

## **BUFFER SOLUTIONS**

The tables below cover only the commonly used buffers and are not intended to be exhaustive. The first three tables are biologically compatible in that they do not contain materials which could interfere with enzymes or alter the structure of complex molecules other than changes due to changes in pH.

<b>Table I</b>		
<b>Citrate/Phosphate buffer (Proportions to give 100cm<sup>3</sup>)</b>		
<b>Desired pH</b>	<b>0.2M Na<sub>2</sub>HPO<sub>4</sub> cm<sup>3</sup></b>	<b>0.1M Citric Acid cm<sup>3</sup></b>
2.2	2.0	98.0
2.4	6.2	93.8
2.6	10.9	89.1
2.8	15.9	84.1
3.0	20.5	79.5
3.2	24.7	76.3
3.4	28.5	71.5
3.6	31.2	68.8
3.8	33.8	66.1
4.0	37.0	63.0
4.2	40.0	60.0
4.4	42.1	57.9
4.6	44.1	55.9
4.8	47.5	52.5
5.0	49.3	50.7
5.2	52.6	47.4
5.4	54.7	45.3
5.6	56.8	43.2
5.8	59.2	40.8
6.0	62.1	37.9
6.2	64.1	35.9
6.4	66.1	33.9
6.6	72.5	27.5
6.8	77.0	23.0
7.0	82.3	17.7
7.2	85.6	14.4
7.4	88.9	11.1
7.6	92.2	7.8
7.8	94.8	5.2
8.0	95.8	4.2

<b>Table II</b>	
<b>Phosphate buffer - 50cm<sup>3</sup> 0.2M KH<sub>2</sub>PO<sub>4</sub> plus stated volume 0.2M NaOH diluted to 200cm<sup>3</sup></b>	
<b>Desired pH</b>	<b>Volume of 0.2M NaOH</b>
6.0	5.7
6.2	8.6
6.4	12.6
6.6	17.8
6.8	23.65
7.0	29.65
7.2	35.0
7.4	39.5
7.6	42.8
7.8	45.2
8.0	46.8

  

<b>Table III</b>	
<b>Acetate buffer - 20cm<sup>3</sup> of 1M sodium acetate plus the stated volume of 1M acetic acid and diluted to 200cm<sup>3</sup></b>	
<b>Desired pH</b>	<b>Volume of 1M acetic acid</b>
4.1	70.0
4.2	60.0
4.4	49.0
4.6	25.0
4.8	20.0
5.0	12.5

## BUFFER SOLUTIONS (cont'd)

<b>Table IV</b>	
<b>Phthalate buffer</b> 50cm <sup>3</sup> 0.2M potassium hydrogen phthalate, plus stated volume of 0.2M HCl and diluted to 200cm <sup>3</sup> with water.	
<b>Desired pH</b>	<b>Volume of 0.2M HCl</b>
2.2	46.6
2.4	39.6
2.6	33.0
2.8	26.5
3.0	20.4
3.2	14.8
3.4	9.95
3.6	6.0
3.8	2.65
4.0	nil

<b>Table V</b>	
<b>Borate buffer</b> 0.7456g KCl + 0.618g H <sub>3</sub> BO <sub>3</sub> in 50cm <sup>3</sup> water, plus stated volume of 0.2M NaOH and diluted to 200cm <sup>3</sup> with water.	
<b>Desired pH</b>	<b>Volume of 0.2M NaOH</b>
8.0	3.97
8.2	5.9
8.4	8.5
8.6	12.0
8.8	16.3
9.0	21.3
9.2	26.7
9.4	32.0
9.6	36.85
9.8	40.8
10.0	43.9

<b>Table VI</b>			
<b>Buffers for EDTA titrations</b>			
<b>pH</b>	<b>Composition</b>	<b>Use</b>	<b>Indicator</b>
10.0	67.5g NH <sub>4</sub> Cl + 570cm <sup>3</sup> Ammonia (0.880) diluted to 1 litre	Ca; Mg; water hardness	Eriochrome _
	100cm <sup>3</sup> 1M NH <sub>4</sub> Cl + 500cm <sup>3</sup> 1M NH	Most divalent heavy metals	Pyrocatechol violet
5.0	100cm <sup>3</sup> 0.1M Ethanoic acid + 200cm <sup>3</sup> 0.1 M Sodium acetate	Pb; Zn	Xylenol orange
2.0	500cm <sup>3</sup> 1M Sodium ethanoate + 52.5cm <sup>3</sup> 1M HCl diluted to 250cm <sup>3</sup>	Bi	Xylenol orange