

Table 1c Temperature 85-129.4°C

Medium	pH	Temp. (°C)	D (min)	z (°C)	a _w (humectant)	Strain	Replicates	Method of heat/cool ^a	Recovery method	Ref.
0.25 M phosphate	7.0	85	33.8	9.7	-	T	6	RT/-0°C	TSA CC	1
0.25 M phosphate	7.0	85	106	13.9	-	1	6	RT/-0°C	TSA CC	1
0.25 M phosphate	7.0	85	34.4	6.9	-	1	6	RT/-0°C	TSA CC	1
0.06 M phosphate	7.0	95	2.6	10.0	-	1	-	-	NA CC	2
0.06 M phosphate	7.0	95	21.7	10.1	-	1	-	-	NA CC	2
Infant formula (milk-based)	6.3	95	2.7	8.1	-	1	-	-	NA CC	2
Infant formula (milk-based)	6.3	95	15.3	8.7	-	1	-	-	NA CC	2
Water	-	95	36	8.3	-	1	1	RT/-0°C	BA CC	3
Water	-	95	36	6.7	-	1	1	RT/-0°C	BA CC	3
Rice broth	7.0	100	6.3	-	-	1	-	RT/40°C	CC	4
Rice broth	7.0	100	4.2	-	-	1	-	RT/40°C	CC	4
Milk	-	95	1.8	9.4	-	1	-	-	CC	4
Bread	-	95	2.9	-	-	1	-	RT/27.5°C	MYP CC	5
Bread	-	95	36.2	-	-	1	-	RT/27.5°C	MYP CC	6
Milk	-	95	3.0	-	-	1	-	RT	DNA-EY CC	7
Milk	7.0	95	19.1	-	-	B. cereus var. albolactis	-	RT	DNA-EY CC	7
0.05 M phosphate buffer	7.0	95	2.8	-	> 0.995 (sorbitol)	T	-	RT/-0°C	NA CC	8
	7.0	95	3.4	-	0.99 (sorbitol)	T	-	RT/-0°C	NA CC	8
	7.0	95	3.4	-	0.96 (sorbitol)	T	-	RT/-0°C	NA CC	8
	7.0	95	2.1	-	> 0.995 (glycerol)	T	-	RT/-0°C	NA CC	8
	7.0	95	2.4	-	0.99 (glycerol)	T	-	RT/-0°C	NA CC	8
	7.0	95	2.4	-	0.91 (glycerol)	T	-	RT/-0°C	NA CC	8
	7.0	95	2.9	-	> 0.995 (NaCl)	T	-	RT/-0°C	NA CC	8
	7.0	95	3.0	-	0.99 (NaCl)	T	-	RT/-0°C	NA CC	8
	7.0	95	2.9	-	0.96 (NaCl)	T	-	RT/-0°C	NA CC	8
0.067 M phosphate buffer	7.0	115.6	0.13-11.3	7.9-9.9	-	T	2	37.8°C/ I-0°C	DTA CC	9
	7.0	121.1	0.03-2.35	7.9-9.9	-	T	2	37.8°C/ I-0°C	DTA CC	9
	7.0	126.7	0.30	7.9	-	T	2	37.8°C/ I-0°C	DTA CC	9
	7.0	129.4	0.24	7.9	-	T	2	37.8°C/ I-0°C	DTA CC	9
Distilled water	-	100	5.5	9.7	-	1	5	RT/-0°C	AA med CC	10
Distilled water	-	115	0.13	9.7	-	1	5	RT/-0°C	AA med CC	10

(continued)

Table 1c Temperature 85-129.4°C (continued)

Medium	pH	Temp. (°C)	D (min)	z (°C)	a _w (humectant)	Strain	Replicates	Method of heat/cool ^a	Recovery method	Ref.
Phosphate buffer	7.0	85	220	-	-	1	-	RT/-0°C	TGEA CC	11
Phosphate buffer	7.0	90	71	-	-	1	-	RT/-0°C	TGEA CC	11
Phosphate buffer	7.0	95	13	-	-	1	-	RT/-0°C	TGEA CC	11
Phosphate buffer	7.0	100	8	-	-	1	-	RT/-0°C	TGEA CC	11
Soybean oil	-	112	46.5	-	-	1	-	RT/-0°C	TGEA CC	11
Soybean oil	-	121	30	-	-	1	-	RT/-0°C	TGEA CC	11
Olive oil	-	121	17.5	-	-	1	-	RT/-0°C	TGEA CC	11
Triolein	-	112	14	-	-	1	-	RT/-0°C	TGEA CC	11
Triolein	-	121	10	-	-	1	-	RT/-0°C	TGEA CC	11
Liquid paraffin	-	112	21	-	-	1	-	RT/-0°C	TGEA CC	11
Liquid paraffin	-	121	8	-	-	1	-	RT/-0°C	TGEA CC	11
Pumpkin pie	-	100	40	-	-	1	-	RT/-0°C	TGEA CC	11
Pumpkin pie	-	108	10.5	-	-	1	-	RT/-0°C	TGEA CC	11
Pumpkin pie	-	124	7	-	-	1	-	RT/-0°C	KG CC	12
Distilled water	-	95	1.5-9.5	-	-	1	-	RT/-0°C	KG CC	12
Distilled water	-	95	24.0-36.2	-	-	15	-	RT/-0°C	BA CC	13
Distilled water	-	95	16.2-19.7	-	-	10	-	RT/-0°C	BA CC	13
Distilled water	-	95	-	-	-	2	-	RT/-0°C	BA CC	13

^a RT, spores heated from or cooled to ambient temperature; l-0°C, vessel of heated spores cooled in ice water; other temperatures, temperatures used to cool heated spores

T. *B. cereus* strain T - not known to be associated with illness

TSA, tryptone soya agar

CC, colony counts

NA, nutrient agar

BA, blood agar

MYP, mannitol egg yolk polymyxin agar

DNA-EY, (Difco) Nutrient Agar + 1% NaCl + 0.5 ml 10% sodium citrate + 0.5-1 ml Oxoid egg yolk emulsion

DTA, dextrose tryptone agar

AA, antibiotic assay

TGEA, tryptone glucose extract agar

KG, egg yolk polymyxin medium of Kim and Goepfert (1971)

1. Johnson *et al.* (1982)
2. Rajkowsky and Mikolajcik (1987)
3. Gilbert *et al.* (1974)
4. Chung and Sun (1986)
5. Shehata and Collins (1972)
6. Kaur (1986)
7. Stadhouders *et al.* (1980)
8. Jakobsen and Murrell (1977)
9. Bradshaw *et al.* (1975)
10. Briggs (1966)
11. Molin and Snygg (1967)
12. Wyatt and Guy (1981)
13. Parry and Gilbert (1980)

Table 2 Water activity

Medium	Strain	a _w	Humectant	Growth	Temp. (°C)	pH	Ref.
TGE broth	NCTC2603 ^a	0.96	NaCl	Growth at 24 h	30	7	1
TGE broth	NCTC2603 ^a	0.95	NaCl	Growth at 72 h	30	7	1
TGE broth	NCTC2603 ^a	0.96	KCl	Growth at 24 h	30	7	1
TGE broth	NCTC2603 ^a	0.95	KCl	Growth at 72 h	30	7	1
TGE broth	NCTC2603 ^a	0.97	Fructose	Growth at 24 h	30	7	1
TGE broth	NCTC2603 ^a	0.95	Glucose	Growth at 24 h	30	7	1
TGE broth	NCTC2603 ^a	0.94	Sorbitol	Growth at 24 h	30	7	1
TGE broth	NCTC2603 ^a	0.94	Erythritol	Growth at 24 h	30	7	1
TGE broth	NCTC2603 ^a	0.94	Glycerol	Growth at 24 h	30	7	1
TGE broth	NCTC2603 ^a	0.93	Glycerol	Growth at 72 h	30	7	1
TGE broth	NCTC2603 ^a	0.95	DMSO	Growth at 24 h	30	7	1
TGE broth	NCTC2603 ^a	0.94	DMSO	Growth at 72 h	30	7	1
BHI broth (1/4 strength)	C3 and 5B	0.92	Glycerol	No growth at 28 d	30	—	2
BHI broth (1/4 strength)	C3 and 5B	0.92–0.93	NaCl	No growth at 28 d	30	—	2
Potato extract– yeast extract– glucose broth	—	0.92	NaCl	No growth	37	—	3

^a *B. cereus* var. *mycoides*

TGE, tryptone glucose extract

DMSO, dimethyl sulphoxide

1. Jakobsen *et al.* (1972)
2. Marshall *et al.* (1971)
3. Measures (1975)

Table 3a pH and growth

Substrate	pH	Lag (h)	Growth (h/gen)	Acidulant (buffer)	Temp. (°C)	No. of strains [†]	Ref.
2% tryptone	5.0	—	1.20	HCl	30	1	1
2% tryptone	6.0	—	0.38	HCl	30	1	1
2% tryptone	8.0	—	0.40	HCl	30	1	1
2% soy flour	5.0	—	NG	HCl	30	1	1
2% soy flour	6.0	—	0.39	HCl	30	1	1
2% soy flour	7.0	—	0.38	HCl/NaOH	30	1	1
2% soy flour	8.0	—	0.37	NaOH	30	1	1
2% peanut flour	5.0	—	0.54	HCl	30	1	1
2% peanut flour	6.0	—	0.31	HCl	30	1	1
2% peanut flour	8.0	—	0.38	NaOH	30	1	1
TSB	4.8	—	NG	HCl	30	1	2
TSB	5.0	—	1.73	HCl	30	1	2
TSB	5.2	—	0.39*	HCl	30	1	2
TSB	6.4	—	0.28*	HCl	30	1	2
TSB	5.6	—	NG	0.1 M lactate	30	1	2
TSB	5.8	—	0.69*	0.1 M lactate	30	1	2
TSB	6.4	—	0.39*	0.1 M lactate	30	1	2
TSB	6.0	—	NG	0.1 M formate	30	1	2
TSB	6.1	—	3.5*	0.1 M formate	30	1	2
TSB	6.4	—	0.58*	0.1 M formate	30	1	2
TSB	6.1	—	NG	0.1 M acetate	30	1	2
TSB	6.2	—	3.5*	0.1 M acetate	30	1	2
TSB	6.3	—	3.5*	0.1 M acetate	30	1	2
TSB	6.4	—	1.16*	0.1 M acetate	30	1	2
Skim milk	5.5	—	0.75*	Lactic acid	30	1	3
Skim milk	6.0	—	0.5*	Lactic acid	30	1	3
Skim milk	6.5	—	0.44*	Lactic acid	30	1	3
BHI	5.0	—	0.80–2.1*	Piperazine/HCl	30	4	4
BHI	8.8	6–8	1.5–2.1*	Tris/HCl	30	4	4

* Approximate growth rates from published data

[†] Vegetative cells

NG, no growth

1. Beuchat *et al.* (1980)
2. Wong and Chen (1988)
3. Mikolajcik *et al.* (1973)
4. Garcia-Arribas and Kramer (1990)