

ICS 13.080.30

CCS Z 18

T/GXAS

团 体 标 准

T/GXAS 523—2023

污泥 粪大肠菌群的测定 酶底物法

Sludge—Determination of fecal coliforms—Enzyme substrate method

2023 – 07 – 18 发布

2023 – 07 – 24 实施

广西标准化协会 发 布

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前 言

本文件参照GB/T 1.1—2020《标准化工作导则 第1部分：标准化文件的结构和起草规则》和HJ 168—2020《环境监测分析方法标准制订技术导则》的规定起草。

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本文件由广西环境科学学会提出、归口并宣贯。

本文件起草单位：广西北投环保水务集团有限公司、广西上善若水发展有限公司、广西壮族自治区生态环境监测中心、广西壮族自治区分析测试研究中心、清华大学深圳国际研究生院、广西城市供水水质监测网防城港监测站、广西泽霖环保水务有限公司、南京水务集团有限公司排水水质监测中心、昆明市城市排水监测站、深圳市水务（集团）有限公司水质监测站、广西大学、东莞市东江检测有限公司、南宁市水安全工程技术研究中心、南宁市城乡供水排水工程研究中心、广西标准化协会。

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污泥 粪大肠菌群的测定 酶底物法

1 范围

本文件描述了使用酶底物法测定污泥中粪大肠菌群的方法。

本文件适用于城镇污水处理厂污泥、排水管道通挖污泥、污泥衍生产品中粪大肠菌群的测定。土壤和沉积物中粪大肠菌群的测定可参照本法。

本方法检出限为10 MPN/g。

2 规范性引用文件

下列文件中的内容通过文中的规范性引用而构成本文件必不可少的条款。其中，注日期的引用文件，仅该日期对应的版本适用于本文件；不注日期的引用文件，其最新版本（包括所有的修改单）适用于本文件。

GB/T 6682 分析实验室用水规格和试验方法

GB/T 24188 城镇污水处理厂污泥泥质

GB/T 24600 城镇污水处理厂污泥处置 土地改良用泥质

HJ 1001 水质 总大肠菌群、粪大肠菌群和大肠埃希氏菌的测定 酶底物法

3 术语和定义

GB 24188、GB/T 24600、HJ 1001界定的以及下列术语和定义适用于本文件。

3.1

污泥衍生产品 *sludge derived product*

城镇生活污水处理厂污泥经过减量化、稳定化、无害化后形成的可资源化利用的衍生产品。

3.2

绝干污泥 *absolute dried sludge*

在103℃~105℃下烘干至恒重的污泥样品。

3.3

粪大肠菌群菌值 *values of fecal coliforms*

检出一个粪大肠菌菌落形成单位的最小样本量。

注：为粪大肠菌群数的倒数。

4 方法原理

在(44.5±0.5)℃培养24h条件下，粪大肠菌群能产生β-半乳糖苷酶，将选择性培养基(5.2)中的无色底物邻硝基苯-β-D-吡喃半乳糖苷(ONPG)分解为黄色的邻硝基苯酚(ONP)。统计阳性反应出现数量，查最大可能数(MPN)表，计算样品中粪大肠菌群的浓度值。

5 试剂与材料

5.1 除非另有说明，分析时均使用符合国家标准和分析纯试剂，实验用水应满足 GB/T 6682 中三级水的要求。

5.2 培养基：采用 Minimal Medium ONPG-MUG 培养基。每 100 mL 样品使用培养基粉末 $2.7 \text{ g} \pm 0.5 \text{ g}$ ，所含基本成分见表 1。

表1 培养基基本成分及含量

基本成分	含量
硫酸铵 $[(\text{NH}_4)_2\text{SO}_4]$	0.5 g
硫酸锰 (MnSO_4)	0.05 mg
硫酸锌 (ZnSO_4)	0.05 mg
硫酸镁 (MgSO_4)	10 mg
氯化钠 (NaCl)	1 g
氯化钙 (CaCl_2)	5 mg
亚硫酸钠 (Na_2SO_3)	4 mg
两性霉素B (Amphotericin B)	0.1 mg
邻硝基苯- β -D-吡喃半乳糖苷 (ONPG)	50 mg
4-甲基伞形酮- β -D-葡萄糖醛酸苷 (MUG)	7.5 mg
茄属植物萃取物 (Solaniutn萃取物)	50 mg
N-2-羟乙基哌嗪-N-2-乙磺酸钠盐 (HEPES钠盐)	0.53 g
N-2-羟乙基哌嗪-N-2-乙磺酸 (HEPES)	0.69 g

5.3 硫代硫酸钠 $(\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O})$ 。

5.4 乙二胺四乙酸二钠 $(\text{C}_{10}\text{H}_{14}\text{N}_2\text{O}_8\text{Na}_2 \cdot 2\text{H}_2\text{O})$ 。

5.5 无菌水：取适量实验用水，经高压蒸汽灭菌器（6.3）121 °C 灭菌 20 min，备用。

5.6 硫代硫酸钠溶液： $\rho(\text{Na}_2\text{S}_2\text{O}_3) = 0.05 \text{ g/mL}$ 。称取 7.85 g 硫代硫酸钠（5.3），溶于适量无菌水（5.5）中，定容至 100 mL，现用现配。

5.7 乙二胺四乙酸二钠溶液： $\rho(\text{C}_{10}\text{H}_{14}\text{N}_2\text{O}_8\text{Na}_2 \cdot 2\text{H}_2\text{O}) = 0.15 \text{ g/mL}$ 。称取 15 g 乙二胺四乙酸二钠（5.4），溶于适量无菌水（5.5）中，定容至 100 mL，溶液保质期为 30 d。

5.8 1 mol/L 盐酸：吸取浓盐酸 90 mL，用无菌水（5.5）稀释至 1 000 mL。

5.9 1 mol/L 氢氧化钠：称取 40 g 氢氧化钠溶于 1 000 mL 无菌水（5.5）中。

5.10 97 孔定量盘：定量培养用无菌塑料盘，内含 49 个大孔和 48 个小孔。每个小孔可容纳 0.186 mL 样品，大孔中 48 个大孔每个可容纳 1.86 mL 样品，一个顶部大孔可容纳 11 mL 样品。

5.11 标准阳性比色盘。

6 仪器和设备

6.1 采样瓶：经过灭菌处理的耐高压塑料瓶。可采用市售无菌采样瓶、无菌采样袋或均质袋。

6.2 样品瓶：具螺旋帽的 100 mL、250 mL 玻璃瓶。可采用市售无菌采样瓶。

6.3 高压蒸汽灭菌器：121 °C 可调。

6.4 恒温培养箱：允许温度偏差 $44.5 \text{ °C} \pm 0.5 \text{ °C}$ 。

6.5 程控定量封口机：用于 97 孔定量盘（5.10）的封口。

6.6 天平：感量 0.01 g。

6.7 涡旋振荡器。

6.8 移液管：1 mL±0.01 mL、10 mL±0.1 mL。也可采用计量合格的可调式移液器。

6.9 三角瓶：100 mL、250 mL、500 mL。

6.10 量筒：100 mL±1 mL。

6.11 托盘。

6.12 刮板。

6.13 镊子。

注：采样瓶（6.1）、样品瓶（6.2）、移液管（6.8）、三角瓶（6.9）等器具保持清洁、无生物毒性，在试验前按无菌操作要求包扎，按需选择高压蒸汽灭菌器（6.3）121℃灭菌20 min，烘干，或160℃干热灭菌2 h，备用。

7 分析步骤

7.1 样品采集

7.1.1 分层采样法：对堆放污泥的表层、中层、下层断面各采集三点，使用无菌器具（包括6.11、6.12、6.13等）充分混合泥样，采用四分法取样装入无菌采样瓶（6.1）中。

7.1.2 随机采样法：污泥量少、分散，采样条件受限制时，按照其原来的状况，用无菌器具（包括6.11、6.12、6.13等）随机采取泥样装入无菌采样瓶（6.1）中。

7.1.3 系统采样法：在污泥处置车间，污泥通过压滤机、输送带等形式连续排出的移动过程中，按一定的质量或时间间隔采样，用无菌器具（包括6.11、6.12、6.13等）采集泥样装入无菌采样瓶（6.1）中。

7.1.4 污泥样品应采集瞬时样品，采用系统采样法连续采样时，单独采集，不应混合采集。污泥样品应有代表性，样品质量不小于1 kg。采样后2 h内测定，如不能，将样品置于保温箱或冰箱（0℃~4℃）中避光低温保存，从采样到开始测定的时间不超过24 h。

注1：若样品为经过氯消毒的污泥，在采样后立即加入硫代硫酸钠溶液（5.6），适当搅拌混匀，去除余氯。

注2：样品采集时，对重金属离子含量较高的样品，加入乙二胺四乙酸二钠溶液（5.7）适当搅拌混匀，每125 g样品加入0.3 mL的乙二胺四乙酸二钠溶液（5.7）。

注3：在野外操作时避开明显局部污染源，宜使用一次性无菌手套、口罩、酒精灯等。

7.2 样品制备

7.2.1 将样品置于无菌托盘（6.11）内，用无菌镊子（6.13）拣出样品中的杂质异物，充分混匀后用天平（6.6）称取10.0 g样品，放入无菌样品瓶（6.2）内，用无菌移液管（6.8）加入90 mL无菌水（5.5），混摇或用涡旋振荡器（6.7）振荡2 min~4 min，混匀，制成1:10稀释样品。

注1：偏干的污泥用少量无菌水（5.5）浸泡软化，再稀释混匀。

注2：无涡旋振荡器时，使用均质机慢速均质样品2 min，或者使用轨道式摇床以200 rpm±10 rpm的速度对样品进行均质1 h。

7.2.2 根据样品污染程度决定稀释度，用无菌吸管吸取1:10稀释样品10 mL加到含有90 mL无菌水（5.5）的无菌样品瓶（6.2）中，混匀制成1:100稀释样品。按同法依次稀释，制成1:1 000、1:10 000等梯度稀释样品。对于未知样品，选用多个接种量进行检测。

注1：稀释后的待测样品pH值在4.5~10.5范围内，如超出此范围，用1 mol/L盐酸（5.8）或1 mol/L氢氧化钠溶液（5.9）调节pH值后再测定。

注2：经过石灰处理的样品在稀释均质后，调整pH值至7.0±0.5。

注3：稀释后的待测样品颜色类似或深于标准阳性比色盘时，不直接接种培养，进一步稀释后再测定。

7.3 接种

用无菌量筒（6.10）量取100 mL稀释样品于无菌样品瓶（6.2）或灭菌三角瓶（6.9）内，加入2.7 g ±0.5 g培养基（5.2）粉末，充分混匀，完全溶解后，全部倒入97孔定量盘（5.10）内，以手抚平97孔定量盘背面，赶除孔内气泡，然后用程控定量封口机（6.5）封口，使每个孔格内都有液体。观察97孔定量盘颜色，若出现类似或深于标准阳性比色盘（5.11）的颜色或者其他异色，在排查样品、培养基（5.2）、无菌水（5.5）等因素后，终止试验或重新操作。

7.4 培养

将封口后的97孔定量盘放入恒温培养箱（6.4）中，在44.5℃±0.5℃下培养24 h。

7.5 对照试验

7.5.1 空白对照

每次试验都用无菌水（5.5）按照步骤7.2~7.4进行实验室空白测定。若有阳性结果出现，该次样品测定结果无效。

7.5.2 阴性和阳性对照

7.5.2.1 粪大肠菌群的阴性、阳性菌株参考表 2。

表2 阴性、阳性菌株参考表

测定指标	阳性菌种	阴性菌种
粪大肠菌群	大肠埃希氏菌（耐热型）、 克雷伯氏菌属（ <i>Klebsiella trevisan</i> ）（耐热型）	粪链球菌（ <i>Streptococcus faecalis</i> ）、 假单胞菌属

7.5.2.2 将标准菌株制成 300 MPN/L~3 000 MPN/L 的菌悬液，并将菌悬液按 7.3 和 7.4 要求操作，阳性菌株应呈现阳性反应；阴性菌株应呈现阴性反应，否则，该批次样品测定结果无效，应重新测定。

注：可先制备较高浓度菌悬液，采用血球计数器在显微镜下对其浓度进行初步测定，然后根据实际情况用无菌水（5.5）稀释至300 MPN/L~3 000 MPN/L。

7.5.3 结果判读与计数

7.5.3.1 将培养 24 h 后的 97 孔定量盘进行结果判读，样品变黄色判断为粪大肠菌群阳性。若结果可疑，可延长培养至 28 h 进行结果判读，超过 28 h 后出现的颜色反应不作为阳性结果。可使用保质期内的标准阳性比色盘（5.11）以辅助判读（见附录 A），当样品孔格的黄色与其颜色相同或更深，判读结果为阳性。

7.5.3.2 分别记录 97 孔定量盘中大孔和小孔的阳性孔数量。

8 结果计算与表示

8.1 结果计算

8.1.1 计算原始（湿）污泥的粪大肠菌群浓度

按照附录B，从97孔定量盘法MPN表中查得每100 mL稀释样品中粪大肠菌群的MPN值后（置信区间见附录C），再根据样品不同的稀释度，按照公式（1）换算样品中粪大肠菌群浓度：

$$C_w = \frac{\text{MPN 值}}{f} \dots\dots\dots (1)$$

式中:

C_w ——原始(湿)污泥样品中粪大肠菌群浓度,单位为最大可能数每克(MPN/g);

MPN值——每100 mL稀释样品中粪大肠菌群浓度,单位为最大可能数每一百毫升(MPN/100 mL);

f ——每100 mL稀释样品代表的样品实际接种量,单位为克每一百毫升(g/100 mL)。

8.1.2 计算绝干污泥的粪大肠菌群浓度

按照式(2)计算绝干污泥的粪大肠菌群浓度:

$$C_d = \frac{C_w \times 100}{100 - \omega} \dots\dots\dots (2)$$

式中:

C_d ——绝干污泥样品中粪大肠菌群浓度,单位为最大可能数每克(MPN/g);

C_w ——原始(湿)污泥样品中粪大肠菌群浓度,单位为最大可能数每克(MPN/g);

ω ——原始(湿)污泥样品的含水率,单位为%。

8.2 结果表示

测定结果保留两位有效数字,当测定结果 ≥ 100 MPN/g时,以科学计数法表示;若97孔均为阴性,可报告为粪大肠菌群未检出或 < 10 MPN/g。通常报告原始(湿)污泥中粪大肠菌群浓度。对采用连续采样法采集的样品进行测试时,单独计算每份样品结果,或以其算术平均值报告结果。

8.3 结果换算

按照公式(3)将粪大肠菌群浓度换算成粪大肠菌群菌值:

$$V = \frac{1}{C_w} \dots\dots\dots (3)$$

式中:

V ——样品的粪大肠菌群菌值;

C_w ——原始(湿)污泥样品中粪大肠菌群浓度,单位为最大可能数每克(MPN/g)。

9 精密度

3家实验室6个实验组分别对低浓度(浓度均值为66 MPN/g)、中浓度(浓度均值为 2.2×10^3 MPN/g)和高浓度(浓度均值为 1.9×10^5 MPN/g)三个不同浓度粪大肠菌群的样品及有证标准物质配制的样品(参考值3600 MPN/g)进行了6次重复测定:实验室内相对标准偏差范围分别为4.5%~13.7%、1.6%~6.7%、1.4%~3.6%和1.1%~4.5%;实验室间相对标准偏差分别为8.7%、5.2%、5.3%、3.1%;重复性限为0.44、0.39、0.43和0.27;再现性限为0.44、0.49、0.81和0.31;实验室间置信区间见表3。

表3 粪大肠菌群实验室间置信区间表

低浓度 (MPN/g)		中浓度 (MPN/g)		高浓度 (MPN/g)		有证标准物质配制的样品 (MPN/g)	
均值	95%置信区间	均值	95%置信区间	均值	95%置信区间	均值	95%置信区间
66	59~73	2.2×10^3	$1.9 \times 10^3 \sim 2.4 \times 10^3$	1.9×10^5	$1.4 \times 10^5 \sim 2.4 \times 10^5$	3.4×10^3	$3.1 \times 10^3 \sim 3.7 \times 10^3$

10 准确度

3家实验室6个实验组对有证标准物质配制的样品（参考值3 600 MPN/g）进行了6次重复测定：实验室内的相对误差范围为0.91%~2.8%；相对误差最终值为1.9%±1.5%。

注：微生物测定数据为偏态分布，上述精密度、准确度均为对测定结果以10取对数后进行计算。

11 质量保证和质量控制

- 11.1 实验过程设置阳性对照、阴性对照和空白对照。
- 11.2 每批培养基按 7.5 的要求采用有证标准菌株进行培养基质量验证。
- 11.3 宜选用市售商品化培养基。
- 11.4 定期使用有证标准菌株或标准样品进行质量控制。
- 11.5 每 20 个样品或每批次样品（≤20 个/批）测定一个平行双样，测定结果以算术平均值计。

12 废物处理

实验中产生的废弃物经高压蒸汽灭菌器（6.3）121℃灭菌30 min后，作为一般废物处理。

附录 A
(资料性)
结果判定参考图片

A.1 图 A.1 给出了粪大肠菌群酶底物法阴性、阳性结果参考图, 结果以实物比色判断为准。



标引序号说明:

1—粪大肠菌群阳性（黄色）；2—粪大肠菌群阳性（黄色）；3—粪大肠菌群阳性（黄色）；
5—粪大肠菌群阴性（无色）；5—粪大肠菌群阴性（无色）；6—粪大肠菌群疑似阳性（浅黄色）。

图A.1 粪大肠菌群酶底物法阴性、阳性结果参考图

A. 2 图 A. 2 给出了标准阳性比色盘，结果以实物比色判断为准。



图A. 2 标准阳性比色盘

附 录 B
(规范性)
97 孔定量盘法 MPN 表

表B.1规定了97孔定量盘法MPN表。

表B.1 97 孔定量盘法 MPN 表

单位为最大可能数每一百毫升 (MPN/100 mL)

打孔阳 性格数	小孔阳性格数											
	0	1	2	3	4	5	6	7	8	9	10	11
0	<1.0	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0
1	1.0	2.0	3.0	4.0	5.0	6.0	7.1	8.1	9.1	10.1	11.1	12.1
2	2.0	3.0	4.1	5.1	6.1	7.1	8.1	9.2	10.2	11.2	12.2	13.3
3	3.1	4.1	5.1	6.1	7.2	8.2	9.2	10.3	11.3	12.4	13.4	14.5
4	4.1	5.2	6.2	7.2	8.3	9.3	10.4	11.4	12.5	13.5	14.6	15.6
5	5.2	6.3	7.3	8.4	9.4	10.5	11.5	12.6	13.7	14.7	15.8	16.9
6	6.3	7.4	8.4	9.5	10.6	11.6	12.7	13.8	14.9	16.0	17.0	18.1
7	7.5	8.5	9.6	10.7	11.8	12.8	13.9	15.0	16.1	17.2	18.3	19.4
8	8.6	9.7	10.8	11.9	13.0	14.1	15.2	16.3	17.4	18.5	19.6	20.7
9	9.8	10.9	12.0	13.1	14.2	15.3	16.4	17.6	18.7	19.8	20.9	22.0
10	11.0	12.1	13.2	14.4	15.5	16.6	17.7	18.9	20.0	21.1	22.3	23.4
11	12.2	13.4	14.5	15.6	16.8	17.9	19.1	20.2	21.4	22.5	23.7	24.8
12	13.5	14.6	15.8	16.9	18.1	19.3	20.4	21.6	22.8	23.9	25.1	26.3
13	14.8	16.0	17.1	18.3	19.5	20.6	21.8	23.0	24.2	25.4	26.6	27.8
14	16.1	17.3	18.5	19.7	20.9	22.1	23.3	24.5	25.7	26.9	28.1	29.3
15	17.5	18.7	19.9	21.1	22.3	23.5	24.7	25.9	27.2	28.4	29.6	30.9
16	18.9	20.1	21.3	22.6	23.8	25.0	26.2	27.5	28.7	30.0	31.2	32.5
17	20.3	21.6	22.8	24.1	25.3	26.6	27.8	29.1	30.3	31.6	32.9	34.1
18	21.8	23.1	24.3	25.6	26.9	28.1	29.4	30.7	32.0	33.3	34.6	35.9
19	23.3	24.6	25.9	27.2	28.5	29.8	31.1	32.4	33.7	35.0	36.3	37.6
20	24.9	26.2	27.5	28.8	30.1	31.5	32.8	34.1	35.4	36.8	38.1	39.5
21	26.5	27.9	29.2	30.5	31.8	33.2	34.5	35.9	37.3	38.6	40.0	41.4
22	28.2	29.5	30.9	32.3	33.6	35.0	36.4	37.7	39.1	40.5	41.9	43.3

表 B.1 97 孔定量盘法 MPN 表（续）

单位为最大可能数每一百毫升（MPN/100 mL）

打孔阳 性格数	小孔阳性格数											
	0	1	2	3	4	5	6	7	8	9	10	11
23	29.9	31.3	32.7	34.1	35.5	36.8	38.3	39.7	41.1	42.5	43.9	45.4
24	31.7	33.1	34.5	35.9	37.3	38.8	40.2	41.7	43.1	44.6	46.0	47.5
25	33.6	35.0	36.4	37.9	39.3	40.8	42.2	43.7	45.2	46.7	48.2	49.7
26	35.5	36.9	38.4	39.9	41.4	42.8	44.3	45.9	47.4	48.9	50.4	52.0
27	37.4	38.9	40.4	42.0	43.5	45.0	46.5	48.1	49.6	51.2	52.8	54.4
28	39.5	41.0	42.6	44.1	45.7	47.3	48.8	50.4	52.0	53.6	55.2	56.9
29	41.7	43.2	44.8	46.4	48.0	49.6	51.2	52.8	54.5	56.1	57.8	59.5
30	43.9	45.5	47.1	48.7	50.4	52.0	53.7	55.4	57.1	58.8	60.5	62.2
31	46.2	47.9	49.5	51.2	52.9	54.6	56.3	58.1	59.8	61.6	63.3	65.1
32	48.7	50.4	52.1	53.8	55.6	57.3	59.1	60.9	62.7	64.5	66.3	68.2
33	51.2	53.0	54.8	56.5	58.3	60.2	62.0	63.8	65.7	67.6	69.5	71.4
34	53.9	55.7	57.6	59.4	61.3	63.1	65.0	67.0	68.9	70.8	72.8	74.8
35	56.8	58.6	60.5	62.4	64.4	66.3	68.3	70.3	72.3	74.3	76.3	78.4
36	59.8	61.7	63.7	65.7	67.7	69.7	71.7	73.8	75.9	78.0	80.1	82.3
37	62.9	65.0	67.0	69.1	71.2	73.3	75.4	77.6	79.8	82.0	84.2	86.5
38	66.3	68.4	70.6	72.7	74.9	77.1	79.4	81.6	83.9	86.2	88.6	91.0
39	70.0	72.2	74.4	76.7	78.9	81.3	83.6	86.0	88.4	90.9	93.4	95.9
40	73.8	76.2	78.5	80.9	83.3	85.7	88.2	90.8	93.3	95.9	98.5	101.2
41	78.0	80.5	83.0	85.5	88.0	90.6	93.3	95.9	98.7	101.4	104.3	107.1
42	82.6	85.2	87.8	90.5	93.2	96.0	98.8	101.7	104.6	107.6	110.6	113.7
43	87.6	90.4	93.2	96.0	99.0	101.9	105.0	108.1	111.2	114.5	117.8	121.1
44	93.1	96.1	99.1	102.2	105.4	108.6	111.9	115.3	118.7	122.3	125.9	129.6
45	99.3	102.5	105.8	109.2	112.6	116.2	119.8	123.6	127.4	131.4	135.4	139.6
46	106.3	109.8	113.4	117.2	121.0	125.0	129.1	133.3	137.6	142.1	146.7	151.5
47	114.3	118.3	122.4	126.6	130.9	135.4	140.1	145.0	150.0	155.3	160.7	166.4
48	123.9	128.4	133.1	137.9	143.0	148.3	153.9	159.7	165.8	172.2	178.9	186.0
49	135.5	140.8	146.4	152.3	158.5	165.0	172.0	179.3	187.2	195.6	204.6	214.3

表 B.1 97 孔定量盘法 MPN 表（续）

单位为最大可能数每一百毫升（MPN/100 mL）

打孔阳 性格数	小孔阳性格数											
	12	13	14	15	16	17	18	19	20	21	22	23
0	12.0	13.0	14.1	15.1	16.1	17.1	18.1	19.1	20.2	21.2	22.2	23.3
1	13.2	14.2	15.2	16.2	17.3	18.3	19.3	20.4	21.4	22.4	23.5	24.5
2	14.3	15.4	16.4	17.4	18.5	19.5	20.6	21.6	22.7	23.7	24.8	25.8
3	15.5	16.5	17.6	18.6	19.7	20.8	21.8	22.9	23.9	25.0	26.1	27.1
4	16.7	17.8	18.8	19.9	21.0	22.0	23.1	24.2	25.3	26.3	27.4	28.5
5	17.9	19.0	20.1	21.2	22.2	23.3	24.4	25.5	26.6	27.7	28.8	29.9
6	19.2	20.3	21.4	22.5	23.6	24.7	25.8	26.9	28.0	29.1	30.2	31.3
7	20.5	21.6	22.7	23.8	24.9	26.0	27.1	28.3	29.4	30.5	31.6	32.8
8	21.8	22.9	24.1	25.2	26.3	27.4	28.6	29.7	30.8	32.0	33.1	34.3
9	23.2	24.3	25.4	26.6	27.7	28.9	30.0	31.2	32.3	33.5	34.6	35.8
10	24.6	25.7	26.9	28.0	29.2	30.3	31.5	32.7	33.8	35.0	36.2	37.4
11	26.0	27.2	28.3	29.5	30.7	31.9	33.0	34.2	35.4	36.6	37.8	39.0
12	27.5	28.6	29.8	31.0	32.2	33.4	34.6	35.8	37.0	38.2	39.5	40.7
13	29.0	30.2	31.4	32.6	33.8	35.0	36.2	37.5	38.7	39.9	41.2	42.4
14	30.5	31.7	33.0	34.2	35.4	36.7	37.9	39.1	40.4	41.6	42.9	44.2
15	32.1	33.3	34.6	35.8	37.1	38.4	39.6	40.9	42.2	43.4	44.7	46.0
16	33.7	35.0	36.3	37.5	38.8	40.1	41.4	42.7	44.0	45.3	46.6	47.9
17	35.4	36.7	38.0	39.3	40.6	41.9	43.2	44.5	45.9	47.2	48.5	49.8
18	37.2	38.5	39.8	41.1	42.4	43.8	45.1	46.5	47.8	49.2	50.5	51.9
19	39.0	40.3	41.6	43.0	44.3	45.7	47.1	48.4	49.8	51.2	52.6	54.0
20	40.8	42.2	43.6	44.9	46.3	47.7	49.1	50.5	51.9	53.3	54.7	56.1
21	42.8	44.1	45.5	46.9	48.4	49.8	51.2	52.6	54.1	55.5	56.9	58.4
22	44.8	46.2	47.6	49.0	50.5	51.9	53.4	54.8	56.3	57.8	59.3	60.8
23	46.8	48.3	49.7	51.2	52.7	54.2	55.6	57.1	58.6	60.2	61.7	63.2
24	49.0	50.5	52.0	53.5	55.0	56.5	58.0	59.5	61.1	62.6	64.2	65.8

表 B.1 97 孔定量盘法 MPN 表（续）

单位为最大可能数每一百毫升（MPN/100 mL）

打孔阳 性格数	小孔阳性格数											
	12	13	14	15	16	17	18	19	20	21	22	23
25	51.2	52.7	54.3	55.8	57.3	58.9	60.5	62.0	63.6	65.2	66.8	68.4
26	53.5	55.1	56.7	58.2	59.8	61.4	63.0	64.7	66.3	67.9	69.6	71.2
27	56.0	57.6	59.2	60.8	62.4	64.1	65.7	67.4	69.1	70.8	72.5	74.2
28	58.5	60.2	61.8	63.5	65.2	66.9	68.6	70.3	72.0	73.7	75.5	77.3
29	61.2	62.9	64.6	66.3	68.0	69.8	71.5	73.3	75.1	76.9	78.7	80.5
30	64.0	65.7	67.5	69.3	71.0	72.9	74.7	76.5	78.3	80.2	82.1	84.0
31	66.9	68.7	70.5	72.4	74.2	76.1	78.0	79.9	81.8	83.7	85.7	87.6
32	70.0	71.9	73.8	75.7	77.6	79.5	81.5	83.5	85.4	87.5	89.5	91.5
33	73.3	75.2	77.2	79.2	81.2	83.2	85.2	87.3	89.3	91.4	93.6	95.7
34	76.8	78.8	80.8	82.9	85.0	87.1	89.2	91.4	93.5	95.7	97.9	100.2
35	80.5	82.6	84.7	86.9	89.1	91.3	93.5	95.7	98.0	100.3	102.6	105.0
36	84.5	86.7	88.9	91.2	93.5	95.8	98.1	100.5	102.9	105.3	107.7	110.2
37	88.8	91.1	93.4	95.8	98.2	100.6	103.1	105.6	108.1	110.7	113.3	115.9
38	93.4	95.8	98.3	100.8	103.4	105.9	108.6	111.2	113.9	116.6	119.4	122.2
39	98.4	101.0	103.6	106.3	109.0	111.8	114.6	117.4	120.3	123.2	126.1	129.2
40	103.9	106.7	109.5	112.4	115.3	118.2	121.2	124.3	127.4	130.5	133.7	137.0
41	110.0	113.0	116.0	119.1	122.2	125.4	128.7	132.0	135.4	138.8	142.3	145.9
42	116.9	120.1	123.4	126.7	130.1	133.6	137.2	140.8	144.5	148.3	152.2	156.1
43	124.6	128.1	131.7	135.4	139.1	143.0	147.0	151.0	155.2	159.4	163.8	168.2
44	133.4	137.4	141.4	145.5	149.7	154.1	158.5	163.1	167.9	172.7	177.7	182.9
45	143.9	148.3	152.9	157.6	162.4	167.4	172.6	178.0	183.5	189.2	195.1	201.2
46	156.5	161.6	167.0	172.5	178.2	184.2	190.4	196.8	203.5	210.5	217.8	225.4
47	172.3	178.5	185.0	191.8	198.9	206.4	214.2	222.4	231.0	240.0	249.5	259.5
48	193.5	201.4	209.8	218.7	228.2	238.2	248.9	260.3	272.3	285.1	298.7	313.0
49	224.7	235.9	248.1	261.3	275.5	290.9	307.6	325.5	344.8	365.4	387.3	410.6

表 B.1 97 孔定量盘法 MPN 表（续）

单位为最大可能数每一百毫升（MPN/100 mL）

打孔阳 性格数	小孔阳性格数											
	24	25	26	27	28	29	30	31	32	33	34	35
0	24.3	25.3	26.4	27.4	28.4	29.5	30.5	31.5	32.6	33.6	34.7	35.7
1	25.6	26.6	27.7	28.7	29.8	30.8	31.9	32.9	34.0	35.0	36.1	37.2
2	26.9	27.9	29.0	30.0	31.1	32.2	33.2	34.3	35.4	36.5	37.5	38.6
3	28.2	29.3	30.4	31.4	32.5	33.6	34.7	35.8	36.8	37.9	39.0	40.1
4	29.6	30.7	31.8	32.8	33.9	35.0	36.1	37.2	38.3	39.4	40.5	41.6
5	31.0	32.1	33.2	34.3	35.4	36.5	37.6	38.7	39.9	41.0	42.1	43.2
6	32.4	33.5	34.7	35.8	36.9	38.0	39.2	40.3	41.4	42.6	43.7	44.8
7	33.9	35.0	36.2	37.3	38.4	39.6	40.7	41.9	43.0	44.2	45.3	46.5
8	35.4	36.6	37.7	38.9	40.0	41.2	42.3	43.5	44.7	45.9	47.0	48.2
9	37.0	38.1	39.3	40.5	41.6	42.8	44.0	45.2	46.4	47.6	48.8	50.0
10	38.6	39.7	40.9	42.1	43.3	44.5	45.7	46.9	48.1	49.3	50.6	51.8
11	40.2	41.4	42.6	43.8	45.0	46.3	47.5	48.7	49.9	51.2	52.4	53.7
12	41.9	43.1	44.3	45.6	46.8	48.1	49.3	50.6	51.8	53.1	54.3	55.6
13	43.6	44.9	46.1	47.4	48.6	49.9	51.2	52.5	53.7	55.0	56.3	57.6
14	45.4	46.7	48.0	49.3	50.5	51.8	53.1	54.4	55.7	57.0	58.3	59.6
15	47.3	48.6	49.9	51.2	52.5	53.8	55.1	56.4	57.8	59.1	60.4	61.8
16	49.2	50.5	51.8	53.2	54.5	55.8	57.2	58.5	59.9	61.2	62.6	64.0
17	51.2	52.5	53.9	55.2	56.6	58.0	59.3	60.7	62.1	63.5	64.9	66.3
18	53.2	54.6	56.0	57.4	58.8	60.2	61.6	63.0	64.4	65.8	67.2	68.6
19	55.4	56.8	58.2	59.6	61.0	62.4	63.9	65.3	66.8	68.2	69.7	71.1
20	57.6	59.0	60.4	61.9	63.3	64.8	66.3	67.7	69.2	70.7	72.2	73.7
21	59.9	61.3	62.8	64.3	65.8	67.3	68.8	70.3	71.8	73.3	74.9	76.4
22	62.3	63.8	65.3	66.8	68.3	69.8	71.4	72.9	74.5	76.1	77.6	79.2
23	64.7	66.3	67.8	69.4	71.0	72.5	74.1	75.7	77.3	78.9	80.5	82.2
24	67.3	68.9	70.5	72.1	73.7	75.3	77.0	78.6	80.3	81.9	83.6	85.2

表 B.1 97 孔定量盘法 MPN 表（续）

单位为最大可能数每一百毫升（MPN/100 mL）

打孔阳 性格数	小孔阳性格数											
	24	25	26	27	28	29	30	31	32	33	34	35
25	70.0	71.7	73.3	75.0	76.6	78.3	80.0	81.7	83.3	85.1	86.8	88.5
26	72.9	74.6	76.3	78.0	79.7	81.4	83.1	84.8	86.6	88.4	90.1	91.9
27	75.9	77.6	79.4	81.1	82.9	84.6	86.4	88.2	90.0	91.9	93.7	95.5
28	79.0	80.8	82.6	84.4	86.3	88.1	89.9	91.8	93.7	95.6	97.5	99.4
29	82.4	84.2	86.1	87.9	89.8	91.7	93.7	95.6	97.5	99.5	101.5	103.5
30	85.9	87.8	89.7	91.7	93.6	95.6	97.6	99.6	101.6	103.7	105.7	107.8
31	89.6	91.6	93.6	95.6	97.7	99.7	101.8	103.9	106.0	108.2	110.3	112.5
32	93.6	95.7	97.8	99.9	102.0	104.2	106.3	108.5	110.7	113.0	115.2	117.5
33	97.8	100.0	102.2	104.4	106.6	108.9	111.2	113.5	115.8	118.2	120.5	122.9
34	102.4	104.7	107.0	109.3	111.7	114.0	116.4	118.9	121.3	123.8	126.3	128.8
35	107.3	109.7	112.2	114.6	117.1	119.6	122.2	124.7	127.3	129.9	132.6	135.3
36	112.7	115.2	117.8	120.4	123.0	125.7	128.4	131.1	133.9	136.7	139.5	142.4
37	118.6	121.3	124.0	126.8	129.6	132.4	135.3	138.2	141.2	144.2	147.3	150.3
38	125.0	127.9	130.8	133.8	136.8	139.9	143.0	146.2	149.4	152.6	155.9	159.2
39	132.2	135.3	138.5	141.7	145.0	148.3	151.7	155.1	158.6	162.1	165.7	169.4
40	140.3	143.7	147.1	150.6	154.2	157.8	161.5	165.3	169.1	173.0	177.0	181.1
41	149.5	153.2	157.0	160.9	164.8	168.9	173.0	177.2	181.5	185.8	190.3	194.8
42	160.2	164.3	168.6	172.9	177.3	181.9	186.5	191.3	196.1	201.1	206.2	211.4
43	172.8	177.5	182.3	187.3	192.4	197.6	202.9	208.4	214.0	219.8	225.8	231.8
44	188.2	193.6	199.3	205.1	211.0	217.2	223.5	230.0	236.7	243.6	250.8	258.1
45	207.5	214.1	220.9	227.9	235.2	242.7	250.4	258.4	266.7	275.3	284.1	293.3
46	233.3	241.5	250.0	258.9	268.2	277.8	287.8	298.1	308.8	319.9	331.4	343.3
47	270.0	280.9	292.4	304.4	316.9	330.0	343.6	357.8	372.5	387.7	403.4	419.8
48	328.2	344.1	360.9	378.4	396.8	416.0	436.0	456.9	478.6	501.2	524.7	549.3
49	435.2	461.1	488.4	517.2	547.5	579.4	613.1	648.8	686.7	727.0	770.1	816.4

表 B.1 97 孔定量盘法 MPN 表（续）

单位为最大可能数每一百毫升（MPN/100 mL）

打孔阳 性格数	小孔阳性格数												
	36	37	38	39	40	41	42	43	44	45	46	47	48
0	36.8	37.8	38.9	40.0	41.0	42.1	43.1	44.2	45.3	46.3	47.4	48.5	49.5
1	38.2	39.3	40.4	41.4	42.5	43.6	44.7	45.7	46.8	47.9	49.0	50.1	51.2
2	39.7	40.8	41.9	43.0	44.0	45.1	46.2	47.3	48.4	49.5	50.6	51.7	52.8
3	41.2	42.3	43.4	44.5	45.6	46.7	47.8	48.9	50.0	51.2	52.3	53.4	54.5
4	42.8	43.9	45.0	46.1	47.2	48.3	49.5	50.6	51.7	52.9	54.0	55.1	56.3
5	44.4	45.5	46.6	47.7	48.9	50.0	51.2	52.3	53.5	54.6	55.8	56.9	58.1
6	46.0	47.1	48.3	49.4	50.6	51.7	52.9	54.1	55.2	56.4	57.6	58.7	59.9
7	47.7	48.8	50.0	51.2	52.3	53.5	54.7	55.9	57.1	58.3	59.4	60.6	61.8
8	49.4	50.6	51.8	53.0	54.1	55.3	56.5	57.7	59.0	60.2	61.4	62.6	63.8
9	51.2	52.4	53.6	54.8	56.0	57.2	58.4	59.7	60.9	62.1	63.4	64.6	65.8
10	53.0	54.2	55.5	56.7	57.9	59.2	60.4	61.7	62.9	64.2	65.4	66.7	67.9
11	54.9	56.1	57.4	58.6	59.9	61.2	62.4	63.7	65.0	66.3	67.5	68.8	70.1
12	56.8	58.1	59.4	60.7	62.0	63.2	64.5	65.8	67.1	68.4	69.7	71.0	72.4
13	58.9	60.2	61.5	62.8	64.1	65.4	66.7	68.0	69.3	70.7	72.0	73.3	74.7
14	60.9	62.3	63.6	64.9	66.3	67.6	68.9	70.3	71.6	73.0	74.4	75.7	77.1
15	63.1	64.5	65.8	67.2	68.5	69.9	71.3	72.6	74.0	75.4	76.8	78.2	79.6
16	65.3	66.7	68.1	69.5	70.9	72.3	73.7	75.1	76.5	77.9	79.3	80.8	82.2
17	67.7	69.1	70.5	71.9	73.3	74.8	76.2	77.6	79.1	80.5	82.0	83.5	84.9
18	70.1	71.5	73.0	74.4	75.9	77.3	78.8	80.3	81.8	83.3	84.8	86.3	87.8
19	72.6	74.1	75.5	77.0	78.5	80.0	81.5	83.1	84.6	86.1	87.6	89.2	90.7
20	75.2	76.7	78.2	79.8	81.3	82.8	84.4	85.9	87.5	89.1	90.7	92.2	93.8
21	77.9	79.5	81.1	82.6	84.2	85.8	87.4	89.0	90.6	92.2	93.8	95.4	97.1
22	80.8	82.4	84.0	85.6	87.2	88.9	90.5	92.1	93.8	95.5	97.1	98.8	100.5
23	83.8	85.4	87.1	88.7	90.4	92.1	93.8	95.5	97.2	98.9	100.6	102.4	104.1
24	86.9	88.6	90.3	92.0	93.8	95.5	97.2	99.0	100.7	102.5	104.3	106.1	107.9

表 B.1 97 孔定量盘法 MPN 表（续）

单位为最大可能数每一百毫升（MPN/100 mL）

打孔阳 性格数	小孔阳性格数												
	36	37	38	39	40	41	42	43	44	45	46	47	48
25	90.2	92.0	93.7	95.5	97.3	99.1	100.9	102.7	104.5	106.3	108.2	110.0	111.9
26	93.7	95.5	97.3	99.2	101.0	102.9	104.7	106.6	108.5	110.4	112.3	114.2	116.2
27	97.4	99.3	101.2	103.1	105.0	106.9	108.8	110.8	112.7	114.7	116.7	118.7	120.7
28	101.3	103.3	105.2	107.2	109.2	111.2	113.2	115.2	117.3	119.3	121.4	123.5	125.6
29	105.5	107.5	109.5	111.6	113.7	115.7	117.8	120.0	122.1	124.2	126.4	128.6	130.8
30	109.9	112.0	114.2	116.3	118.5	120.6	122.8	125.1	127.3	129.5	131.8	134.1	136.4
31	114.7	116.9	119.1	121.4	123.6	125.9	128.2	130.5	132.9	135.3	137.7	140.1	142.5
32	119.8	122.1	124.5	126.8	129.2	131.6	134.0	136.5	139.0	141.5	144.0	146.6	149.1
33	125.4	127.8	130.3	132.8	135.3	137.8	140.4	143.0	145.6	148.3	150.9	153.7	156.4
34	131.4	134.0	136.6	139.2	141.9	144.6	147.4	150.1	152.9	155.7	158.6	161.5	164.4
35	138.0	140.8	143.6	146.4	149.2	152.1	155.0	158.0	161.0	164.0	167.1	170.2	173.3
36	145.3	148.3	151.3	154.3	157.3	160.5	163.6	166.8	170.0	173.3	176.6	179.9	183.3
37	153.5	156.7	159.9	163.1	166.5	169.8	173.2	176.7	180.2	183.7	187.3	191.0	194.7
38	162.6	166.1	169.6	173.2	176.8	180.4	184.2	188.0	191.8	195.7	199.7	203.7	207.7
39	173.1	176.9	180.7	184.7	188.7	192.7	196.8	201.0	205.3	209.6	214.0	218.5	223.0
40	185.2	189.4	193.7	198.1	202.5	207.1	211.7	216.4	221.1	226.0	231.0	236.0	241.1
41	199.5	204.2	209.1	214.0	219.1	224.2	229.4	234.8	240.2	245.8	251.5	257.2	263.1
42	216.7	222.2	227.7	233.4	239.2	245.2	251.3	257.5	263.8	270.3	276.9	283.6	290.5
43	238.1	244.5	251.0	257.7	264.6	271.7	278.9	286.3	293.8	301.5	309.4	317.4	325.7
44	265.6	273.3	281.2	289.4	297.8	306.3	315.1	324.1	333.3	342.8	352.4	362.3	372.4
45	302.6	312.3	322.3	332.5	343.0	353.8	364.9	376.2	387.9	399.8	412.0	424.5	437.4
46	355.5	368.1	381.1	394.5	408.3	422.5	437.1	452.0	467.4	483.3	499.6	516.3	533.5
47	436.6	454.1	472.1	490.7	509.9	529.8	550.4	571.7	593.8	616.7	640.5	665.3	691.0
48	574.8	601.5	629.4	658.6	689.3	721.5	755.6	791.5	829.7	870.4	913.9	960.6	1011.2
49	866.4	920.8	980.4	1046.2	1119.9	1203.3	1299.7	1413.6	1553.1	1732.9	1986.3	2419.6	>2419.6

附 录 C

(资料性)

97 孔定量盘法 MPN 表对应 95%置信区间

表C.1给出了97孔定量盘法MPN表对应95%置信区间。

表C.1 97 孔定量盘法 MPN 表对应 95%置信区间

单位为最大可能数每一百毫升 (MPN/100 mL)

大孔阳性格数	小孔阳性格数						
	0	1	2	3	4	5	6
0	0.0~3.7	0.0~3.7	0.3~5.6	0.6~7.3	1.1~8.9	1.7~10.5	2.3~12.1
1	0.1~5.5	0.3~5.9	0.6~7.3	1.1~8.9	1.7~10.5	2.3~12.1	3.0~13.7
2	0.3~7.1	0.7~7.4	1.2~9.0	1.6~10.6	2.3~12.1	3.0~13.7	3.7~15.3
3	0.7~8.9	1.2~9.1	1.7~10.6	2.3~12.1	3.0~13.7	3.6~15.3	4.4~16.9
4	1.7~9.5	1.8~10.8	2.4~12.2	2.9~13.7	3.6~15.3	4.5~16.9	5.2~18.5
5	2.3~11.9	2.5~12.7	2.9~13.9	3.7~15.3	4.3~16.9	5.2~18.5	6.0~20.1
6	2.9~13.7	3.2~14.4	3.7~15.3	4.4~16.9	5.3~18.5	6.0~20.1	6.8~21.7
7	3.6~14.9	3.9~15.6	4.4~16.9	5.1~18.5	6.1~20.1	6.9~21.7	7.8~22.9
8	4.5~16.9	4.5~17.2	5.2~18.6	5.9~20.2	6.7~21.8	7.8~23.4	8.7~24.6
9	4.7~18.4	5.6~19.5	6.0~20.3	6.8~21.8	7.6~23.4	8.5~25.1	9.5~26.4
10	5.7~20.1	6.5~21.1	7.1~22.0	7.7~23.6	8.6~25.1	9.6~26.8	10.6~27.5
11	6.8~21.4	7.4~22.3	7.8~23.6	8.7~25.3	9.7~26.8	10.7~28.2	11.4~29.3
12	7.8~23.4	8.2~24.6	8.8~25.7	9.4~27.0	10.4~28.6	11.5~30.0	12.6~31.2
13	8.5~25.1	9.2~26.4	9.9~27.4	10.5~28.8	11.6~30.4	12.7~31.8	13.4~33.1
14	9.3~26.8	10.3~28.2	11.0~29.2	11.7~30.7	12.4~32.3	13.6~33.7	14.8~35.0
15	10.1~28.6	10.8~30.0	11.9~30.9	12.6~32.6	13.7~34.1	14.9~35.2	15.7~36.5
16	11.3~30.4	12.4~31.8	12.7~32.6	13.9~34.5	14.6~35.8	15.9~37.1	17.2~38.5
17	12.1~32.2	12.9~33.7	14.0~35.0	14.8~36.5	16.1~37.7	16.9~39.2	18.2~40.6
18	13.4~33.9	14.2~35.7	15.4~37.1	15.7~38.4	17.1~39.8	18.4~41.3	19.2~42.7
19	14.4~36.1	15.1~37.6	16.4~39.1	17.3~40.2	18.1~41.8	19.5~43.4	20.9~44.9
20	15.8~38.1	16.6~39.7	17.5~41.2	18.3~42.7	19.7~44.2	20.6~45.7	22.1~47.2
21	16.8~40.1	18.2~41.3	18.5~43.1	19.4~44.8	20.8~46.4	21.7~47.9	23.3~49.5
22	17.9~42.3	18.8~44.0	19.6~45.5	21.2~47.2	22.0~48.8	23.6~50.3	24.5~51.3

表 C.1 97 孔定量盘法 MPN 表对应 95%置信区间（续）

单位为最大可能数每一百毫升（MPN/100 mL）

大孔阳 性格数	小孔阳性格数						
	0	1	2	3	4	5	6
23	19.0~44.4	20.5~46.0	21.4~47.7	22.3~49.2	23.9~51.0	24.8~52.2	25.8~53.8
24	20.7~46.6	21.7~48.1	23.3~50.1	24.2~51.9	25.2~53.3	26.1~54.7	27.1~56.4
25	22.0~48.9	22.9~51.2	23.8~52.6	25.5~54.0	26.5~55.9	28.3~57.3	29.3~59.0
26	23.2~52.0	24.9~53.7	25.9~55.4	26.9~56.5	27.9~58.6	29.7~60.1	30.7~61.8
27	24.5~54.5	26.2~55.9	27.3~57.4	28.3~59.7	29.3~60.8	31.2~63.0	32.3~64.7
28	25.9~57.0	27.7~58.8	28.7~60.7	30.6~62.5	30.8~63.8	32.8~65.9	33.9~67.5
29	28.1~59.8	29.1~61.4	30.2~63.4	31.3~65.4	33.3~67.2	34.4~68.5	35.5~70.7
30	29.6~62.6	30.7~64.5	31.8~66.6	33.8~68.0	34.9~70.1	36.1~72.2	38.3~74.0
31	31.1~65.5	32.3~67.5	34.4~69.3	35.5~71.7	36.7~73.7	37.9~75.6	39.1~77.6
32	32.8~69.0	33.9~70.9	36.1~73.0	37.3~75.0	38.5~77.2	39.7~79.1	42.1~81.2
33	34.5~72.3	36.7~74.3	38.0~76.4	39.2~78.6	40.5~80.6	42.9~83.0	44.2~85.1
34	37.4~75.8	38.6~77.9	39.9~80.0	41.2~82.2	43.7~84.6	45.0~86.9	46.4~89.2
35	39.4~79.5	40.7~81.5	42.0~83.7	43.3~86.2	44.6~88.6	47.3~90.4	48.7~93.0
36	41.4~83.4	42.8~85.4	44.1~87.8	45.5~90.3	46.9~92.7	49.7~95.3	51.1~97.5
37	43.6~87.4	45.0~89.6	46.5~92.0	47.9~95.6	50.7~98.3	52.2~100.1	53.8~102.6
38	46.0~91.7	47.5~96.2	48.9~98.5	51.9~101.0	53.4~102.9	55.0~105.7	56.6~107.7
39	48.5~98.5	50.0~101.1	53.0~103.6	54.6~106.2	56.3~108.8	57.9~111.4	59.6~113.8
40	51.2~103.6	52.8~106.2	56.0~109.0	57.7~111.7	59.4~114.6	61.1~117.2	62.9~120.2
41	54.1~109.0	55.8~111.8	57.5~114.9	60.9~118.0	62.8~121.0	64.6~124.1	66.5~126.3
42	57.3~115.4	59.1~118.3	60.9~121.9	62.8~125.0	66.5~128.0	68.4~131.7	70.4~135.3
43	60.7~123.1	62.7~126.0	64.6~129.1	68.5~132.1	70.5~136.7	72.7~140.4	74.8~143.9
44	64.6~130.6	66.6~135.3	68.7~138.7	70.9~142.2	75.1~145.4	77.4~150.0	79.8~154.0
45	68.8~140.4	71.1~144.2	73.4~148.9	75.7~152.6	78.1~156.6	80.6~160.7	83.1~165.2
46	71.6~151.7	76.1~155.9	78.7~159.9	81.3~163.9	83.9~168.3	86.7~176.8	89.5~181.9
47	79.3~163.7	82.0~168.0	84.8~177.0	85.3~181.9	88.2~187.2	91.3~192.7	97.2~198.8
48	83.5~181.9	86.5~187.2	89.7~192.9	92.9~199.0	99.2~206.3	102.8~212.4	106.7~222.4
49	88.7~203.4	92.1~209.3	98.7~219.3	102.6~228.4	106.8~235.5	111.2~243.4	115.9~260.5

表 C.1 97 孔定量盘法 MPN 表对应 95%置信区间（续）

单位为最大可能数每一百毫升（MPN/100 mL）

大孔阳 性格数	小孔阳性格数						
	7	8	9	10	11	12	13
0	2.9~13.7	3.7~15.3	4.5~15.8	5.2~16.9	5.9~18.5	6.9~20.1	7.8~21.2
1	3.7~15.3	4.3~16.2	5.2~17.2	6.0~18.5	6.8~20.1	7.6~21.7	8.7~22.2
2	4.4~16.9	5.3~17.8	6.0~18.6	6.8~20.1	7.7~21.7	8.5~22.9	9.4~24.0
3	5.1~18.3	6.1~18.8	6.9~20.2	7.7~21.8	8.6~23.4	9.5~24.1	10.2~25.3
4	5.9~19.5	6.9~20.5	7.8~21.8	8.7~23.4	9.6~24.6	10.3~25.7	10.9~26.9
5	6.8~21.2	7.6~21.9	8.5~23.4	9.4~25.1	10.4~26.4	11.0~27.0	11.7~28.6
6	7.7~22.2	8.6~23.6	9.5~25.1	10.5~26.8	11.1~27.5	11.8~28.8	12.5~30.4
7	8.7~24.0	9.6~25.3	10.6~26.9	11.6~28.2	12.3~29.3	12.6~30.5	13.7~31.9
8	9.7~25.7	10.4~26.9	11.4~28.6	12.4~30.0	13.1~30.7	13.9~32.3	14.6~33.8
9	10.5~27.0	11.5~28.6	12.6~30.4	13.3~31.2	14.0~32.6	14.7~34.2	15.9~35.2
10	11.6~28.8	12.7~30.4	13.4~31.8	14.1~33.1	14.9~34.5	16.1~35.7	16.8~37.1
11	12.4~30.7	13.6~32.3	14.3~33.8	15.5~35.0	15.8~36.1	17.0~37.7	18.3~39.1
12	13.7~32.6	14.9~34.2	15.7~35.2	15.9~36.5	17.2~38.1	18.0~39.2	19.3~40.6
13	14.6~34.5	15.8~35.7	16.6~37.1	17.4~38.5	18.2~39.9	19.5~41.3	20.3~42.7
14	16.0~36.1	16.8~37.7	17.6~39.1	18.4~40.6	19.7~41.8	20.6~43.4	22.0~44.4
15	17.0~38.1	17.8~39.7	18.6~41.2	19.4~42.3	20.8~44.0	21.6~44.9	23.1~46.5
16	18.0~40.2	18.8~41.6	19.6~42.7	21.0~44.4	21.9~45.7	23.4~47.2	24.3~48.8
17	19.0~42.0	20.4~43.4	21.3~44.9	22.2~46.5	27.3~48.0	24.6~49.5	25.5~51.0
18	20.7~44.2	21.6~45.7	22.4~47.2	23.3~48.8	24.9~50.3	25.8~51.2	26.7~52.8
19	21.8~46.5	22.7~48.0	23.6~49.5	25.2~51.0	26.1~52.0	27.0~53.7	27.9~55.4
20	23.0~48.8	23.9~50.3	25.5~51.2	26.4~52.8	27.4~54.5	28.3~56.2	30.1~57.6
21	24.2~51.0	25.8~52.0	26.8~53.7	27.7~55.4	28.7~57.1	30.5~58.6	31.5~60.1
22	26.2~52.9	27.1~54.5	28.1~56.2	29.1~58.0	30.9~59.7	31.9~60.8	32.9~62.5
23	26.7~55.4	28.5~57.1	29.5~58.9	30.5~60.2	32.3~61.8	33.4~63.6	34.4~65.4
24	28.9~58.0	29.9~59.8	30.9~61.3	32.8~63.0	33.9~64.7	34.9~66.1	36.0~67.8

表 C.1 97 孔定量盘法 MPN 表对应 95%置信区间（续）

单位为最大可能数每一百毫升（MPN/100 mL）

大孔阳 性格数	小孔阳性格数						
	7	8	9	10	11	12	13
25	30.3~60.7	31.3~62.5	33.3~64.2	34.4~66.0	35.4~67.3	36.5~69.0	37.6~70.7
26	31.8~63.5	32.8~65.4	34.9~66.6	36.0~68.5	37.1~70.4	38.2~72.2	40.4~73.7
27	33.3~66.1	35.4~67.8	36.5~69.7	37.6~71.7	38.8~73.4	41.0~75.0	42.2~77.2
28	35.0~69.1	37.1~71.0	38.2~73.0	39.4~74.4	41.7~76.4	41.7~77.9	44.1~80.0
29	36.6~72.3	38.8~74.1	40.0~75.9	41.2~77.8	42.4~79.5	44.8~81.4	46.0~83.3
30	39.5~75.8	40.7~77.6	41.9~79.5	43.1~81.4	45.6~83.3	46.8~85.3	48.1~87.3
31	41.4~79.5	42.6~81.4	43.9~83.3	46.4~85.3	47.7~87.3	49.0~89.5	50.3~91.6
32	43.4~83.3	44.7~85.3	46.0~87.3	48.6~89.5	49.9~91.6	51.3~93.9	52.6~94.6
33	45.5~87.2	46.8~89.2	49.5~91.6	50.9~93.9	52.3~94.6	53.7~96.2	55.1~98.5
34	47.7~91.5	50.5~93.8	50.5~94.6	51.9~96.2	54.8~98.5	56.2~101.0	57.7~103.6
35	50.1~94.6	51.5~96.4	53.0~98.8	55.9~101.2	57.4~103.6	59.0~106.2	60.5~109.0
36	52.6~99.5	54.1~101.4	55.6~103.8	58.7~106.4	60.3~109.1	61.9~111.8	63.5~114.7
37	55.3~104.5	56.9~107.0	60.0~109.4	61.7~112.2	63.3~114.9	65.0~117.5	66.7~120.2
38	58.2~110.3	59.8~112.8	63.2~115.4	64.9~118.3	66.6~121.0	68.4~123.1	70.2~126.0
39	61.3~115.5	63.0~119.2	66.6~121.6	68.4~124.2	70.2~127.6	72.1~130.6	74.0~133.7
40	66.5~123.1	66.5~125.4	70.2~128.9	72.2~132.1	74.1~135.0	76.1~137.0	78.2~140.4
41	68.4~130.5	72.3~133.7	74.3~136.1	76.4~139.3	78.5~142.7	80.6~146.2	82.8~149.1
42	72.5~138.2	74.6~142.1	78.8~145.4	81.0~148.8	83.3~151.7	85.6~155.9	87.9~159.8
43	77.0~147.2	79.3~151.7	81.6~155.5	86.3~158.2	88.7~163.3	91.2~167.8	93.8~172.1
44	82.2~158.1	84.7~162.7	87.2~167.2	92.2~172.0	95.0~174.4	95.1~177.9	97.9~182.9
45	85.7~170.1	90.8~176.4	93.6~180.4	96.5~184.0	99.5~190.0	102.6~195.0	105.7~199.9
46	92.4~186.9	98.1~192.3	101.3~196.8	104.6~201.1	108.0~207.8	111.6~215.4	115.2~220.6
47	100.5~204.8	104.0~211.8	107.7~218.7	111.4~226.4	115.4~234.0	119.5~242.2	123.8~250.5
48	110.7~229.7	114.9~238.0	119.4~245.0	124.0~257.8	125.3~268.8	130.4~279.5	135.7~284.0
49	120.8~270.3	126.1~281.0	128.0~292.9	137.9~306.9	140.2~320.9	147.0~343.5	159.0~360.0

表 C.1 97 孔定量盘法 MPN 表对应 95%置信区间（续）

单位为最大可能数每一百毫升（MPN/100 mL）

大孔阳 性格数	小孔阳性格数						
	14	15	16	17	18	19	20
0	8.6~21.9	9.0~23.4	9.6~24.9	10.5~25.7	11.5~26.9	12.5~28.6	13.2~29.3
1	9.4~23.6	9.7~25.1	10.6~26.4	11.6~27.0	12.6~28.6	13.3~30.0	14.0~30.7
2	9.8~25.1	10.4~26.8	11.4~27.5	12.4~28.8	13.5~30.4	14.1~31.2	14.8~32.6
3	10.5~26.9	11.5~28.2	12.5~29.2	13.6~30.4	14.3~31.8	15.0~32.7	15.7~34.2
4	11.6~28.6	12.6~29.3	13.7~30.7	14.8~32.2	15.1~33.1	15.8~34.5	17.0~35.7
5	12.4~30.0	13.4~31.2	14.6~32.3	15.7~33.8	16.0~35.0	17.2~36.1	17.9~37.5
6	13.6~31.8	14.7~32.6	15.9~34.2	16.6~35.2	17.4~36.5	18.1~37.8	19.4~39.1
7	14.9~33.1	15.6~34.5	16.8~35.7	17.5~37.1	18.3~38.1	19.6~39.7	20.4~40.6
8	15.7~35.0	17.0~36.1	17.7~37.7	18.5~38.5	19.2~40.2	20.6~41.3	21.4~42.7
9	17.1~36.5	17.9~38.1	18.7~39.2	19.5~40.6	20.8~41.8	21.6~43.2	22.4~44.4
10	18.1~38.5	18.9~39.7	19.7~41.2	21.0~42.3	21.8~43.4	23.3~44.9	23.5~46.5
11	19.1~40.2	19.9~41.6	20.7~42.7	22.1~44.2	23.6~45.7	23.7~46.8	25.2~48.0
12	20.1~42.0	21.5~43.4	22.3~44.9	23.2~46.2	24.7~47.2	24.8~48.8	26.4~50.3
13	21.8~44.2	22.6~45.6	23.4~46.6	25.0~48.0	25.8~49.5	26.7~51.0	27.6~52.0
14	22.9~45.8	23.7~47.2	24.6~48.8	26.1~50.3	27.0~51.2	27.9~52.8	28.8~54.5
15	24.0~48.0	24.9~49.5	26.4~51.0	27.3~52.0	28.2~53.7	29.1~55.2	30.9~56.2
16	25.2~50.3	26.8~51.2	27.7~52.8	28.6~54.5	29.5~55.9	30.4~57.1	32.2~58.6
17	26.4~52.0	28.0~53.7	28.9~55.4	29.9~56.4	30.8~58.0	32.6~59.7	33.6~60.8
18	27.6~54.5	29.3~56.1	30.3~57.4	31.2~58.9	33.0~60.2	34.0~61.8	35.0~63.4
19	29.7~57.0	30.7~58.0	31.6~59.8	32.6~61.3	34.5~62.6	35.5~64.2	36.5~66.0
20	31.1~59.0	32.0~60.7	33.0~62.5	34.9~63.6	36.0~65.4	37.0~66.6	38.0~68.5
21	32.5~61.6	33.5~63.0	35.4~64.7	36.5~66.1	37.5~67.8	38.5~69.2	39.6~70.9
22	33.9~64.2	35.0~66.0	37.0~67.3	38.0~69.0	39.1~70.4	40.2~72.2	41.2~73.7
23	35.5~66.6	37.5~68.5	38.6~70.3	39.7~71.7	40.8~73.4	41.9~75.0	43.0~76.4
24	38.1~69.7	39.2~71.0	40.3~73.0	41.4~74.4	42.5~75.9	44.8~77.8	45.9~79.5

表 C.1 97 孔定量盘法 MPN 表对应 95%置信区间（续）

单位为最大可能数每一百毫升（MPN/100 mL）

大孔阳 性格数	小孔阳性格数						
	14	15	16	17	18	19	20
25	39.7~72.4	40.9~74.0	42.0~75.9	43.1~77.6	45.5~79.5	46.7~81.2	47.8~83.0
26	41.5~75.7	42.7~77.6	43.8~79.2	45.0~80.8	46.2~82.7	48.6~84.2	49.8~85.4
27	43.3~78.6	44.5~80.6	45.7~82.3	46.9~83.7	49.4~85.3	50.7~87.3	51.9~89.5
28	45.3~81.5	46.5~83.4	47.7~85.3	50.3~87.3	51.6~89.5	52.8~91.6	54.1~93.9
29	47.3~85.3	48.6~87.3	51.2~89.5	51.1~91.6	53.8~93.9	55.1~94.6	56.5~96.2
30	49.4~89.5	50.7~91.6	52.0~93.9	54.8~94.6	56.1~96.2	57.5~98.6	58.9~101.0
31	51.7~93.9	53.0~94.6	55.8~96.2	57.2~98.5	58.6~101.0	60.1~103.6	61.5~105.7
32	54.0~96.2	56.9~98.5	58.4~101.0	59.8~103.6	61.3~106.2	62.8~108.0	64.3~109.4
33	58.1~101.0	59.5~103.6	61.0~106.2	62.6~108.3	64.1~110.3	65.6~112.2	67.2~114.9
34	60.8~106.2	62.3~108.8	63.9~111.1	65.5~112.8	67.1~115.1	68.7~118.0	70.3~120.4
35	62.1~111.4	65.3~113.8	67.0~115.4	68.6~118.3	70.3~121.2	72.0~123.1	73.7~126.0
36	66.9~116.4	68.6~119.2	70.3~121.8	72.0~124.2	73.8~127.1	75.5~129.1	77.3~132.1
37	70.3~121.9	72.0~125.0	73.8~127.6	75.7~130.6	77.5~133.7	79.4~135.3	83.4~138.7
38	73.9~128.9	75.8~132.1	77.7~135.0	79.7~137.0	81.6~140.4	83.6~143.0	85.6~146.2
39	75.9~135.3	77.9~138.7	82.0~142.2	84.0~145.4	86.1~148.2	88.3~151.7	92.8~154.7
40	80.2~144.0	84.5~147.9	86.7~150.0	88.9~154.0	91.1~156.6	95.9~159.9	95.8~163.7
41	87.2~152.6	89.6~156.1	91.9~159.8	94.3~163.7	94.2~168.0	99.2~172.4	101.8~174.4
42	92.8~163.7	95.3~168.0	95.3~172.4	97.8~174.4	103.1~177.0	105.9~182.0	108.7~187.2
43	96.5~174.4	99.2~177.0	101.9~182.0	107.5~187.2	110.5~192.9	113.5~197.7	116.7~200.4
44	103.5~187.8	106.6~193.2	109.7~199.0	115.9~203.5	119.2~209.3	122.7~213.8	126.2~219.3
45	112.0~206.2	115.4~212.3	119.0~215.7	122.6~222.7	126.4~228.5	130.3~235.5	134.4~243.1
46	119.0~227.9	123.0~235.5	130.5~243.1	134.9~251.4	135.7~254.1	144.2~260.8	149.1~270.3
47	131.9~256.3	136.7~264.5	141.8~273.3	147.1~283.1	152.7~294.4	158.5~303.3	169.2~315.5
48	145.5~301.1	151.7~314.5	158.2~323.1	165.2~340.8	172.6~350.2	175.4~365.2	183.5~382.9
49	162.3~371.9	170.9~398.5	185.7~416.8	190.4~446.1	195.3~471.2	206.6~498.1	218.9~520.7

表 C.1 97 孔定量盘法 MPN 表对应 95%置信区间（续）

单位为最大可能数每一百毫升（MPN/100 mL）

大孔阳 性格数	小孔阳性格数						
	21	22	23	24	25	26	27
0	13.9~30.5	14.5~31.8	15.7~33.1	16.4~34.2	17.6~35.2	18.3~36.5	19.5~37.7
1	14.7~32.3	15.8~33.1	17.0~34.5	17.2~35.7	18.4~37.1	19.2~38.1	20.5~39.2
2	16.0~33.8	17.2~35.0	17.9~36.1	18.1~37.1	19.4~38.5	20.7~39.7	21.4~40.6
3	16.8~35.2	18.1~36.5	18.8~37.7	19.6~39.1	20.9~40.2	21.6~41.3	22.4~42.7
4	18.3~37.1	19.0~38.1	19.8~39.2	20.5~40.6	21.9~41.8	22.6~42.8	23.4~44.2
5	19.2~38.5	20.0~39.9	20.7~41.2	22.1~42.3	22.9~43.4	23.7~44.9	24.4~45.8
6	20.2~40.2	20.9~41.6	22.3~42.7	23.1~44.2	23.9~45.2	24.7~46.5	26.2~47.9
7	21.2~42.0	21.9~43.4	23.4~44.4	24.2~45.7	25.0~47.2	26.5~48.3	27.3~49.5
8	22.2~44.0	23.6~44.9	24.4~46.5	25.2~47.8	26.1~48.8	27.6~50.3	28.5~51.2
9	23.2~45.7	24.7~47.2	25.5~48.0	26.3~49.5	27.9~51.0	28.8~52.0	29.6~53.7
10	25.0~47.5	25.8~48.8	26.6~50.3	28.2~51.2	29.1~52.8	30.0~54.1	30.9~55.4
11	26.1~49.5	26.9~51.0	28.6~52.0	29.4~53.7	30.3~54.6	31.2~56.2	32.1~57.4
12	27.3~51.2	28.9~52.8	29.8~54.4	30.7~55.4	31.6~57.0	32.5~58.0	33.4~59.7
13	28.5~53.7	30.1~54.7	31.1~56.2	32.0~57.6	32.9~58.9	34.7~60.2	35.6~61.6
14	30.5~55.4	31.4~57.1	32.4~58.6	33.3~59.8	35.1~61.3	36.1~62.5	37.0~64.0
15	31.8~58.0	32.8~59.0	33.7~60.7	35.6~61.8	36.5~63.5	37.5~64.7	38.5~66.1
16	33.2~60.1	34.1~61.5	35.1~63.0	37.0~64.2	38.0~66.0	39.0~67.3	40.0~68.5
17	34.6~62.5	35.5~63.6	37.5~65.4	38.5~66.6	39.5~68.4	40.5~69.7	41.5~71.0
18	36.0~64.7	38.0~66.1	39.0~67.8	40.0~69.1	41.1~70.7	42.1~72.2	43.1~73.7
19	37.5~67.3	39.5~69.0	40.6~70.4	41.6~71.7	42.7~73.4	43.7~75.0	44.8~76.4
20	40.1~69.7	41.1~71.5	42.2~73.0	43.3~74.4	44.4~75.9	45.5~77.6	47.8~79.3
21	41.7~72.4	42.8~74.0	43.9~75.8	45.0~77.6	46.1~79.2	48.5~80.6	49.6~81.7
22	43.5~75.7	44.6~77.2	45.7~78.6	46.8~80.0	47.9~81.5	50.4~83.3	51.5~85.3
23	45.2~77.9	46.4~79.5	47.5~81.4	48.7~83.3	51.1~85.3	51.0~86.9	53.5~87.8
24	47.1~81.4	48.3~83.3	49.4~85.1	50.6~86.3	53.2~87.7	54.4~89.5	55.6~91.6

表 C.1 97 孔定量盘法 MPN 表对应 95%置信区间（续）

单位为最大可能数每一百毫升（MPN/100 mL）

大孔阳 性格数	小孔阳性格数						
	21	22	23	24	25	26	27
25	49.0~84.6	50.2~86.2	51.5~87.4	54.0~89.5	55.3~91.6	56.6~93.9	57.8~94.6
26	51.1~87.3	52.3~89.5	55.0~91.6	54.8~93.9	57.5~94.6	58.8~96.2	60.1~98.6
27	53.2~91.6	55.9~93.9	55.8~94.6	58.5~96.2	59.9~98.6	61.2~101.0	62.6~102.5
28	55.5~94.6	56.8~96.2	59.6~98.6	61.0~101.0	62.4~102.8	63.7~103.9	65.1~106.2
29	57.8~98.6	60.7~101.0	62.1~103.3	63.5~104.7	65.0~106.4	66.4~109.0	67.8~111.1
30	60.3~103.6	63.3~105.0	64.8~106.4	66.2~109.0	67.7~111.4	69.2~112.9	70.7~115.1
31	63.0~107.0	66.1~109.1	67.6~111.8	69.1~113.8	70.7~115.4	72.2~118.0	73.8~120.4
32	65.8~111.8	69.0~114.7	70.6~116.4	72.2~118.3	73.8~121.2	75.4~123.1	77.0~125.1
33	70.5~117.5	72.2~119.2	73.8~121.8	75.5~124.2	77.2~126.0	78.8~128.9	80.6~130.6
34	73.8~121.9	75.5~125.0	77.3~127.3	79.0~129.4	80.8~132.1	84.6~135.0	84.3~137.0
35	75.4~128.2	79.2~130.6	81.0~133.7	82.8~135.3	84.7~138.7	86.5~140.7	88.4~144.0
36	81.2~135.0	83.1~137.0	85.0~140.4	87.0~142.7	88.9~145.4	93.2~148.2	95.2~151.7
37	83.2~142.1	87.4~144.2	89.4~147.9	91.5~150.0	93.6~152.6	95.7~155.9	97.8~159.5
38	90.0~148.9	92.1~152.3	94.3~155.5	96.5~158.7	98.7~161.3	103.5~163.9	105.9~168.0
39	95.0~158.2	94.9~160.7	99.6~163.7	102.0~168.0	104.4~172.4	106.8~174.4	109.3~177.0
40	98.1~168.0	103.2~172.4	105.7~174.4	108.2~177.0	110.8~181.9	113.5~186.9	119.2~190.0
41	107.1~177.0	107.0~181.9	109.7~187.2	115.3~190.1	118.2~194.0	121.1~198.9	124.1~203.5
42	111.5~192.3	114.4~195.0	120.5~200.4	123.6~205.3	126.8~209.3	130.0~213.8	133.4~219.3
43	119.9~206.2	123.1~212.3	126.5~215.7	133.3~221.8	133.5~227.0	140.7~233.7	144.5~238.0
44	129.9~226.4	133.6~229.7	137.5~235.5	141.5~243.1	145.6~251.4	153.7~254.1	158.2~260.5
45	142.3~251.4	146.7~254.1	151.3~260.5	156.1~270.3	161.0~279.8	170.4~283.1	175.8~294.4
46	154.2~281.0	159.5~290.4	169.5~296.2	175.4~306.9	176.9~315.5	188.0~328.6	194.7~340.8
47	175.8~328.6	177.9~340.8	185.0~343.5	197.7~360.0	205.8~378.3	214.2~388.4	217.0~401.8
48	197.7~398.8	207.1~423.2	217.0~439.5	233.9~448.0	245.3~472.5	257.3~498.7	262.4~526.2
49	231.9~555.5	245.9~567.0	260.6~618.9	276.2~650.0	292.7~687.9	310.0~721.5	338.4~763.6

表 C.1 97 孔定量盘法 MPN 表对应 95%置信区间（续）

单位为最大可能数每一百毫升（MPN/100 mL）

大孔阳 性格数	小孔阳性格数						
	28	29	30	31	32	33	34
0	19.7~38.6	21.0~39.9	21.7~41.2	22.5~42.3	23.9~43.4	24.6~44.4	25.4~45.7
1	21.2~40.6	22.0~41.6	22.7~42.7	23.5~44.0	24.9~44.9	25.7~46.4	26.4~47.2
2	22.2~42.0	23.6~43.4	24.4~44.4	25.1~45.7	25.9~46.6	26.7~48.0	28.2~48.9
3	23.2~43.6	24.6~44.9	25.4~46.2	26.2~47.2	27.0~48.6	27.8~49.5	29.3~51.0
4	24.9~45.6	25.7~46.5	26.5~48.0	27.3~48.8	28.1~50.3	29.7~51.2	30.5~52.8
5	25.9~47.2	26.7~48.5	27.6~49.5	28.4~51.0	29.2~52.0	30.8~53.3	31.7~54.5
6	27.0~48.8	27.9~50.3	28.7~51.2	29.5~52.8	31.1~53.8	32.0~55.4	32.9~56.2
7	28.2~51.0	29.0~52.0	30.6~53.5	31.5~54.5	32.4~55.9	33.2~57.1	34.1~58.3
8	29.3~52.8	30.2~53.8	31.8~55.4	32.7~56.4	33.6~58.0	34.5~59.0	35.4~60.2
9	30.5~54.5	32.2~56.1	33.1~57.1	34.0~58.6	34.9~59.8	35.8~61.2	36.7~62.5
10	31.7~56.8	33.5~58.0	34.4~59.1	35.3~60.7	36.2~61.8	37.1~63.0	39.0~64.5
11	33.9~58.9	34.8~60.1	35.7~61.3	36.6~62.6	38.5~64.2	39.5~65.4	40.4~66.6
12	35.2~60.8	36.1~62.5	37.1~63.6	38.0~64.7	40.0~66.1	40.9~67.7	41.9~69.0
13	36.6~63.0	37.5~64.4	38.5~66.0	39.4~67.3	41.4~68.5	42.4~69.7	43.4~71.0
14	38.0~65.4	39.0~66.6	41.0~67.9	42.0~69.6	43.0~70.9	44.0~72.3	45.0~73.7
15	39.5~67.8	40.5~69.0	41.4~70.4	43.5~72.0	44.6~73.4	45.6~74.7	46.6~75.9
16	41.0~70.3	43.1~71.7	44.1~73.0	45.2~74.4	46.2~75.9	47.3~77.6	48.3~78.9
17	42.6~72.4	44.7~74.0	45.8~75.7	46.8~77.2	47.9~78.6	49.0~79.8	51.3~81.4
18	45.3~75.1	46.4~76.6	47.5~77.9	48.6~79.5	49.7~81.4	50.8~83.0	53.2~84.2
19	47.1~77.8	48.2~79.5	49.3~81.2	50.4~82.7	51.5~83.7	54.0~85.3	53.7~87.3
20	48.9~80.8	50.0~82.3	51.1~83.4	52.3~85.3	53.4~87.3	55.9~88.7	57.1~89.6
21	50.7~83.4	51.9~85.3	53.1~87.2	54.2~88.6	56.8~89.5	58.0~91.6	59.2~93.9
22	52.7~87.0	53.9~88.2	55.1~89.5	56.3~91.6	58.9~93.9	60.2~94.6	61.4~96.1
23	54.7~89.5	56.0~91.6	57.2~93.9	58.4~94.6	61.2~96.1	62.4~98.6	63.7~100.4
24	56.9~93.9	58.1~94.6	60.9~96.1	62.2~98.6	63.5~100.6	64.8~101.5	66.1~103.6

表 C.1 97 孔定量盘法 MPN 表对应 95%置信区间（续）

单位为最大可能数每一百毫升（MPN/100 mL）

大孔阳 性格数	小孔阳性格数						
	28	29	30	31	32	33	34
25	59.1~96.1	60.4~98.6	61.7~101.0	64.6~101.6	65.9~103.6	67.3~106.2	68.6~107.3
26	61.5~101.0	62.8~102.2	64.1~103.6	67.1~106.2	68.5~108.0	69.9~109.4	71.3~111.8
27	63.9~103.8	65.3~106.2	68.4~108.3	69.8~109.6	71.2~111.8	72.7~113.8	74.1~115.4
28	66.5~108.8	68.0~110.3	71.1~112.2	72.6~114.7	74.1~116.4	75.6~118.3	77.1~120.4
29	69.3~112.8	72.6~114.9	74.1~116.9	75.6~119.2	77.2~121.2	78.7~123.1	80.3~125.0
30	74.1~117.5	75.6~119.2	77.2~121.8	78.8~124.2	80.4~126.0	82.0~128.2	83.6~130.6
31	75.4~121.9	78.9~124.7	80.5~127.1	82.2~128.9	83.9~131.5	85.6~133.7	87.3~135.3
32	78.7~127.6	82.4~130.5	84.1~132.1	85.8~135.0	87.6~137.0	89.4~139.5	91.1~142.1
33	84.4~133.7	86.1~135.3	88.0~138.7	89.8~140.5	91.6~143.0	95.8~145.9	95.3~148.2
34	86.1~139.5	90.2~142.2	92.1~145.0	94.0~147.9	96.0~150.0	97.9~152.6	102.4~155.5
35	92.6~146.2	94.6~148.9	96.6~152.0	98.7~154.7	100.7~157.0	102.8~159.9	107.5~163.6
36	94.9~154.0	99.4~156.6	101.6~159.8	103.7~163.1	105.9~165.2	110.8~168.0	110.4~172.4
37	102.5~162.7	104.8~164.6	107.0~168.0	109.3~172.4	111.7~174.4	114.1~177.0	116.5~181.9
38	105.6~172.4	110.7~174.4	113.1~177.0	115.6~181.9	118.1~185.4	120.7~187.3	123.3~192.2
39	114.7~181.9	117.3~185.5	120.0~187.8	122.7~192.8	125.4~196.8	128.2~200.4	131.1~203.8
40	119.0~193.1	124.8~197.7	127.8~200.4	130.8~205.9	133.8~209.3	136.9~213.8	140.0~219.3
41	130.4~206.2	133.6~212.3	133.4~215.7	140.1~221.8	143.5~226.4	147.0~229.7	150.5~235.5
42	136.8~222.7	140.3~228.5	147.5~234.0	151.3~238.0	155.1~243.1	159.1~251.4	163.1~254.1
43	148.4~243.1	152.4~251.4	160.5~254.1	160.8~260.5	169.3~269.7	173.9~273.3	178.6~281.0
44	162.8~270.3	167.5~274.9	172.4~282.2	177.5~290.4	187.3~296.2	188.0~305.1	198.4~314.5
45	176.8~302.0	187.2~310.9	193.2~318.2	199.4~328.6	205.8~340.8	212.4~343.5	219.2~360.0
46	201.6~343.5	208.9~360.0	216.4~372.2	230.0~382.9	232.2~398.6	246.8~405.3	255.7~423.0
47	232.1~423.0	248.2~439.5	251.7~446.2	262.0~471.2	280.1~495.6	299.1~498.7	295.5~526.2
48	275.1~555.5	296.6~556.7	310.9~586.6	334.6~618.9	341.2~652.5	357.3~687.9	374.1~700.1
49	358.2~804.5	379.1~847.2	401.2~879.2	424.5~941.5	449.3~974.4	475.7~1048.9	549.0~1094.0

表 C.1 97 孔定量盘法 MPN 表对应 95%置信区间（续）

单位为最大可能数每一百毫升（MPN/100 mL）

大孔阳 性格数	小孔阳性格数						
	35	36	37	38	39	40	41
0	26.2~46.8	27.7~48.0	28.5~49.0	29.2~50.3	30.0~51.2	30.8~52.8	31.6~53.7
1	27.9~48.8	28.7~49.6	29.5~51.0	30.4~52.0	31.2~53.1	32.8~54.5	33.6~55.4
2	29.0~50.3	29.9~51.2	30.7~52.8	31.5~53.7	32.3~54.9	34.0~56.2	34.8~57.1
3	30.2~52.0	31.0~53.2	31.8~54.5	32.6~55.4	34.3~57.0	35.2~58.0	36.0~59.0
4	31.3~53.7	32.2~55.2	33.0~56.2	34.7~57.4	35.6~58.6	36.4~59.8	37.3~60.9
5	32.5~55.7	33.4~57.0	35.1~58.0	36.0~59.3	36.8~60.7	37.7~61.8	38.6~63.0
6	33.7~57.6	35.5~58.9	36.4~60.1	37.2~61.3	38.1~62.5	39.0~63.6	39.9~64.8
7	35.0~59.7	36.8~60.8	37.7~61.9	38.6~63.4	39.5~64.7	40.4~66.0	41.3~67.3
8	36.3~61.6	38.1~63.0	39.0~64.2	39.9~65.4	40.9~66.6	41.8~67.8	43.8~69.1
9	38.6~63.6	39.5~64.7	40.4~66.1	41.3~67.5	42.3~69.0	44.3~70.3	45.3~71.5
10	40.0~66.0	40.9~67.3	41.8~68.5	42.8~69.7	43.7~71.0	45.8~72.3	46.8~73.7
11	41.4~67.8	42.4~69.2	43.3~70.7	45.4~72.2	45.2~73.4	47.4~74.5	48.4~75.9
12	42.9~70.4	43.9~71.7	44.8~73.0	47.0~74.4	48.0~75.8	49.0~77.2	50.0~78.6
13	44.4~72.4	45.4~74.0	46.4~75.7	48.6~76.9	49.6~77.9	50.7~79.5	51.7~81.2
14	46.0~75.0	47.0~76.4	49.3~77.8	50.3~79.5	51.4~80.8	52.4~82.1	53.5~83.3
15	47.7~77.6	48.7~79.2	51.0~80.6	52.1~81.5	53.1~83.3	54.2~85.1	55.3~86.2
16	49.4~80.0	50.4~81.4	52.8~83.3	53.9~84.8	55.0~85.9	56.1~87.3	57.2~89.5
17	51.1~83.3	53.5~84.6	54.6~85.4	55.8~87.3	56.9~89.4	58.0~90.3	59.1~91.6
18	53.0~85.3	55.4~87.3	56.6~89.2	57.7~90.0	58.9~91.6	60.0~93.9	61.2~94.6
19	56.3~89.1	57.4~89.8	58.6~91.6	59.8~93.9	60.9~94.6	62.1~96.1	64.9~98.6
20	58.3~91.6	59.5~93.9	60.7~94.6	61.9~96.1	63.1~98.6	64.3~99.5	65.5~101.0
21	60.4~94.6	61.7~96.1	62.9~98.6	64.1~99.8	65.4~101.0	68.2~103.6	69.5~104.7
22	62.7~98.6	63.9~100.1	65.2~101.0	66.4~103.6	69.4~105.0	70.7~106.4	72.0~108.8
23	65.0~101.2	66.3~103.6	67.6~105.6	68.9~106.4	70.2~109.0	73.3~110.3	74.6~112.2
24	67.4~105.7	68.8~107.0	70.1~109.0	71.4~111.1	74.6~112.2	76.0~114.7	77.4~116.4

表 C.1 97 孔定量盘法 MPN 表对应 95%置信区间（续）

单位为最大可能数每一百毫升（MPN/100 mL）

大孔阳 性格数	小孔阳性格数						
	35	36	37	38	39	40	41
25	70.0~109.1	71.4~111.4	72.8~112.8	74.2~114.9	77.4~116.4	78.9~118.3	80.3~120.4
26	72.7~113.5	74.1~115.1	75.6~117.5	78.9~119.2	80.4~121.2	81.9~123.1	83.4~125.0
27	75.6~118.0	77.1~119.8	80.5~121.8	82.0~123.7	83.5~125.9	85.1~127.6	86.6~129.4
28	78.6~121.9	80.1~124.2	83.7~126.0	85.3~128.5	86.9~130.6	88.5~132.4	90.1~135.0
29	81.8~127.3	83.4~129.1	87.1~131.7	88.8~133.7	90.4~135.3	92.1~138.1	93.8~140.4
30	87.4~132.1	89.1~135.0	88.6~137.0	92.5~138.7	94.3~141.6	96.0~144.0	97.8~145.9
31	89.0~138.7	93.0~140.4	94.7~142.7	96.5~145.4	98.4~147.9	100.2~150.0	102.1~152.3
32	95.2~144.2	94.8~146.2	99.0~148.9	100.9~151.7	102.8~154.0	104.7~156.2	106.7~159.5
33	99.6~150.9	101.6~153.0	103.6~155.9	105.6~158.7	107.6~160.7	109.7~163.7	111.7~167.2
34	101.9~158.2	106.5~160.1	108.6~163.7	110.7~166.5	112.9~168.0	115.0~172.4	117.2~174.4
35	109.7~165.7	111.9~168.0	114.1~172.4	116.4~174.4	118.6~177.0	121.0~181.4	123.3~182.9
36	115.4~174.4	117.8~177.0	120.2~181.9	122.6~183.1	125.1~187.3	127.5~190.0	130.1~193.1
37	118.9~184.2	124.4~187.3	127.0~191.9	129.6~194.0	132.2~198.0	134.9~200.4	137.6~205.3
38	126.0~194.9	131.8~198.9	134.6~203.5	137.5~206.2	140.4~209.3	143.3~213.8	146.3~218.1
39	134.0~208.0	140.3~212.3	143.4~215.7	146.5~219.3	149.7~223.6	152.9~228.5	156.2~233.7
40	143.2~222.4	146.5~227.0	153.5~230.9	157.0~235.5	160.6~242.2	164.2~244.1	167.8~251.4
41	154.1~240.7	161.7~243.4	165.5~251.4	169.5~254.1	173.5~260.5	177.6~266.0	186.1~270.3
42	167.2~260.5	175.7~268.2	175.7~270.9	184.6~279.8	189.2~283.1	193.9~290.4	198.7~296.2
43	187.9~287.7	188.3~294.4	198.2~302.0	198.6~306.9	208.9~315.5	214.5~322.8	220.2~328.6
44	204.1~320.9	210.1~328.6	221.5~340.8	222.5~343.5	234.6~359.4	235.5~364.3	248.3~378.5
45	232.0~365.5	233.5~378.3	247.0~388.2	254.9~401.7	263.0~413.9	278.0~423.0	279.9~439.5
46	264.8~439.5	281.2~446.2	284.0~471.2	294.0~476.1	312.1~498.1	315.0~515.2	334.2~526.2
47	315.6~555.5	336.9~556.7	341.4~586.6	355.0~618.9	378.6~623.8	393.4~652.5	398.4~687.9
48	402.3~724.5	432.2~763.6	440.6~804.5	448.7~847.5	482.4~886.5	518.3~892.6	542.6~941.5
49	550.1~1174.6	583.8~1245.4	620.5~1282.0	660.6~1410.2	705.0~1509.0	754.6~1614.0	810.8~1750.7

表 C.1 97 孔定量盘法 MPN 表对应 95%置信区间（续）

单位为最大可能数每一百毫升（MPN/100 mL）

大孔阳 性格数	小孔阳性格数						
	42	43	44	45	46	47	48
0	33.3~54.7	34.1~56.1	34.9~57.1	35.7~58.1	37.5~59.5	38.3~60.7	39.2~61.6
1	34.5~56.6	35.3~58.0	36.1~58.9	37.0~60.1	38.7~61.3	39.6~62.5	40.5~63.6
2	35.7~58.6	36.5~59.7	37.4~60.8	38.2~61.8	40.0~63.0	40.9~64.2	41.8~65.4
3	36.9~60.2	37.8~61.5	38.6~62.6	40.5~63.8	41.4~65.0	42.2~66.1	43.1~67.3
4	38.2~62.5	40.0~63.5	40.9~64.7	41.8~66.0	42.7~67.3	43.6~68.4	44.5~69.4
5	39.5~64.2	41.4~65.4	42.3~66.6	43.2~67.8	44.1~69.0	45.0~70.4	45.9~71.7
6	40.8~66.1	42.8~67.5	43.7~68.7	44.6~69.8	45.5~71.0	46.5~72.4	47.4~73.7
7	43.3~68.5	44.2~69.7	45.1~70.8	46.1~72.2	47.0~73.4	48.0~74.4	48.9~75.9
8	44.7~70.4	45.7~71.7	46.6~73.0	47.6~74.3	48.5~75.7	49.5~77.0	50.5~77.9
9	46.2~72.5	47.2~74.0	48.2~75.4	49.1~76.4	51.4~77.8	51.1~79.3	53.4~80.6
10	47.8~75.0	48.8~76.3	49.8~77.6	50.7~79.2	53.0~80.0	54.0~81.4	55.1~83.2
11	49.4~77.6	50.4~78.6	51.4~80.0	52.4~81.4	54.7~83.0	55.8~83.7	56.8~85.3
12	51.0~79.5	52.1~81.4	53.1~82.7	54.1~83.7	56.5~85.3	57.6~86.9	58.6~87.7
13	52.8~82.3	53.8~83.4	54.9~85.3	55.9~86.7	58.4~87.4	59.4~89.5	60.5~90.8
14	54.5~85.3	55.6~86.3	56.7~87.4	59.2~89.5	60.3~90.7	61.4~91.6	62.5~93.8
15	56.4~87.3	58.9~89.5	60.0~90.5	61.1~91.6	62.3~93.8	63.4~94.6	64.5~96.1
16	58.3~90.3	60.9~91.6	62.0~93.8	63.2~94.6	64.3~96.1	65.5~98.4	66.6~98.9
17	60.3~93.9	62.9~94.6	64.1~96.1	65.3~98.6	66.5~99.0	67.7~101.0	68.8~102.5
18	63.9~96.1	65.1~98.6	66.3~99.2	67.5~101.0	68.7~102.8	69.9~103.8	71.1~106.2
19	66.1~99.5	67.3~101.0	68.6~103.3	69.8~103.9	71.0~106.2	72.3~107.6	73.5~109.1
20	68.4~103.3	69.7~104.4	70.9~106.2	72.2~108.0	73.5~109.1	74.8~111.4	76.1~112.8
21	70.8~106.2	72.1~108.3	73.4~109.4	74.7~111.8	76.0~112.9	79.2~114.9	78.7~116.4
22	73.4~110.0	74.7~111.8	76.0~113.8	77.4~115.1	78.7~117.3	82.0~118.7	83.4~120.4
23	76.0~114.0	77.4~115.4	78.8~117.5	80.2~119.2	81.6~121.2	83.0~123.1	86.4~124.7
24	78.8~118.0	80.2~120.1	81.7~121.8	83.1~123.4	86.6~125.1	86.0~127.3	89.6~128.9

表 C.1 97 孔定量盘法 MPN 表对应 95%置信区间（续）

单位为最大可能数每一百毫升（MPN/100 mL）

大孔阳 性格数	小孔阳性格数						
	42	43	44	45	46	47	48
25	81.8~121.9	83.2~124.2	84.7~126.0	86.2~128.0	89.8~130.2	91.3~132.1	92.9~133.7
26	84.9~127.1	86.4~128.9	90.1~130.6	89.5~132.4	93.2~135.0	94.8~137.0	96.4~138.7
27	88.2~132.0	89.8~133.7	91.4~135.3	95.2~137.8	94.6~140.1	98.5~142.1	100.2~144.2
28	91.7~137.0	95.6~138.7	95.0~140.7	99.0~143.0	98.4~145.4	102.5~147.9	104.2~149.8
29	95.5~142.2	99.6~144.2	99.0~146.3	103.1~148.9	104.9~151.7	106.7~153.5	108.6~155.9
30	99.6~148.2	101.4~150.3	105.7~152.6	107.5~155.5	109.4~157.6	111.3~159.8	113.2~162.7
31	103.9~154.7	105.8~156.6	110.3~159.8	112.3~162.4	114.3~163.9	116.3~167.8	118.3~168.8
32	111.3~161.3	113.3~163.7	115.4~167.2	117.4~168.3	119.5~172.4	121.7~174.4	123.8~177.0
33	113.8~168.3	118.7~172.4	120.9~174.4	123.1~177.0	125.3~180.8	127.5~182.1	129.8~186.4
34	119.4~177.0	124.6~180.8	126.9~182.1	129.3~187.0	131.6~188.5	134.0~192.5	136.5~194.9
35	125.7~187.3	128.1~190.0	130.5~192.8	136.1~195.8	138.7~198.9	141.3~202.9	143.9~205.9
36	135.8~197.7	138.4~200.4	141.1~203.5	143.8~206.2	146.6~210.2	149.4~213.8	152.2~217.5
37	140.4~209.3	146.7~212.3	149.6~215.7	152.5~219.3	155.5~222.7	158.5~227.0	161.6~229.7
38	149.3~221.8	152.3~226.4	159.2~229.7	162.4~234.0	165.7~238.0	169.1~243.1	172.4~245.9
39	159.5~236.1	166.9~242.5	170.4~245.0	174.0~251.4	177.6~254.1	181.3~260.5	185.1~264.5
40	175.7~254.1	175.4~260.5	183.6~264.5	187.6~270.3	191.7~274.9	195.9~281.0	200.2~285.6
41	186.0~277.9	194.9~282.2	194.7~290.1	204.0~294.4	208.7~302.0	213.5~306.9	218.4~314.5
42	208.6~303.3	208.7~310.9	219.0~315.5	219.1~325.8	229.8~328.6	235.4~340.8	241.2~343.5
43	226.0~340.8	232.0~343.5	238.1~356.3	244.4~360.0	256.8~372.4	263.5~378.5	270.3~388.2
44	255.4~382.7	262.7~398.6	270.2~401.7	277.8~418.7	285.7~423.0	293.7~439.5	301.8~446.2
45	295.7~446.2	297.6~467.0	314.4~472.5	316.2~495.6	334.0~498.7	344.1~524.9	354.5~526.2
46	337.2~555.5	357.6~556.7	369.8~586.6	382.3~600.6	404.9~618.9	408.4~648.2	422.0~652.5
47	424.6~700.1	441.1~724.5	458.1~763.6	487.8~786.4	494.2~804.8	513.2~847.5	546.6~886.5
48	553.4~993.9	579.7~1048.9	623.9~1108.7	654.5~1153.8	705.0~1174.6	703.6~1245.4	740.6~1323.5
49	850.4~1896.6	924.9~2101.6	1016.2~ 2353.1	1167.7~ 2709.5	1222.0~ 3300.2	1630.4~ 4716.1	1439.5~ infinite

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污泥 粪大肠菌群的测定 酶底物法

T/GXAS 523—2023

广西标准化协会统一印制

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