



วัสดุภัณฑ์ เครื่องมือ และเคมีภัณฑ์

2.1 วัสดุภัณฑ์

ก๊าซไนโตรเจน บริษัท แหลมทอังก๊าซโปรดักต์ จำกัด, กรุงเทพมหานคร.

ก๊าซอาร์กอน บริษัท ไทยอินดัสเตรียลแก๊ส จำกัด, กรุงเทพมหานคร.

Millipore filter, 0.22  $\mu$ , 25 mm. บริษัท Millipore Corporation  
Bedford, Massachusetts, U.S.A.

Whatman Filter Paper No. 1 บริษัท Whatman, Ltd., England.

Whatman Chromatographic Paper 3 MM. บริษัท Whatman Ltd., England.

Micro - hematocrit capillary tubes บริษัท Fisher Scientific Co.,  
Pittsburgh, U.S.A.

Cellulose PEI flexible sheet 20 x 5 cm. บริษัท J.T. Baker Chemical  
Co., Philipsburg, N.J. West Germany.

Scintillation vial บริษัท Packard Instruments Co., U.S.A.

2.2 เครื่องมือ

Sartorius Analytical Balance, model 2355 บริษัท Sartorius Werke,  
Gottingen, Germany.

Autocal pH Meter, model PHM 83 Laboratory บริษัท Radiometer,  
Copenhagen, Denmark.

Rotatory evaporator บริษัท Buchi Laboratory Techniques,  
Switzerland.

Spectrophotometer, model Spectronic 20 บริษัท Bausch & Lomb,  
U.S.A.

Spectrophotometer, model Spectronic 2000 **ប្រិម័ត** Bausch & Lomb, U.S.A.

Beckman Refrigerated Centrifuge, model J. 21C **ប្រិម័ត** Beckman Instruments Inc., Fullerton, California, U.S.A.

Fermentation Equipment, model MD 500-10L **ប្រិម័ត** Marubishi Laboratory Equipment Co., Ltd. Japan.

Autoclave, model HA-3D **ប្រិម័ត** Hirayama Manufacturing Co., Tokyo, Japan.

Colony Counter, Model 3326 **ប្រិម័ត** American Optical Corporation, Buffalo, New York, U.S.A.

Water bath, model BKM 250 **ប្រិម័ត** Gallenkamp & Co., Ltd. London, England.

Shaking water bath **ប្រិម័ត** Heto Lab Equipment, Denmark,

Sonicator, model W 375 **ប្រិម័ត** Heat System - Ultrasonic Inc., New York, U.S.A.

Ultrarack Fraction Collector, model 2070 **ប្រិម័ត** LKB - Productor Ab. Stockholm 12, Sweden.

Pipetman **ប្រិម័ត** Gilson Medical Electronics, France.

Heated vacuum desicator **ប្រិម័ត** Precision Scientific Co., Chicago, U.S.A.

Hot air oven **ប្រិម័ត** Grundy Equipment Ltd., Cowley Peachey, Middx, England.

Fisher - Johns Melting Point Apparatus **ប្រិម័ត** Fisher Scientific Co., U.S.A.

Liquid Scintillation Counter **ប្រិម័ត** Packard Instrument Co., U.S.A.

Forma Bio - Freezer บริษัท Forma Scientific, Marietta, Ohio,  
U.S.A.

Freeze Dryer, model 10-145-MR-BA บริษัท Virtis Company Inc.,  
Gardiner N.Y., U.S.A.

### 2.3 เคมีภัณฑ์

L - Alanine, L-Methionine, L-Valine, L-Leucine, L-Phenylalanine,  
L-Asparagine, Dihydroxyacetone, Hydrazine hydrate, 2,4,5-Triamino-6-  
hydroxypyrimidine sulfate, Ferric ammonium citrate, BSA (bovine serum  
albumin, A-grade, crystallized), PPO (2,5-diphenyloxazole) (scintilla-  
tion grade), Dimethyl-POPOP (1,4-bis-2-(4-methyl-5- phenyloxazolyl)  
-benzene) (scintillation grade) บริษัท Sigma Chemical Company, St.  
Louis, U.S.A.

p - Acetaminobenzenesulfonyl chloride (grade puriss), Pyrophos-  
phoric acid, Tris(hydroxymethyl)aminomethane (grade puriss), Sulfa-  
nilamide (grade puriss), Di-potassium hydrogenphosphate (purum),  
Ammonium sulfamate (purum), Sodium carbonate (purum), Ethoxyethanol  
(purum) บริษัท Fluka AG, Buchs, Switzerland.

Glycine (chromatographically homogeneous), L-Tyrosine  
(Chromatographically homogeneous), Diethyl ether (AR), Ethylene  
glycol (extrapure), Sodium dithionite, Activated charcoal, Cupric  
sulfate, Magnesium sulfate (AR), 2-Mercaptoethanol, Sodium-potassium  
tartate, N-(1-naphthyl) ethylenediamine dihydrochloride บริษัท  
BDH Chemical Ltd. Poole, England.

Ammonium sulfate (AR), Hydrochloric acid (AR), Sodium hydroxide  
(AR), Silver nitrate บริษัท J.T. Baker Chemical B.V. Deventor, Holland.

Potassium di-hydrogen phosphate, Sodium nitrite, Boric Acid, Magnesium chloride บริษัท May & Baker Ltd., Bagenham, England.

*p*-Aminobenzoic acid (AR), Naphthalene (scintillation grade), DMSO- $d_6$  (dimethylsulfoxide - $d_6$ , for NMR - spectroscopy) E. Merck, Damstadt, Germany.

Ammonium hydroxide, Sodium chloride บริษัท Mallinckrodt Inc., Kentucky, U.S.A.

Trichloroacetic acid บริษัท Riedel-DeHaën AG, Germany.

Toluene บริษัท Ajax Chemical, Sydney, Australia.

Agar, Tryptone บริษัท Difco Laboratories, Detroit, Michigan, U.S.A.

Yeast extract บริษัท BBL, Cockeyville, Maryland, U.S.A.

*p*-Aminobenzoic-7- $^{14}C$ -acid (0.1 mCi/ $1.73 \times 10^{-2}$  mmole)  
New England Newclear, Boston, Massachusetts, U.S.A.

Absolute ethanol องค์การเภสัชกรรม, กรุงเทพมหานคร.

#### 2.4 จุลชีพที่ใช้ในการทดลอง

*Escherichia coli* strain K12 ATCC 3110