method for culturing cells in the event of pH or DO probe failure in WAVE BIOREACTORs™ equipped with these probes.

[0146] It is also to be understood that the specific examples described herein are illustrative only and not intended to limit the scope of the invention. The invention is limited only by the appended claims.

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1-43. (canceled)

44. A method for culturing eukaryotic cells comprising:

(i) providing a cell culture comprising eukaryotic cells in a bicarbonate-containing culture liquid to a vessel, wherein said vessel has a volume of about 50 L and has walls that encapsulate said cell culture and a gas phase head space above said cell culture, and wherein said vessel comprises at least one port that provides an entrance and an egress of gas to and from said head space;

(ii) perfusing fresh culture medium into said vessel and removing spent culture medium from said vessel at a perfusion rate of about 1 volume per day; and

(iii) providing gas to said head space through said port to sweep accumulated CO_2 from the head space of the vessel, wherein said gas is supplemented with O_2 in an amount of 30% (v/v) of said gas 48 hours after the start of perfusion, thereby modulating pH of the cell culture to maintain the pH of the culture between pH 6.8 and 7.2, and maintaining dissolved O_2 to a level greater than 20% of air saturation,

wherein the fresh culture medium has a pH of 7.2, clearance rate of the head space is between 0.002 and 0.1 head space volume per minute (hvm), the vessel is agitated by rocking the vessel at a rock rate between 15 and 30 rocks per minute (rpm) at a rock angle of between 5° and 15°, and wherein the method does not require continuous monitoring and feedback control of pH and dissolved O_2.

45. The method of claim **44**, wherein the rock rate is between 19 and 25 rpm and the rock angle is between 8° to 12°.

46. The method of claim **44**, wherein the clearance rate is between 0.01 to 0.04 hvm.

47. The method of claim **46**, wherein the clearance rate is about 0.02 hvm.

48. The method of claim **44**, wherein said vessel is a rigid container.

49. The method of claim **44**, wherein said vessel is a pliable container.

50. The method of claim **49**, wherein said vessel is a disposable culture bag.

51. The method of claim **44**, further comprising intermittently monitoring the pH of the cell culture.

52. The method of claim **44**, wherein the perfusion of said fresh culture medium is performed through a perfusion device that allows retention of cells in the vessel.

53. The method of claim **44**, wherein flow rate of the gas is from 0.1 L/min to 1 L/min.

54. The method of claim **53**, wherein the flow rate is 0.6 L/min.