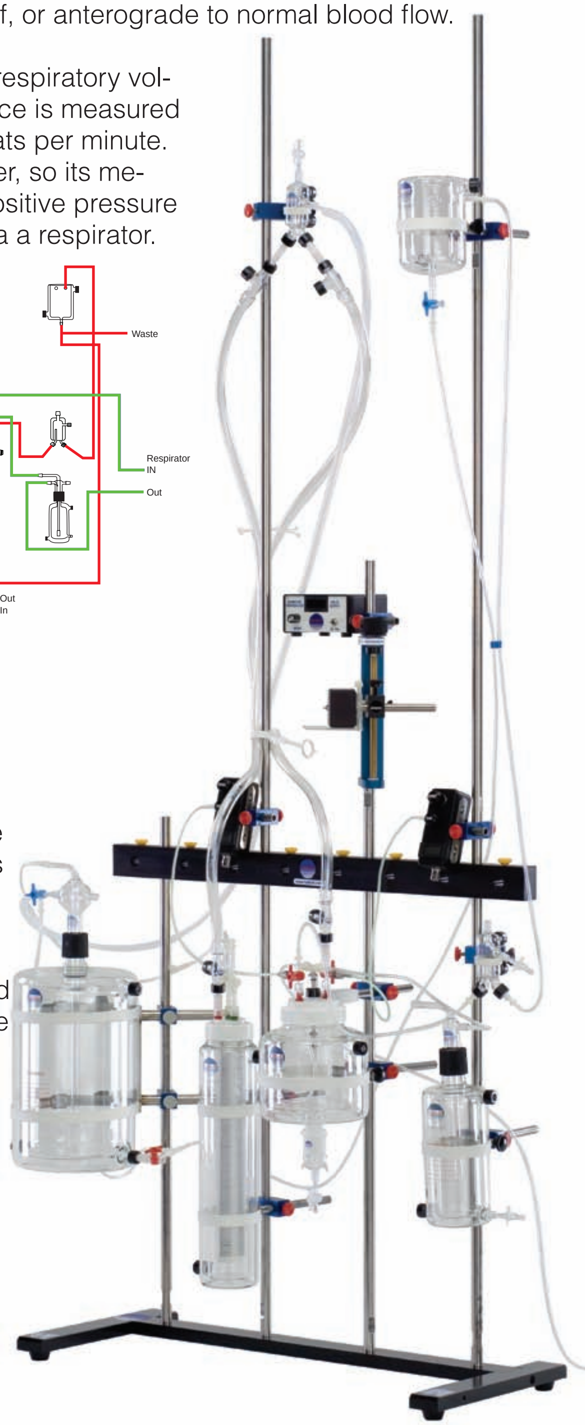
Radnoti Isolated Lung System:
#190101

The lungs are important not only for respiration, but also as a target organ for drugs that include volatile anesthetics, biochemical and biological agents, are involved in drug metabolism and distribution and are involved in a number of pathological scenarios, including ischemia, edema, various diseases and trauma. The isolated lung system has both similarities and differences to the isolated heart system. Both systems require maintenance of the organ at physiological temperatures and perfusion with crystalloid solutions, such as Kreb's or Tyrode's solutions, or admixtures containing blood. Like the isolated heart system, the vasculature of the lung can be perfused in a constant pressure or a constant pressure mode and the lung is cannulated on an artificial trachea, just as the heart is cannulated on an artificial aorta. This perfusion, can be in either retrograde, as in the Langendorff, or anterograde to normal blood flow.

The respiratory performance of the lung can be measured in terms of respiratory volumes exchanged at a given rate, while cardiac mechanical performance is measured by its developed pressure or stroke volume multiplied by its rate in beats per minute. Unlike the heart, the isolated lung does not have an intrinsic pacemaker, so its mechanical activity must be generated through one of two ways. In the positive pressure method, air is forced into the artificial trachea and then into the lung via a respirator. In the negative pressure method, the lungs are placed in a sealed chamber that mimics the situation in the subject's chest cavity. The Radnoti system is configured for the positive pressure method.



The Radnoti isolated lung system permits a wide variety of experimental formats to be explored. Through the use of water-jacketed reservoirs and peristaltic pumps, constant pressure and constant flow perfusion can occur in both re-circulating and non-re-circulating modes. Perfusion solutions can be aerated through the use of sintered glass frits or through a silicone tubing gas exchange system, the latter best for solutions containing proteins or blood. Perfusion pressure is measured via inline pressure transducers and perfusion flow can measured via inline flow meters. A variable speed and volume respirator delivers humidified air or other gasses to the lungs (positive pressure) or creates a cycling negative/positive pressure change in the lung chamber (negative pressure). Pressure sensors are used to determine inspiration and expiration pressures and the gasses passed into the lung are humidified using a gas chamber. Expired air or perfusate can also be collected for metabolic studies. For experimenters interested in measuring lung edema, the lung cannula is attached to a force transducer with a +/- 5 volt readout that can be linked to a data acquisition system. Perfusate pH, oxygen and carbon dioxide can be measured with inline ion selective electrodes. By changing artificial tracheas and the lung chamber in concert with respirator settings and control valves, lungs from subjects from mice to rabbits or larger can be used.



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