DMSO

10.5°C

VM
210 $p_o$ + 10% DMSO

25

$A_{sy} =$ 0.00411 fCi/cell / 0.577 fCi/cell

1 pCi
0.037 Bq
1 fCi = 0.037 mBq
~~0.00037 Bq~~

$A_0 = 0.13$ mBq/cell (historical)

$= 0.13 \frac{\text{~~pCi~~ mBq}}{\text{cell}} \left(\frac{1 \text{ fCi}}{0.037 \text{ mBq}}\right) = 3.5 \frac{\text{fCi}}{\text{cell}}$

6.1

$\frac{89}{17} = 5.2$

0.1 0.2 µCi/ml 0.5
0.01 0.4 µCi/ml 0.3
0.001 0.6 µCi/ml 0.1

0.2
0.35
0.5 µCi/ml

V79 $^{210}Po$ vs 10% DMSO

1/13/99

| Expt # | 10% DMSO Ao (mBq/cell) | n | 0% DMSO Ao (mBq/cell) | n | DMF |
|---|---|---|---|---|---|
| 2 | ~~0.0288~~ 0.0218 | ~~0.279~~ 1 | ~~0.0190~~ ~~0.0189~~ 0.0243 | ~~2.24~~ 1 | ~~0.897~~ 0.90 |
| ~~2~~ | ~~0.0118~~ ~~5.71~~ | | | | |
| 3 | 0.0193 | 1 | 0.0191 | 1 | 1.01 |

0.95 ± 0.07

# V79 COLONY FORMING ASSAY

**Experiment Name :** $^{210}$Po-citrate + 10%DMSO ; **Exp. # :** 3; **Investigator:** A. Bishayee

**Date:** 10/23/98

1. Set the rocker-roller at 37°C incubator, set the Coulter Counter, wash cells (from 75 cm$^2$ flask, subcultured 1:2, 24h before) with PBS, trypsinize cells, resuspend in 7 ml MEMB, pass five times through 3 cc syringe with 21 gauge needle, perform cell count by transfering 100 ul in Coulter cup containing 20 ml isotone (Coulter balanced electrolyte solution)
2. Dilute to ~400,000 cells/ml in MEMB (final volume 11 ml) [Actual count : 495,866 cells/ml)
3. Transfer 1 ml of cell suspension into ten 12 ml tubes (Falcon plastic test tube, 17x100 mm) labeled 1-10 both on cap and wall
4. Roll the tubes for 3-4 h at 37°C, 5% $CO_2$ **Date/Time:** 10/23/98; 4-00 p.m.
5. Calibrate the stock $^{210}$Po-citrate for today (6.23μCi/ml on 10/16/98)
6. After 3-4 h, remove test tubes from roller and add according to Table below.

**Date/Time:** 10/23/98 ; 5-30 p.m.

| Tube # | $^{210}$Po-citrate uCi/ml | Cells in MEMB (ml) | MEMB (ul) | Po-citrate (6.23 uCi/ml) (ul) | 10 % DMSO in MEMA (ml) | MEMA (ml) |
|---|---|---|---|---|---|---|
| 1 | 0 | 1.0 | 1000 | 0 | 2 | 0 |
| 2 | 0 | 1.0 | 1000 | 0 | 2 | 0 |
| 3 | 0.2 | 1.0 | 935 | 65 | 2 | 0 |
| 4 | 0.35 | 1.0 | 885 | 115 | 2 | 0 |
| 5 | 0.5 | 1.0 | 840 | 160 | 2 | 0 |
| 6 | 0 | 1.0 | 1000 | 0 | 0 | 2 |
| 7 | 0 | 1.0 | 1000 | 0 | 0 | 2 |
| 8 | 0.2 | 1.0 | 935 | 65 | 0 | 2 |
| 9 | 0.35 | 1.0 | 885 | 115 | 0 | 2 |
| 10 | 0.5 | 1.0 | 840 | 160 | 0 | 2 |

7. Return test tubes to roller for 30 min. **Date/Time:** 10/23/98; 6-00 p.m.
8. After 30 min, centrifuge tubes for 10 min at 2000 rpm, 4°C **Date/Time:** 10/23/98; 6-30 p.m.
9. During the centrifugation move roller to 10.5°C
10. Collect 150 ul supernatant in separate tubes

11. Add 8 ml of wash MEMA in each tube containing the pallet
12. Centrifuge tubes for 10 min at 2000 rpm, 4°C
13. Decant supernatant, click tubes, vortex, resuspend in 10 ml wash MEMA
14. Centrifuge tubes for 10 min at 2000 rpm, 4°C
15. Decant supernatant, click tubes, vortex, resuspend in 10 ml wash MEMA
16. Centrifuge tubes for 10 min at 2000 rpm, 4°C
17. Decant the supernatant, click tubes, vortex add 2 ml of MEMA with or without 10% DMSO as per Table
18. Transfer tubes at 10°C for 72 h. **Date/Time:** 10/23/98; 8-00 p.m.
19. Transfer 30 ul of supernatant in triplicate from step 10 into 20 ml scintillation vial containing 6 ml cocktail (Aquasol) and count for radioactivity **Date/Time:** 10/27/98; 11-00 a.m.
19. After 72 h, add 8 ml wash MEMA in each tube, vortex and centrifuge the tubes for 10 min at 2000 rpm, 4°C ***(precooled centrifuge)*** **Date/Time:** 10/26/98; 4-00 p.m.
20. Labeling and preparation of dilution tubes and colony dishes
    - load 60 mm petri dishes with 4 ml MEMA
    - load 30 test tubes with 4.5 ml MEMA and label them 1.2, 1.3, 1.4, 1.5; 2.2, 2.3, 2.4, 2.5; X.2, X.3, X.4, X.5 etc.
21. Decant supernatant, click tubes, vortex, resuspend in 10 ml wash MEMA
22. Centrifuge tubes for 10 min at 2000 rpm, 4°C
23. Decant supernatant, click tubes, vortex, resuspend in 10 ml wash MEMA
24. Centrifuge tubes for 10 min at 2000 rpm, 4°C
25. Decant supernatant, click tubes, vortex, resuspend in 2 ml wash MEMA, pass five times through 3 cc syringe with 21 gauge needle
26. Determine cell concentration by transfering 100 µl to Coulter cup
27. Vortex tube, transfer 0.5 ml into X.4, vortex tube X.4 and transfer 0.5 ml to tube X.3 and vortex tube X.3 and transfer 0.5 ml to tube X.2. Keep tubes on ice.
28. Transfer 1 ml from dilution tubes into dishes labeled X.2, X.3, X.4 (in triplicate). Only X.2 should be seeded for control T-tubes.
29. Transfer 500 µl of cell suspension (in duplicate) to 20 ml scintillation vial containing 6 ml

cocktail (Aquasol)

30. Incubate petridishes for 1 week
31. Count vials for radioactivity **Date/Time :** 10/27/98; 11-00 a.m.
32. After 1 week, wash colonies 3 times with normal (1X) saline,and 2 times with methanol. Stain colonies with 0.0 5% crystal violet
33. Count colonies. There must be between 25 and 250 colonies for the dish to be a valid data point.

10/23/98

Initial cell count = 6810, 6993, 6993

Avg. Cell count = 6932

cell conc. = 2772800 Cells/ml

For dilusion,

Vol. required = $\frac{4400000}{2772800}$

= 1.58

Take 1.6 ml Cells + 9.4 ml MEMB = 11 ml

After dilusion,

Final cell count

~~Cell conc~~ = 1287, 1246, 1186

Cell Conc = 495,866 Cells/ml

$^{210}Po$ + 10% DMSO ; Expt #3



USER: 5 ID:PO-210 PRESET TIME: 1.00 TUE 27 OCT 1998 11:12
SAMPLE REPEAT: 1 CYCLE REPEAT: 1 SCR:N RS232:N
H#: 4 AQC:N QCF:N RCM:N
CHANNEL 1-LL:600 UL: 900 2SIGMA: 2.00 BKG SUB: 0.00 BKG 2SIG: 0.00 LSR: 0
DATA CALC: CPM, UNKNOWN REPLICATES: 1 NORM FACTOR:@ 1.00000
HALF LIFE(DAYS):N

| SAM | POS | CH | | CPM | 2SIG% | TIME | EL TIME | AVG H# | ERR |
|---|---|---|---|---|---|---|---|---|---|
| 1 | **- 1 | 1 | | 8.00 | 70.71 | 1.00 | 1.55 | 57.0 | |
| 2 | **- 2 | 1 | 1M | 8.00 | 70.71 | 1.00 | 3.23 | 58.0 | |
| 3 | **- 3 | 1 | | 9.00 | 66.67 | 1.00 | 4.97 | 58.0 | |
| 4 | **- 4 | 1 | | 8.00 | 70.71 | 1.00 | 6.75 | 58.0 | |
| 5 | **- 5 | 1 | 2M | 10.00 | 63.25 | 1.00 | 8.63 | 58.0 | |
| 6 | **- 6 | 1 | | 7.00 | 75.59 | 1.00 | 10.37 | 58.0 | |
| 7 | **- 7 | 1 | | 16400.00 | 1.95 | 0.64 | 11.93 | 55.0 | |
| 8 | **- 8 | 1 | 3M | 15815.38 | 1.97 | 0.65 | 13.25 | 55.0 | |
| 9 | **- 9 | 1 | | 14745.71 | 1.97 | 0.70 | 14.63 | 58.0 | |
| 10 | **-10 | 1 | | 26444.71 | 1.89 | 0.43 | 15.78 | 64.0 | |
| 11 | **-11 | 1 | 4M | 25675.00 | 1.97 | 0.40 | 16.94 | 58.0 | |
| 12 | **-12 | 1 | | 29243.84 | 1.94 | 0.36 | 18.13 | 67.0 | |
| 13 | **- 1 | 1 | | 36346.66 | 1.92 | 0.30 | 19.16 | 55.0 | |
| 14 | **- 2 | 1 | 5M | 37509.09 | 1.97 | 0.28 | 20.30 | 55.0 | |
| 15 | **- 3 | 1 | | 36140.00 | 1.92 | 0.30 | 21.27 | 59.0 | |
| 16 | **- 4 | 1 | | 3.00 | 115.5 | 1.00 | 23.09 | 57.0 | |
| 17 | **- 5 | 1 | 6M | 7.00 | 75.59 | 1.00 | 24.92 | 59.0 | |
| 18 | **- 6 | 1 | | 4.00 | 100.0 | 1.00 | 26.85 | 57.0 | |
| 19 | **- 7 | 1 | | 13.00 | 55.47 | 1.00 | 28.72 | 57.0 | |
| 20 | **- 8 | 1 | 7M | 14.00 | 53.45 | 1.00 | 30.45 | 57.0 | |
| 21 | **- 9 | 1 | | 7.00 | 75.59 | 1.00 | 32.23 | 60.0 | |
| 22 | **-10 | 1 | | 14129.33 | 1.94 | 0.75 | 33.77 | 55.0 | |
| 23 | **-11 | 1 | 8M | 13345.81 | 1.97 | 0.77 | 35.27 | 55.0 | |
| 24 | **-12 | 1 | | 13977.33 | 1.95 | 0.75 | 36.78 | 58.0 | |
| 25 | **- 1 | 1 | | 24573.33 | 1.90 | 0.45 | 38.27 | 55.0 | |
| 26 | **- 2 | 1 | 9M | 30365.71 | 1.94 | 0.35 | 39.39 | 58.0 | |
| 27 | **- 3 | 1 | | 26240.00 | 1.89 | 0.43 | 40.54 | 57.0 | |
| 28 | **- 4 | 1 | | 36661.82 | 1.99 | 0.28 | 41.52 | 57.0 | |
| 29 | **- 5 | 1 | | 35673.84 | 1.86 | 0.33 | 42.57 | 55.0 | |
| 30 | **- 6 | 1 | 10M | 37463.33 | 1.89 | 0.30 | 43.53 | 55.0 | |
| 31 | **- 7 | 1 | | 3.00 | 115.5 | 1.00 | 45.31 | 104.0 | |
| 32 | **- 8 | 1 | 1C | 6.00 | 81.65 | 1.00 | 47.13 | 102.0 | |
| 33 | **- 9 | 1 | | 9.00 | 66.67 | 1.00 | 49.02 | 106.0 | |
| 34 | **-10 | 1 | 2C | 7.00 | 75.59 | 1.00 | 50.75 | 102.0 | |
| 35 | **-11 | 1 | | 437.00 | 9.57 | 1.00 | 52.68 | 104.0 | |
| 36 | **-12 | 1 | 3C | 471.00 | 9.22 | 1.00 | 54.36 | 103.0 | |
| 37 | **- 1 | 1 | | 532.00 | 8.67 | 1.00 | 56.14 | 104.0 | |
| 38 | **- 2 | 1 | 4C | 494.00 | 9.00 | 1.00 | 57.87 | 104.0 | |
| 39 | **- 3 | 1 | | 884.00 | 6.73 | 1.00 | 59.75 | 109.0 | |
| 40 | **- 4 | 1 | 5C | 851.00 | 6.86 | 1.00 | 61.57 | 104.0 | |
| 41 | **- 5 | 1 | | 10.00 | 63.25 | 1.00 | 63.50 | 106.0 | |
| 42 | **- 6 | 1 | 6C | 6.00 | 81.65 | 1.00 | 65.37 | 63.0 | |
| 43 | **- 7 | 1 | | 5.00 | 89.44 | 1.00 | 67.09 | 108.0 | |
| 44 | **- 8 | 1 | 7C | 5.00 | 89.44 | 1.00 | 68.77 | 103.0 | |
| 45 | **- 9 | 1 | | 459.00 | 9.34 | 1.00 | 70.44 | 105.0 | |
| 46 | **-10 | 1 | 8C | 447.00 | 9.46 | 1.00 | 72.23 | 102.0 | |

30 µl medium

500 µl cells

| SAM | POS | CH | | CPM | 2SIG% | TIME | EL TIME | AVG H# | ERR |
|---|---|---|---|---|---|---|---|---|---|
| 47 | **-11 | 1 | qc | 760.00 | 7.25 | 1.00 | 74.01 | 103.0 | |
| 48 | **-12 | 1 | qc | 809.00 | 7.03 | 1.00 | 75.70 | 104.0 | |
| 49 | **- 1 | 1 | w/ | 1190.00 | 5.80 | 1.00 | 77.44 | 106.0 | |
| 50 | **- 2 | 1 | w/ | 1216.00 | 5.74 | 1.00 | 79.28 | 116.0 | |

**TABLE-1**

**Expt. # :** 3 **Date/Time :** 10/27/98; 11-15 a.m.

| Tube # | Medium count for 30 ul (cpm) | Avg. cpm | dpm [cpm/1] | µCi/ml ($A_t$) on counting [dpm/66600] | µCi/ml ($A_o$) on addition [$A_t/e^{-\lambda t}$] |
|---|---|---|---|---|---|
| 1 | See the | | | | |
| 2 | attached | | | | |
| 3 | Sheet | 15653 | 15653 | 0·2350 | |
| 4 | | 27121 | 27121 | 0·4072 | |
| 5 | | 36665 | 36665 | 0·5505 | |
| 6 | | | | | |
| 7 | | | | | |
| 8 | | 13817 | 13817 | 0·2074 | |
| 9 | | 27059 | 27059 | 0·4062 | |
| 10 | | 36599 | 36599 | 0·5495 | |

**TABLE-2**

**Expt. # :** 3 **Date/Time :** 10/27/98; 11-15 a.m

| Tube # | Radioactivity for 500 ul cell suspension (cpm) | Avg. cpm | dpm [cpm/1] | μ Ci/ml ($A_t$) on counting [dpm/111x$10^4$] | μ Ci/ml ($A_o$) after 12 h incubation [$A_t/e^{-\lambda t}$] |
|---|---|---|---|---|---|
| 1 | ~~Sto~~ See | | | | |
| 2 | the attached | | | | |
| 3 | Sheet | 454 | 454 | 0.000409 | |
| 4 | | 513 | 513 | 0.000462 | |
| 5 | | 868 | 868 | 0.000781 | |
| 6 | | | | | |
| 7 | | | | | |
| 8 | | 453 | 453 | 0.000408 | |
| 9 | | 784 | 784 | 0.000706 | |
| 10 | | 1203 | 1203 | 0.00108 | |

**TABLE-3**

**Expt. # :** 3 **Date/Time :** 10/26/98; 2-30 p.m.

| Tube # | Coulter count for 100 ul cell suspension | Avg. count | Cells/ml [Avg. count x 400] | fCi/cell [uCi/ml x $10^9$ Cells/ml] |
|---|---|---|---|---|
| 1 | 736, 739, 682 | 719 | 287600 | – |
| 2 | 706, 741, 744 | 730 | 292133 | – |
| 3 | 798, 771, 767 | 778 | 311466 | ~~0.0~~ 1.313 |
| 4 | 775, 785, 798 | 786 | 314400 | 1.469 |
| 5 | ~~669~~, 791, 773, 759 | 774 | 309733 | 2.521 |
| 6 | 899, 892, 902 | 897 | 359066 | – |
| 7 | 654, 648, 633 | 645 | 258000 | – |
| 8 | 907, 948, 928 | 927 | 371066 | 1.099 |
| 9 | 982, 992, 989 | 987 | 395066 | 1.787 |
| 10 | 991, 961, 961 | 971 | 388400 | 2.780 |

~~2.045~~
~~0.02~~
~~.001~~

1069

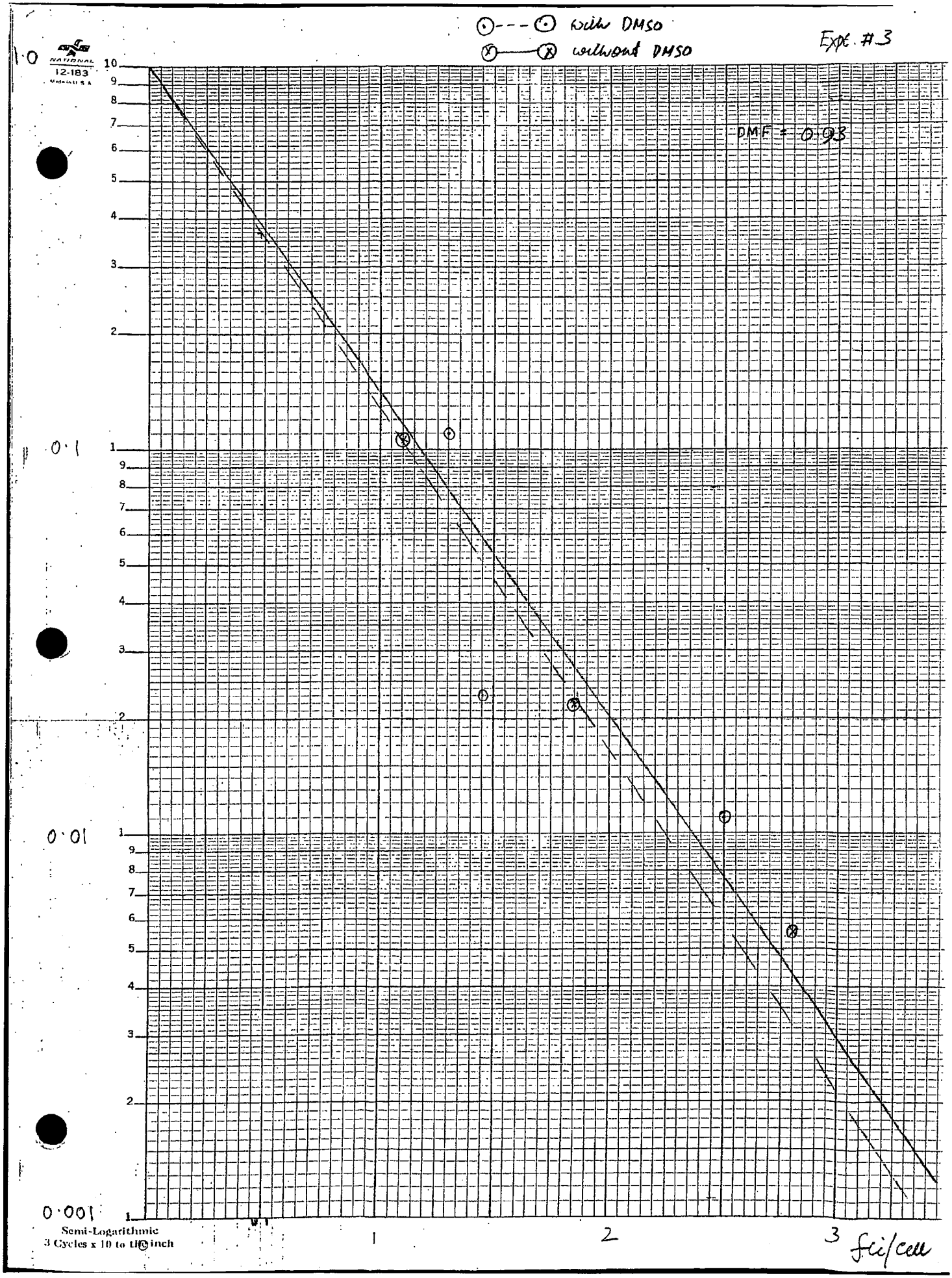
1012

1708

**TABLE-4**

**Expt # :** 3 **Date :** 11/02/98

| Tube.dilution | Colony 1 | Colony 2 | Colony 3 | Avg Colony for x.2 | SF |
|---|---|---|---|---|---|
| 1·2 | 110 | 102 | 101 | } 100·16 | — |
| 2·2 | 103 | 90 | 95 | } | — |
| 3·3 | 121 | 117 | 107 | 11·5 | 0·1148 |
| 4·3 | 20 | 23 | 27 | 2·33 | 0·0232 |
| 5·4 | 107 | 123 | 118 | 1·16 | 0·0115 |
| 6·2 | 125 | 120 | 129 | } 113·5 | — |
| 7·2 | 100 | 115 | 92 | } | — |
| 8·3 | 131 | 126 | 116 | 12·43 | 0·1095 |
| 9·3 | 30 | 27 | 24 | 2·7 | 0·0237 |
| 10·4 | 68 | 64 | 59 | 0·63 | 0·0056 |


⊙---⊙ with DMSO
⊗——⊗ without DMSO
Expt. #3
DMF = 0.93
NATIONAL
12-183
10
9
8
7
6
5
4
3
2
1
0·1
0·01
0·001
1
2
3
fci/cell
Semi-Logarithmic
3 Cycles x 10 to the inch

## V79 COLONY FORMING ASSAY

**Experiment Name :** $^{210}$Po-citrate + 10%DMSO ; **Exp. #** : 2; **Investigator:** A. Bishayee
**Date:** 10/16/98

1. Set the rocker-roller at 37$^0$C incubator, set the Coulter Counter, wash cells (from 75 cm$^2$ flask, subcultured 1:2, 24h before) with PBS, trypsinize cells, resuspend in 7 ml MEMB, pass five times through 3 cc syringe with 21 gauge needle, perform cell count by transfering 100 ul in Coulter cup containing 20 ml isotone (Coulter balanced electrolyte solution)
2. Dilute to ~400,000 cells/ml in MEMB (final volume 11 ml) [Actual count : 451,200 cells/ml)
3. Transfer 1 ml of cell suspension into ten 12 ml tubes (Falcon plastic test tube, 17x100 mm) labeled 1-10 both on cap and wall
4. Roll the tubes for 3-4 h at 37°C, 5% $CO_2$ **Date/Time:** 10/16/98; 1-00 p.m.
5. Calibrate the stock $^{210}$Po-citrate for today (6.23 µCi/ml)
6. After 3-4 h, remove test tubes from roller and add according to Table below.

**Date/Time:** 10/16/98; 3-30 p.m.

| Tube # | $^{210}$Po-citrate uCi/ml | Cells in MEMB (ml) | MEMB (ul) | Po-citrate (6.23 uCi/ml) (ul) | 10 % DMSO in MEMA (ml) | MEMA (ml) |
|---|---|---|---|---|---|---|
| 1 | 0 | 1.0 | 1000 | 0 | 2 | 0 |
| 2 | 0 | 1.0 | 1000 | 0 | 2 | 0 |
| 3 | 0.2 | 1.0 | 935 | 65 | 2 | 0 |
| 4 | 0.35 | 1.0 | 885 | 115 | 2 | 0 |
| 5 | 0.5 | 1.0 | 840 | 160 | 2 | 0 |
| 6 | 0 | 1.0 | 1000 | 0 | 0 | 2 |
| 7 | 0 | 1.0 | 1000 | 0 | 0 | 2 |
| 8 | 0.2 | 1.0 | 935 | 65 | 0 | 2 |
| 9 | 0.35 | 1.0 | 885 | 115 | 0 | 2 |
| 10 | 0.5 | 1.0 | 840 | 160 | 0 | 2 |

7. Return test tubes to roller for 30 min. **Date/Time:** 10/16/98; 3-45 p.m.
8. After 30 min, centrifuge tubes for 10 min at 2000 rpm, 4°C **Date/Time:** 10/16/98; 4-17 p.m.
9. During the centrifugation move roller to 10.5°C
10. Collect 150 ul supernatant in separate tubes

11. Add 8 ml of wash MEMA in each tube containing the pallet
12. Centrifuge tubes for 10 min at 2000 rpm, 4°C
13. Decant supernatant, click tubes, vortex, resuspend in 10 ml wash MEMA
14. Centrifuge tubes for 10 min at 2000 rpm, 4°C
15. Decant supernatant, click tubes, vortex, resuspend in 10 ml wash MEMA
16. Centrifuge tubes for 10 min at 2000 rpm, 4°C
17. Decant the supernatant, click tubes, vortex add 2 ml of MEMA with or without 10% DMSO as per Table
18. Transfer tubes at 10°C for 72 h. **Date/Time:** 10/16/98; 5-30 p.m.
19. Transfer 30 ul of supernatant in triplicate from step 10 into 20 ml scintillation vial containing 6 ml cocktail (Aquasol) and count for radioactivity **Date/Time:** 10/19/98; 6-10 p.m.
19. After 72 h, add 8 ml wash MEMA in each tube, vortex and centrifuge the tubes for 10 min at 2000 rpm, 4°C ***(precooled centrifuge)*** **Date/Time:** 10/19/98; 1-00 p.m.
20. Labeling and preparation of dilution tubes and colony dishes
    - load 60 mm petri dishes with 4 ml MEMA
    - load 30 test tubes with 4.5 ml MEMA and label them 1.2, 1.3, 1.4, 1.5; 2.2, 2.3, 2.4, 2.5; X.2, X.3, X.4, X.5 etc.
21. Decant supernatant, click tubes, vortex, resuspend in 10 ml wash MEMA
22. Centrifuge tubes for 10 min at 2000 rpm, 4°C
23. Decant supernatant, click tubes, vortex, resuspend in 10 ml wash MEMA
24. Centrifuge tubes for 10 min at 2000 rpm, 4°C
25. Decant supernatant, click tubes, vortex, resuspend in 2 ml wash MEMA, pass five times through 3 cc syringe with 21 gauge needle
26. Determine cell concentration by transfering 100 µl to Coulter cup
27. Vortex tube, transfer 0.5 ml into X.4, vortex tube X.4 and transfer 0.5 ml to tube X.3 and vortex tube X.3 and transfer 0.5 ml to tube X.2. Keep tubes on ice.
28. Transfer 1 ml from dilution tubes into dishes labeled X.2, X.3, X.4 (in triplicate). Only X.2 should be seeded for control T-tubes.
29. Transfer 500 µl of cell suspension (in duplicate) to 20 ml scintillation vial containing 6 ml cocktail (Aquasol)
30. Incubate petridishes for 1 week
31. Count vials for radioactivity **Date/Time :** 10/19/98; 6-10 p.m.
32. After 1 week, wash colonies 3 times with normal (1X) saline,and 2 times with methanol. Stain colonies with 0.0 5% crystal violet
33. Count colonies. There must be between 25 and 250 colonies for the dish to be a valid data point.

10/16/98

NOTES

Initial cell count = 7726, 7812, 7748
Avg cell count = 7762
Cell conc. = 7762 x 400
= 3104800 cells/ml

For dilution,

Vol. required = $\frac{4400000}{3104800}$ = 1.41 ml

Take 1.5 ml cells + 9.5 ml MEMB = 11 ml.

After dilution,

Final cell count = 1125, 1112, 1147
Avg. cell count = 1128
cell conc. = 451,200 cells/ml

NOTES

10/16/98

Calibration

~~Preparation~~ of $^{210}$Po-citrate

$^{210}$Po-citrate Stock : on 9/21/98 = 7.07 μci/ml.

on 10/16/98 = ?

$t$ = 25 days.

$e^{-\lambda t} = e^{-\frac{0.693 \times 25}{138.4}} = 0.8823$

Stock on 10/16/98 = $7.07 \times 0.8823$ = 6.23 μci/ml.

210 Po + 10% DMSO Expt #2



USER: 5 ID:PO-210 PRESET TIME: 1.00 MON 19 OCT 1998 18:12
SAMPLE REPEAT: 1 CYCLE REPEAT: 1 SCR:N RS232:N
: 1 AQC:N QCF:N RCM:N 2 PHASE MONITOR:N
CHANNEL 1-LL:600 UL: 900 2SIGMA: 2.00 BKG SUB: 0.00 BKG 2SIG: 0.00 LSR: 0
DATA CALC: CPM, UNKNOWN REPLICATES: 1 NORM FACTOR:Q 1.00000
HALF LIFE(DAYS):N

| SAM | POS | CH | | CPM | 2SIG% | TIME | EL TIME | AVG H# | ERR |
|---|---|---|---|---|---|---|---|---|---|
| 1 | **- 1 | 1 | | 13.00 | 55.47 | 1.00 | 1.49 | 56.0 | |
| 2 | **- 2 | 1 | 1M | 13.00 | 55.47 | 1.00 | 3.14 | 58.0 | |
| 3 | **- 3 | 1 | | 10.00 | 63.25 | 1.00 | 4.78 | 57.0 | |
| 4 | **- 4 | 1 | | 7.00 | 75.59 | 1.00 | 6.42 | 57.0 | |
| 5 | **- 5 | 1 | 2M | 6.00 | 81.65 | 1.00 | 8.06 | 57.0 | |
| 6 | **- 6 | 1 | | 14.00 | 53.45 | 1.00 | 9.70 | 56.0 | |
| 7 | **- 7 | 1 | | 17173.33 | 1.97 | 0.60 | 10.93 | 56.0 | |
| 8 | **- 8 | 1 | 3M | 16768.33 | 1.99 | 0.60 | 12.16 | 51.0 | |
| 9 | **- 9 | 1 | | 17235.00 | 1.97 | 0.60 | 13.40 | 55.0 | |
| 10 | **-10 | 1 | | 28177.50 | 1.88 | 0.40 | 14.43 | 53.0 | |
| 11 | **-11 | 1 | 4M | 29568.57 | 1.97 | 0.35 | 15.40 | 54.0 | |
| 12 | **-12 | 1 | | 30991.43 | 1.92 | 0.35 | 16.38 | 53.0 | |
| 13 | **- 1 | 1 | | 35016.66 | 1.95 | 0.30 | 17.39 | 53.0 | |
| 14 | **- 2 | 1 | 5M | 40764.00 | 1.98 | 0.25 | 18.28 | 54.0 | |
| 15 | **- 3 | 1 | | 41388.00 | 1.97 | 0.25 | 19.14 | 53.0 | |
| 16 | **- 4 | 1 | | 6.00 | 81.65 | 1.00 | 20.78 | 55.0 | |
| 17 | **- 5 | 1 | 6M | 5.00 | 89.44 | 1.00 | 22.42 | 56.0 | |
| 18 | **- 6 | 1 | | 14.00 | 53.45 | 1.00 | 24.07 | 56.0 | |
| 19 | **- 7 | 1 | | 6.00 | 81.65 | 1.00 | 25.71 | 58.0 | |
| 20 | **- 8 | 1 | 7M | 13.00 | 55.47 | 1.00 | 27.36 | 57.0 | |
| 21 | **- 9 | 1 | | 5.00 | 89.44 | 1.00 | 28.99 | 58.0 | |
| 22 | **-10 | 1 | | 16121.54 | 1.95 | 0.65 | 30.28 | 56.0 | |
| 23 | **-11 | 1 | 8M | 17303.33 | 1.96 | 0.60 | 31.51 | 55.0 | |
| 24 | **-12 | 1 | | 16995.00 | 1.98 | 0.60 | 32.74 | 55.0 | |
| 25 | **- 1 | 1 | | 28184.00 | 1.95 | 0.38 | 33.89 | 55.0 | |
| 26 | **- 2 | 1 | | 31334.29 | 1.91 | 0.35 | 34.87 | 55.0 | |
| 27 | **- 3 | 1 | 9M | 28485.00 | 1.87 | 0.40 | 35.89 | 55.0 | |
| 28 | **- 4 | 1 | | 36230.00 | 1.92 | 0.30 | 36.81 | 55.0 | |
| 29 | **- 5 | 1 | | 41936.00 | 1.95 | 0.25 | 37.68 | 53.0 | |
| 30 | **- 6 | 1 | 10M | 43024.00 | 1.93 | 0.25 | 38.56 | 58.0 | |
| 31 | **- 7 | 1 | | 10.00 | 63.25 | 1.00 | 40.20 | 105.0 | |
| 32 | **- 8 | 1 | 1C | 5.00 | 89.44 | 1.00 | 41.85 | 103.0 | |
| 33 | **- 9 | 1 | | 8.00 | 70.71 | 1.00 | 43.48 | 104.0 | |
| 34 | **-10 | 1 | 2C | 11.00 | 60.30 | 1.00 | 45.13 | 102.0 | |
| 35 | **-11 | 1 | | 465.00 | 9.27 | 1.00 | 46.77 | 104.0 | |
| 36 | **-12 | 1 | 3C | 483.00 | 9.10 | 1.00 | 48.40 | 103.0 | |
| 37 | **- 1 | 1 | | 862.00 | 6.81 | 1.00 | 50.13 | 106.0 | |
| 38 | **- 2 | 1 | 4C | 890.00 | 6.70 | 1.00 | 51.78 | 104.0 | |
| 39 | **- 3 | 1 | | 1109.00 | 6.01 | 1.00 | 53.42 | 103.0 | |
| 40 | **- 4 | 1 | 5C | 1226.00 | 5.71 | 1.00 | 55.06 | 103.0 | |
| 41 | **- 5 | 1 | | 9.00 | 66.67 | 1.00 | 56.70 | 104.0 | |
| 42 | **- 6 | 1 | 6C | 10.00 | 63.25 | 1.00 | 58.34 | 105.0 | |
| 43 | **- 7 | 1 | | 10.00 | 63.25 | 1.00 | 59.98 | 103.0 | |
| 44 | **- 8 | 1 | 7C | 9.00 | 66.67 | 1.00 | 61.62 | 104.0 | |
| 45 | **- 9 | 1 | | 491.00 | 9.03 | 1.00 | 63.28 | 105.0 | |
| 46 | **-10 | 1 | 8C | 464.00 | 9.28 | 1.00 | 64.92 | 105.0 | |

30 µl median

500 µl cells



| SAM | POS | CH | | CPM | 2SIG% | TIME | EL TIME | AVG H# | ERR |
|---|---|---|---|---|---|---|---|---|---|
| 47 | **-11 | 1 | | 792.00 | 7.11 | 1.00 | 66.57 | 104.0 | |
| 48 | **-12 | 1 | 9C | 818.00 | 6.99 | 1.00 | 68.22 | 103.0 | |
| 49 | **- 1 | 1 | | 1168.00 | 5.85 | 1.00 | 69.93 | 103.0 | |
| 50 | **- 2 | 1 | 10C | 1227.00 | 5.71 | 1.00 | 71.57 | 104.0 | |

**TABLE-1**

**Expt. # :** 2 **Date/Time :** 10/19/98; 6-10 p.m.

| Tube # | Medium count for 30 ul (cpm) | Avg. cpm | dpm [cpm/1] | µCi/ml ($A_t$) on counting [dpm/66600] | µCi/ml ($A_o$) on addition [$A_t/e^{-\lambda t}$] |
|---|---|---|---|---|---|
| 1 | 13, 13, 10 | | | | |
| 2 | 7, 6, 14 | 17058·6 | 17058·6 | 0·2561 | |
| 3 | | 29579·1 | 29579·1 | 0·4441 | |
| 4 | | 39056 | 39056 | 0·5864 | |
| 5 | | | | | |
| 6 | | | | | |
| 7 | | 16806·6 | 16806·6 | 0·2523 | |
| 8 | | 32016 | 32016 | 0·4807 | |
| 9 | | 40396 | 40396 | 0·6065 | |
| 10 | | | | | |

**TABLE-2**

**Expt. # :** 2 **Date/Time :** 10/19/98; 6-00 p.m.

| Tube # | Radioactivity for 500 ul cell suspension (cpm) | Avg. cpm | dpm [cpm/1] | μCi/ml ($A_t$) on counting [dpm/111x$10^4$] | μCi/ml ($A_o$) after 12 h incubation [$A_t/e^{-\lambda t}$] |
|---|---|---|---|---|---|
| 1 | 10, 5 | | | | |
| 2 | 8, 11 | | | | |
| 3 | 465, 483 | 474 | 474 | 0·00042 | |
| 4 | 862, 890 | 876 | 876 | 0·00079 | |
| 5 | 1109, 1226 | 1167·5 | 1167·5 | 0·00105 | |
| 6 | 9, 10 | | | | |
| 7 | 10, 9 | | | | |
| 8 | 491, 464 | 477·5 | 477·5 | 0·00043 | |
| 9 | 792, 818 | 805 | 805 | 0·00072 | |
| 10 | 1168, 1227 | 1197·5 | 1197·5 | 0·00107 | |

**TABLE-3**

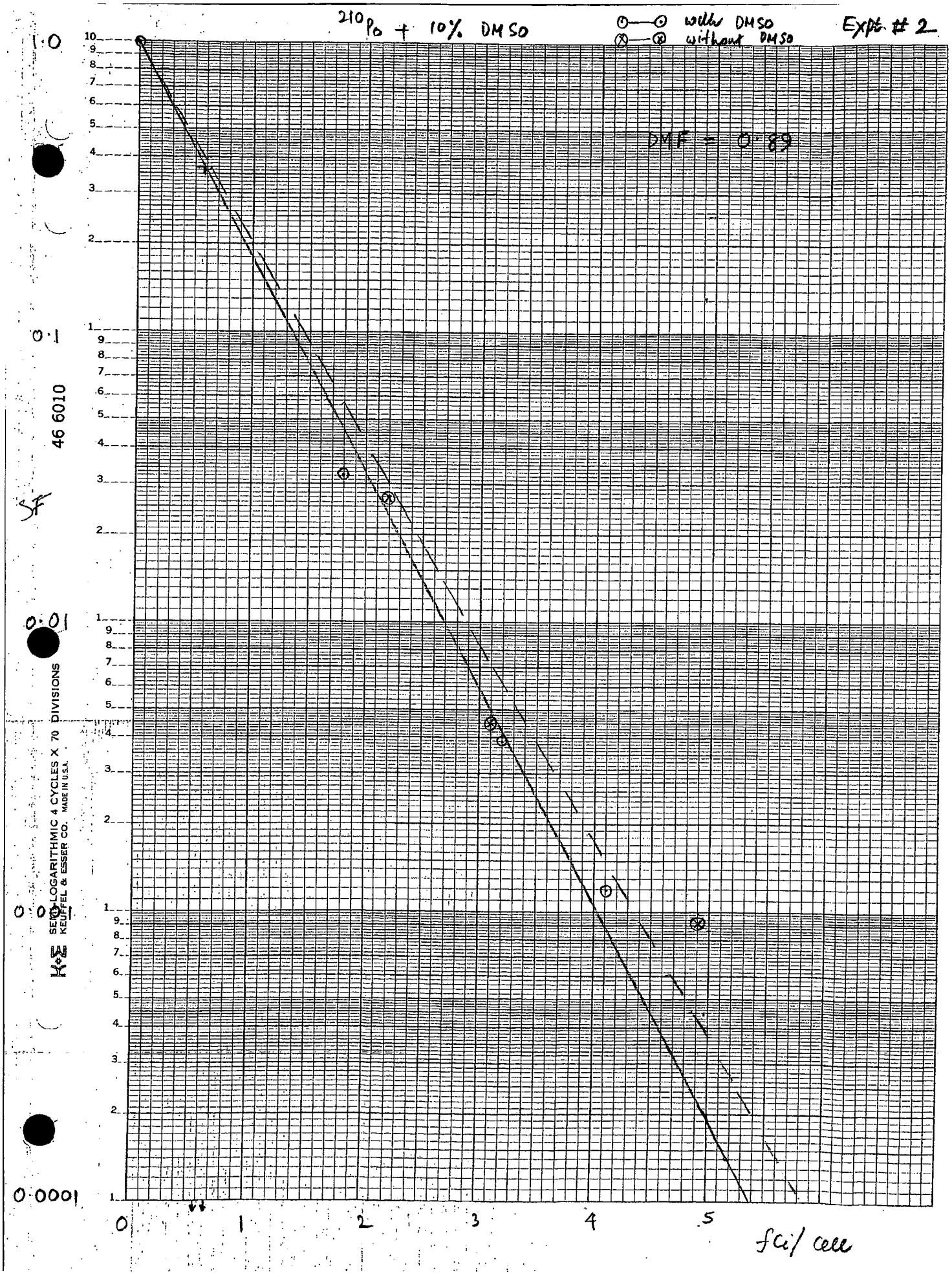
**Expt. # :** 2 **Date/Time :** 10/19/98; 2-00 pm.

| Tube # | Coulter count for 100 ul cell suspension | Avg. count | Cells/ml [Avg. count x 400] | fCi/cell [uCi/ml x $10^9$ / Cells/ml] |
|---|---|---|---|---|
| 1 | 587, 576, 569 | 577.3 | 230933 | — |
| 2 | 619, 666, 648 | 644.3 | 257733 | — |
| 3 | 595, ~~620~~, 576, 563 | 578 | 231200 | 1.816 |
| 4 | ~~657~~, ~~589~~, 619, 617, 605 | 613.6 | 245466 | 3.218 |
| 5 | 637, ~~684~~, 634, 648 | 639.6 | 255866 | 4.103 |
| 6 | 558, 548, 543 | 559.6 | 223866 | — |
| 7 | 591, 626, 597 | 604.6 | 241866 | — |
| 8 | 478, 482, 464 | 474.6 | 189866 | 2.264 |
| 9 | 563, 591, 558 | 570.6 | 229266 | 3.154 |
| 10 | 517, 548, 569 | 544.6 | 217866 | 4.911 |

**TABLE-4**

**Expt # :** 2 **Date :** 10/26/98

| Tube.dilution | Colony 1 | Colony 2 | Colony 3 | Avg Colony | SF |
|---|---|---|---|---|---|
| 1·2 | 175 | 157 | 153 | 174 | — |
| 2·2 | 188 | 179 | 192 | | — |
| 3·3 | 56 | 49 | 63 | 5·6 | 0·032 |
| 4·4 | 70 | 67 | 69 | 0·68 | 0·0039 |
| 5·4 | 20 | 25 | 21 | 0·22 | 0·0012 |
| 6·2 | 184 | 186 | 198 | 182·33 | — |
| 7·2 | 157 | 189 | 180 | | — |
| 8·3 | 50 | 49 | 52 | 50 | 0·027 |
| 9·4 | 80 | 89 | 79 | 0·82 | 0·0045 |
| 10·4 | 15 | 16 | 19 | 0·16 | 0·0009 |


210 Po + 10% DMSO
with DMSO
without DMSO
Expt. # 2
DMF = 0·89
1·0
0·1
0·01
0·001
0·0001
46 6010
SF
SEMI-LOGARITHMIC 4 CYCLES X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.
K+E
0
1
2
3
4
5
fCi/ cell

Added extra wash on foil cover was required

# V79 COLONY FORMING ASSAY

**Experiment Name :** $^{210}$Po-citrate + 10%DMSO ; **Exp. # :** 1; **Investigator:** A. Bishayee

**Date:** 10/09/98

1. Set the rocker-roller at 37°C incubator, set the Coulter Counter, wash cells (from 75 cm$^2$ flask, subcultured 1:2, 24h before) with PBS, trypsinize cells, resuspend in 7 ml MEMB, pass five times through 3 cc syringe with 21 gauge needle, perform cell count by transfering 100 ul in Coulter cup containing 20 ml isotone (Coulter balanced electrolyte solution)
2. Dilute to ~400,000 cells/ml in MEMB (final volume 11 ml) [Actual count : 396, 533 cells/ml)
3. Transfer 1 ml of cell suspension into ten 12 ml tubes (Falcon plastic test tube, 17x100 mm) labeled 1-10 both on cap and wall
4. Roll the tubes for 3-4 h at 37°C, 5% $CO_2$ **Date/Time:** 10/09/98; 2-00 p.m.
5. Prepare $^{210}$Po-citrate in MEMB (10 µCi/ml)
6. After 3-4 h, remove test tubes from roller and add according to Table below.

**Date/Time:** 10/09/98; 4-30 p.m.

| Tube # | $^{210}$Po-citrate uCi/ml | Cells in MEMB (ml) | MEMB (ul) | Po-citrate (10 uCi/ml) (ul) | 10 % DMSO in MEMA (ml) | MEMA (ml) |
|---|---|---|---|---|---|---|
| 1 | 0 | 1.0 | 1000 | 0 | 2 | 0 |
| 2 | 0 | 1.0 | 1000 | 0 | 2 | 0 |
| 3 | 0.2 | 1.0 | 960 | 40 | 2 | 0 |
| 4 | 0.35 | 1.0 | 930 | 70 | 2 | 0 |
| 5 | 0.5 | 1.0 | 900 | 100 | 2 | 0 |
| 6 | 0 | 1.0 | 1000 | 0 | 0 | 2 |
| 7 | 0 | 1.0 | 1000 | 0 | 0 | 2 |
| 8 | 0.2 | 1.0 | 960 | 40 | 0 | 2 |
| 9 | 0.35 | 1.0 | 930 | 70 | 0 | 2 |
| 10 | 0.5 | 1.0 | 900 | 100 | 0 | 2 |

65
115
160

7. Return test tubes to roller for 30 min. **Date/Time:** 4-50 p.m.
8. After 30 min, centrifuge tubes for 10 min at 2000 rpm, 4°C 5-20 p.m.
9. During the centrifugation move roller to 10.5°C
10. Collect 100 ul supernatant in separate tubes

150 µl

XL
- 1.2
- 2.2
- 3.2, 3.3
- 4.3, 4.4
- 5.3, 5.4

11. Add 8 ml of wash MEMA in each tube containing the pallet
12. Centrifuge tubes for 10 min at 2000 rpm, 4°C
13. Decant supernatant, click tubes, vortex, resuspend in 10 ml wash MEMA
14. Centrifuge tubes for 10 min at 2000 rpm, 4°C
15. Decant supernatant, click tubes, vortex, resuspend in 10 ml wash MEMA
16. Centrifuge tubes for 10 min at 2000 rpm, 4°C
17. Decant the supernatant, click tubes, vortex add 2 ml of ~~wash~~ MEMA with or without 10% DMSO (200 u. as per Table
18. Transfer tubes at 10°C for 72 h. **Date/Time:** 10/09/98; 7-00 p.m.
19. Transfer 30 ul of supernatant in triplicate from step 10 into 20 ml scintillation vial containing 6 ml cocktail (Aquasol) and count for radioactivity **Date/Time:** 10/09/98; 6-30 p.m.
19. After 72 h, add 8 ml wash MEMA in each tube, vortex and centrifuge the tubes for 10 min at 2000 rpm, 4°C ***(precooled centrifuge)***
20. Labeling and preparation of dilution tubes and colony dishes Date/Time: 10/12/98; 10-00 a.m.
    - load 69 60 mm petri dishes with 4 ml MEMA
    - load 36 T-tubes with 4.5 ml MEMA and label them 1.2, 1.3, 1.4, 1.5; 2.2, 2.3, 2.4, 2.5; X.2, X.3, X.4, X.5 etc.
28. Decant supernatant, click tubes, vortex, resuspend in 10 ml wash MEMA
29. Centrifuge tubes for 10 min at 2000 rpm, 4°C
30. Decant supernatant, click tubes, vortex, resuspend in 10 ml wash MEMA
31. Centrifuge tubes for 10 min at 2000 rpm, 4°C
32. Decant supernatant, click tubes, vortex, resuspend in 2 ml wash MEMA, pass five times through 3 cc syringe with 21 gauge needle
33. Determine cell concentration by transfering 100 µl to Coulter cup
34. Vortex tube, transfer 0.5 ml into X.4, vortex tube X.4 and transfer 0.5 ml to tube X.3 and vortex tube X.3 and transfer 0.5 ml to tube X.2. Keep tubes on ice.
35. Transfer 1 ml from dilution tubes into dishes labeled X.2, X.3, X.4 (in triplicate). Only X.2 should be seeded for control T-tubes.
36. Transfer 500 µl of cell suspension (in duplicate) to 20 ml scintillation vial containing 6 ml cocktail (Aquasol)
37. Incubate petridishes for 1 week
38. Count vials for radioactivity **Date/Time :**
39. After 1 week, wash colonies 3 times with normal (1X) saline,and 2 times with methanol. Stain colonies with 0.0 5% crystal violet
40. Count colonies. There must be between 25 and 250 colonies for the flask to be a valid data point.

10/09/98

Initial Cell count = 10709, 10709, 10436

Avg. cell count = 10618

Cell Conc. = $10618 \times 400 = 4247200$

For dilution,

Vol required = $\frac{4400000}{4247200} = 1.03$ ml

Take 1 ml cell suspension + 10 ml MEM$\beta$ = 11 ml

After dilution,

Final Cell count = 982, 994, 998

Avg. cell count = 991.3

Cell Conc. = $991.3 \times 400$

= 396,533 cells/ml

10/9/98

Stock : $^{210}Po$- citrate

on 9/21/98 → ~~70.7 μci/ml~~ 7.07 6.46

on 10/9/98 = ~~7.07~~ × 0.9138 = ~~64.6~~ μci/ml

$t$ = 18 days.

$e^{-\lambda t} = e^{-\frac{0.693 \times 18}{138.4}} = 0.9138$

~~Prepare 1ml of 10 μci/ml of $^{210}Po$-citrate = 10μci required~~

Stock required = $\frac{10}{64.6}$ = ~~0.309 ml~~ 0.154 ml.

154μl

i) Take ~ ~~0.150~~ ~~0.310 ml~~ 846μl $^{210}Po$

ii) Add ~~1.690~~ ml MEMB

Conc. of $^{210}Po$citrate = 6.46 × 0.154 = 0.99

≈ 1 μci/ml.

[ instead of 10μci/ml as was the plan to make]

30 µl medium



USER: 5 ID:PO-210 PRESET TIME: 1.00 FRI 09 OCT 1998 18:18
SAMPLE REPEAT: 1 CYCLE REPEAT: 1 SCR:N RS232:N
H#: 1 AQC:N QCF:N RCM:N 2 PHASE MONITOR:N
CHANNEL 1-LL:600 UL: 900 2SIGMA: 2.00 BKG SUB: 0.00 BKG 2SIG: 0.00 LSR: 0
DATA CALC: CPM, UNKNOWN REPLICATES: 1 NORM FACTOR:Q 1.00000
HALF LIFE(DAYS):N

| SAM | POS | CH | CPM | 2SIG% | TIME | EL TIME | AVG H# | ERR |
|---|---|---|---|---|---|---|---|---|
| 1 | **- 1 | 1 | 10.00 | 63.25 | 1.00 | 1.48 | 56.0 | |
| 2 | **- 2 | 1 | 9.00 | 66.67 | 1.00 | 3.13 | 57.0 | |
| 3 | **- 3 | 1 | 4.00 | 100.0 | 1.00 | 4.78 | 55.0 | |
| 4 | **- 4 | 1 | 11.00 | 60.30 | 1.00 | 6.41 | 54.0 | |
| 5 | **- 5 | 1 | 9.00 | 66.67 | 1.00 | 8.04 | 59.0 | |
| 6 | **- 6 | 1 | 9.00 | 66.67 | 1.00 | 9.69 | 59.0 | |
| 7 | **- 7 | 1 | 1154.00 | 5.89 | 1.00 | 11.33 | 57.0 | |
| 8 | **- 8 | 1 | 1319.00 | 5.51 | 1.00 | 12.98 | 58.0 | |
| 9 | **- 9 | 1 | 1320.00 | 5.50 | 1.00 | 14.62 | 59.0 | |
| 10 | **-10 | 1 | 2208.00 | 4.26 | 1.00 | 16.25 | 58.0 | |
| 11 | **-11 | 1 | 2338.00 | 4.14 | 1.00 | 17.89 | 57.0 | |
| 12 | **-12 | 1 | 2384.00 | 4.10 | 1.00 | 19.53 | 59.0 | |
| 13 | **- 1 | 1 | 3130.00 | 3.57 | 1.00 | 21.27 | 58.0 | |
| 14 | **- 2 | 1 | 3376.00 | 3.44 | 1.00 | 22.92 | 58.0 | |
| 15 | **- 3 | 1 | 3065.00 | 3.61 | 1.00 | 24.57 | 60.0 | |
| 16 | **- 4 | 1 | 13.00 | 55.47 | 1.00 | 26.25 | 60.0 | |
| 17 | **- 5 | 1 | 10.00 | 63.25 | 1.00 | 27.89 | 59.0 | |
| 18 | **- 6 | 1 | 7.00 | 75.59 | 1.00 | 29.53 | 60.0 | |
| 19 | **- 7 | 1 | 9.00 | 66.67 | 1.00 | 31.22 | 58.0 | |
| 20 | **- 8 | 1 | 5.00 | 89.44 | 1.00 | 32.86 | 59.0 | |
| 21 | **- 9 | 1 | 9.00 | 66.67 | 1.00 | 34.54 | 61.0 | |
| 22 | **-10 | 1 | 1279.00 | 5.59 | 1.00 | 36.17 | 60.0 | |
| 23 | **-11 | 1 | 1404.00 | 5.34 | 1.00 | 37.82 | 57.0 | |
| 24 | **-12 | 1 | 1246.00 | 5.67 | 1.00 | 39.45 | 59.0 | |
| 25 | **- 1 | 1 | 2251.00 | 4.22 | 1.00 | 41.19 | 60.0 | |
| 26 | **- 2 | 1 | 2145.00 | 4.32 | 1.00 | 42.83 | 58.0 | |
| 27 | **- 3 | 1 | 2226.00 | 4.24 | 1.00 | 44.47 | 59.0 | |
| 28 | **- 4 | 1 | 2959.00 | 3.68 | 1.00 | 46.11 | 59.0 | |
| 29 | **- 5 | 1 | 3301.00 | 3.48 | 1.00 | 47.75 | 60.0 | |
| 0 | **- 6 | 1 | 3367.00 | 3.45 | 1.00 | 49.38 | 58.0 | |

500ul cell suspension

PAGE: 1

USER: 5 ID:PD-210 PRESET TIME: 1.00 MON 12 OCT 1998 13:12
SAMPLE REPEAT: 1 CYCLE REPEAT: 1 SCR:N RS232:N
H#: 1 AQC:N QCF:N RCM:N 2 PHASE MONITOR:N
CHANNEL 1-LL:600 UL: 900 2SIGMA: 2.00 BKG SUB: 0.00 BKG 2SIG: 0.00 LSR: 0
DATA CALC: CPM, UNKNOWN REPLICATES: 1 NORM FACTOR:Q 1.00000
HALF LIFE(DAYS):N

| SAM | POS | CH | CPM | 2SIG% | TIME | EL TIME | AVG H# | ERR |
|---|---|---|---|---|---|---|---|---|
| 1 | **- 1 | 1 | 8.00 | 70.71 | 1.00 | 1.48 | 107.0 | |
| 2 | **- 2 | 1 | 4.00 | 100.0 | 1.00 | 3.13 | 106.0 | |
| 3 | **- 3 | 1 | 7.00 | 75.59 | 1.00 | 4.76 | 106.0 | |
| 4 | **- 4 | 1 | 5.00 | 89.44 | 1.00 | 6.41 | 105.0 | |
| 5 | **- 5 | 1 | 53.00 | 27.47 | 1.00 | 8.04 | 105.0 | |
| 6 | **- 6 | 1 | 55.00 | 26.97 | 1.00 | 9.68 | 106.0 | |
| 7 | **- 7 | 1 | 89.00 | 21.20 | 1.00 | 11.33 | 105.0 | |
| 8 | **- 8 | 1 | 108.00 | 19.25 | 1.00 | 12.98 | 106.0 | |
| 9 | **- 9 | 1 | 134.00 | 17.28 | 1.00 | 14.61 | 106.0 | |
| 10 | **-10 | 1 | 128.00 | 17.68 | 1.00 | 16.26 | 106.0 | |
| 11 | **-11 | 1 | 12.00 | 57.74 | 1.00 | 17.89 | 105.0 | |
| 12 | **-12 | 1 | 9.00 | 66.67 | 1.00 | 19.53 | 104.0 | |
| 13 | **- 1 | 1 | 12.00 | 57.74 | 1.00 | 21.31 | 106.0 | |
| 14 | **- 2 | 1 | 6.00 | 81.65 | 1.00 | 22.95 | 106.0 | |
| 15 | **- 3 | 1 | 60.00 | 25.82 | 1.00 | 24.60 | 103.0 | |
| 16 | **- 4 | 1 | 69.00 | 24.08 | 1.00 | 26.24 | 106.0 | |
| 17 | **- 5 | 1 | 71.00 | 23.74 | 1.00 | 27.88 | 104.0 | |
| 18 | **- 6 | 1 | 86.00 | 21.57 | 1.00 | 29.52 | 105.0 | |
| 19 | **- 7 | 1 | 101.00 | 19.90 | 1.00 | 31.16 | 105.0 | |
| 20 | **- 8 | 1 | 112.00 | 18.90 | 1.00 | 32.80 | 105.0 | |

B013656

**TABLE-2**

**Expt. # :** 1 **Date/Time :** 10/12/98; 1-15 p.m

| Tube # | Radioactivity for 500 ul cell suspension (cpm) | Avg. cpm | dpm [cpm/1] | μ Ci/ml ($A_t$) on counting [dpm/111x10$^4$] | μ Ci/ml ($A_o$) after 12 h incubation [$A_t/e^{-\lambda t}$] |
|---|---|---|---|---|---|
| 1 | 8, 4, 9 | | | | |
| 2 | 5, 7 | | | | |
| 3 | 53, 55 | 54 | 54 | 0.0000486 | |
| 4 | 89, 108 | 98.5 | 98.5 | 0.0000887 | |
| 5 | 134, 128 | 131 | 131 | 0.000118 | |
| 6 | 12, 9 | | | | |
| 7 | 12, 6 | ~~64.5~~ | ~~64.5~~ | ~~0.0000581~~ | |
| 8 | 60, 69 | 64.5 | 64.5 | 0.0000581 | |
| 9 | 71, 86 | 78.5 | 78.5 | 0.0000707 | |
| 10 | 101, 112 | 106.5 | 106.5 | 0.0000959 | |

**TABLE-3**

**Expt. # :** 1

**Date/Time :** 10/12/98; 12:00 Noon

| Tube # | Coulter count for 100 ul cell suspension | Avg. count | Cells/ml [Avg. count x 400] | fCi/cell [uCi/ml x $10^9$ Cells/ml] |
|---|---|---|---|---|
| 1 | 472, 426, 413 | 437 | 174800 | – |
| 2 | 475, 429, 414 | 439.3 | 175733 | – |
| 3 | 416, 400, 411 | 409 | 163600 | 0.2970 |
| 4 | 648, 632, 622 | 634 | 253600 | 0.3497 |
| 5 | 606, 592, 631 | 609.6 | 243866 | 0.4838 |
| 6 | 542, 535, 558 | 545 | 218000 | – |
| 7 | 429, 455, 435 | 439.6 | 175866 | – |
| 8 | 494, 533, 509 | 512 | 204800 | 0.2836 |
| 9 | 593, 624, 609 | 608 | 243466 | 0.2907 |
| 10 | 517, 517, 510 | 514.6 | 205866 | 0.4658 |

**TABLE-4**

Expt. #: 1

Date: 10/19/98

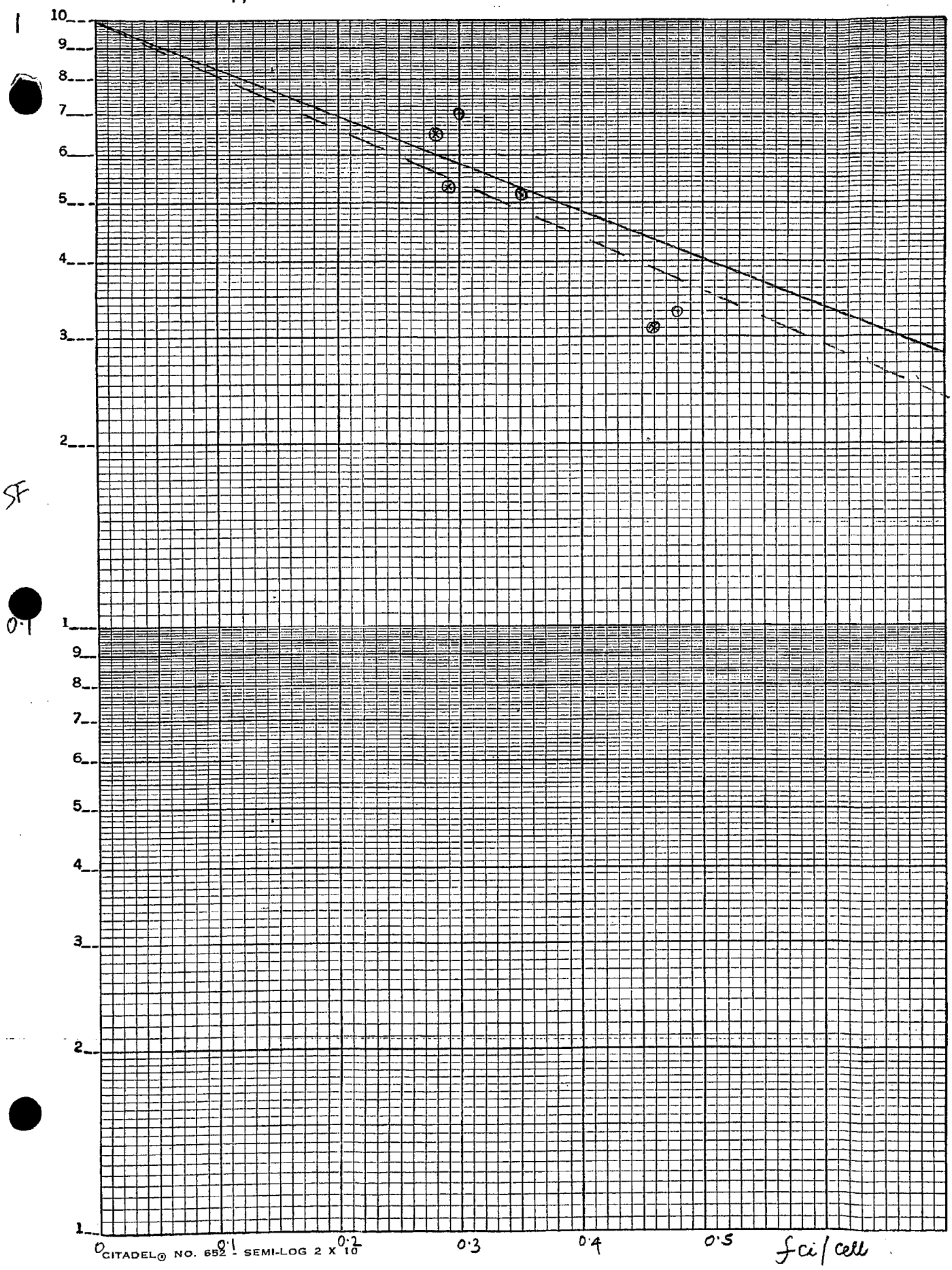
## Colony Counts and Survival Fraction

| Tube.dilution | Colony 1 | Colony 2 | Colony 3 | Avg Colony | SF |
|---|---|---|---|---|---|
| 1·2 | 115 | 114 | 112 | } 123·33 | |
| 2·2 | 113 | 140 | 146 | } | |
| 3·2 | 87 | 85 | 88 | 86·66 | 0·7027 |
| 4·2 | 61 | 67 | 64 | 64 | 0·5189 |
| 5·2 | 42 | 38 | 44 | 41·33 | 0·3351 |
| 6·2 | 97 | 110 | 113 | } 108·66 | |
| 7·2 | 115 | 112 | 105 | } | |
| 8·2 | 66 | 78 | 70 | 71·33 | 0·6564 |
| 9·2 | 60 | 56 | 59 | 58·33 | 0·5337 |
| 10·2 | 35 | 31 | 36 | 34 | 0·3129 |

**TABLE-1**

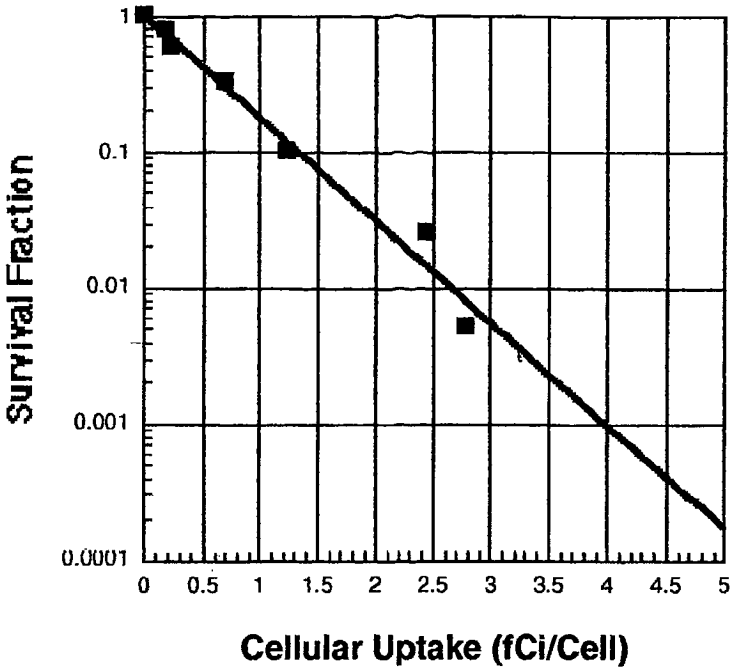
**Expt. # :** 1 **Date/Time :** 10/09/98; 6-20 p.m.

| Tube # | Medium count for 30 ul (cpm) | Avg. cpm | dpm [cpm/1] | µCi/ml ($A_t$) on counting [dpm/66600] | µCi/ml ($A_o$) on addition [$A_t/e^{-\lambda t}$] |
|---|---|---|---|---|---|
| 1 | 10, 9, 4 | | | | |
| 2 | 11, 9, 9 | | | | |
| 3 | 1154, 1319, 1320 | 1264.3 | 1264.3 | 0.0189 | |
| 4 | 2208, 2338, 2384 | 2310 | 2310 | 0.0346 | |
| 5 | 3130, 3376, 3065 | 3190.3 | 3190.3 | 0.0479 | |
| 6 | 13, 10, 7 | | | | |
| 7 | 9, 5, 9 | | | | |
| 8 | 1279, 1404, 1246 | 1309.6 | 1309.6 | 0.0196 | |
| 9 | 2251, 2145, 2226 | 2207.3 | 2207.3 | 0.0331 | |
| 10 | 2959, 3301, 3367 | 3209 | 3209 | 0.0481 | |


Expt. #1
with DMSO (10%)
without DMSO
SF
10
9
8
7
6
5
4
3
2
1
0.1
0.2
0.3
0.4
0.5
fci/cell
CITADEL® NO. 652 - SEMI-LOG 2 X 10

Survival Vs uptake of $^{210}Po$ - citrate 10/08/98

Exp. #1



Single cell ($8 \times 10^4$ cells in 2ml)

| | Label | A | B |
|---|---|---|---|
| Label | μCi/ml | fCi/cell | SF |
| 1 | 0 | 0 | 1 |
| 2 | 0.017 | 0.176 | 0.8047 |
| 3 | 0.035 | 0.2357 | 0.5936 |
| 4 | 0.088 | 0.6913 | 0.3245 |
| 5 | 0.176 | 1.2251 | 0.1002 |
| 6 | 0.353 | 2.4493 | 0.025 |
| 7 | 0.530 | 2.7779 | 0.0052 |

1 μCi = 37 Kbq
1 mCi = 37 Mbq

# V79 COLONY FORMING ASSAY

**Experiment Name :** $^{210}$Po-citrate toxicity ; **Exp. # :** 1; **Investigator:** A. Bishayee
**Date:** 09/21/98

1. Set the rocker-roller at 37$^0$C incubator, set the Coulter Counter, wash cells (from 75 cm$^2$ flask, subcultured 1:2, 24h before) with PBS, trypsinize cells, resuspend in 7 ml MEMB, pass five times through 3 cc syringe with 21 gauge needle, perform cell count by transfering 100 ul in Coulter cup containing 20 ml isotone (Coulter balanced electrolyte solution)
2. Dilute to ~400,000 cells/ml in MEMB (final volume 11 ml) [Actual count : 422, 533 cells/ml)
3. Transfer 1 ml of cell suspension into ten 12 ml tubes (Falcon plastic test tube, 17x100 mm) labeled 1-10 both on cap and wall
4. Roll the tubes for 3-4 h at 37°C, 5% $CO_2$ **Date/Time:** 9/21/98; 3-00 p.m.
6. After 3-4 h, remove test tubes from roller and add according to Table below.

**Date/Time:** 9/21/98; 5-00 p.m.

| Tube # | $^{210}$Po-citrate uCi/ml | Cells in MEMB (ml) | MEMB (ul) | 1:9 of 2N HCl: 1M Na-citrate (ul) | Po-citrate (7 uCi/ml) on 9/21/98 (ul) |
|---|---|---|---|---|---|
| 1 | 0 | 1.0 | 1000 | 0 | 0 |
| 2 | 0 | 1.0 | 1000 | 0 | 0 |
| 3 | 0 | 1.0 | 850 | 150 | 0 |
| 4 | 0 | 1.0 | 850 | 150 | 0 |
| 5 | 0.176 | 1.0 | 850 | 145 | 5 |
| 6 | 0.035 | 1.0 | 850 | 140 | 10 |
| 7 | 0.088 | 1.0 | 850 | 125 | 25 |
| 8 | 0.176 | 1.0 | 850 | 100 | 50 |
| 9 | 0.353 | 1.0 | 850 | 50 | 100 |
| 10 | 0.53 | 1.0 | 850 | 0 | 150 |

7 → 7.07

(1:10 dilution of the stock polonium with 1M Na-citrate pH 7.0)

7. Return test tubes to roller for 30 min. **Date/Time:** 9/21/98; 5-20 p.m.
8. After 30 min, centrifuge tubes for 10 min at 2000 rpm, 4°C
9. During the centrifugation move roller to 10.5°C
10. Collect 100 ul supernatant in separate tubes
11. Add 8 ml of wash MEMA in each tube containing the pallet

1.2
2.2
3.2
4.2
5.2, 5.3
6.2, 6.3, 6.4
8.2, 8.3, 8.4
~~9.2~~, 9.3, 9.4
10.3, 10.4

12. Centrifuge tubes for 10 min at 2000 rpm, 4°C
13. Decant supernatant, click tubes, vortex, resuspend in 10 ml wash MEMA
14. Centrifuge tubes for 10 min at 2000 rpm, 4°C
15. Decant supernatant, click tubes, vortex, resuspend in 10 ml wash MEMA
16. Centrifuge tubes for 10 min at 2000 rpm, 4°C
17. Decant the supernatant, click tubes, vortex add 2 ml of wash MEMA
18. Transfer tubes at 10°C for 72 h. **Date/Time:** 09/21/98; 7-00 p.m.
19. Transfer 30 ul of supernatant in triplicate from step 10 into 20 ml scintillation vial containing 6 ml cocktail (Aquasol) and count for radioactivity **Date/Time:** 09/21/98; 6-30 p.m
19. After 72 h, add 8 ml wash MEMA in each tube, vortex and centrifuge the tubes for 10 min at 2000 rpm, 4°C ***(precooled centrifuge)***
27. Labeling and preparation of dilution tubes and colony dishes
    - load 69 60 mm petri dishes with 4 ml MEMA
    - load 36 T-tubes with 4.5 ml MEMA and label them 1.2, 1.3, 1.4, 1.5; 2.2, 2.3, 2.4, 2.5; X.2, X.3, X.4, X.5 etc.

    30
28. Decant supernatant, click tubes, vortex, resuspend in 10 ml wash MEMA
29. Centrifuge tubes for 10 min at 2000 rpm, 4°C
30. Decant supernatant, click tubes, vortex, resuspend in 10 ml wash MEMA
31. Centrifuge tubes for 10 min at 2000 rpm, 4°C
32. Decant supernatant, click tubes, vortex, resuspend in 2 ml wash MEMA, pass five times through 3 cc syringe with 21 gauge needle
33. Determine cell concentration by transfering 100 µl to Coulter cup
34. Vortex tube, transfer 0.5 ml into X.4, vortex tube X.4 and transfer 0.5 ml to tube X.3 and vortex tube X.3 and transfer 0.5 ml to tube X.2. Keep tubes on ice.
35. Transfer 1 ml from dilution tubes into dishes labeled X.2, X.3, X.4 (in triplicate). Only X.2 should be seeded for control T-tubes.
36. Transfer 500 µl of cell suspension (in duplicate) to 20 ml scintillation vial containing 6 ml cocktail (Aquasol)
37. Incubate petridishes for 1 week
38. Count vials for radioactivity **Date/Time :** 09/24/98; 1-00 p.m.
39. After 1 week, wash colonies 3 times with normal (1X) saline,and 2 times with methanol. Stain colonies with 0.0 5% crystal violet
40. Count colonies. There must be between 25 and 250 colonies for the flask to be a valid data point.

Expt #1

9/21/98

Initial cell count = 6939, 7263, 7220

Avg. cell count = 7140.6

Cell conc = 7140 × 400

= 2856266 cells/ml

For dilution,

Vol. of cell suspension required = $\frac{4400000}{2856266}$

= 1.54 ml

Take 1.6 ml cell suspension + 9.4 ml MEMβ = 11 ml.

After dilution,

Final cell count = 1191, 1059, 1056, 1054

Avg cell count = 1056.3

cell conc. = 422,533 cells/ml

1 mCi = 37 mBq

210 Po-citrate toxicity

Expt. #1

30 µl of medium



USER: 5 ID:PO-210 PRESET TIME: 1.00 MON 21 SEP 1998 18:36
SAMPLE REPEAT: 1 CYCLE REPEAT: 1 SCR:N RS232:N
H#: 1 AQC:N QCF:N RCM:N 2 PHASE MONITOR:N
CHANNEL 1-LL:600 UL: 900 2SIGMA: 2.00 BKG SUB: 0.00 BKG 2SIG: 0.00 LSR: 0
DATA CALC: CPM, UNKNOWN REPLICATES: 1 NORM FACTOR:Q 1.00000
HALF LIFE(DAYS):N

| SAM | POS | CH | CPM | 2SIG% | TIME | EL TIME | AVG H# | ERR |
|---|---|---|---|---|---|---|---|---|
| 1 | **- 1 | 1 | 35824.61 | 1.85 | 0.33 | 0.84 | 57.0 | 10 M |
| 2 | **- 2 | 1 | 35083.07 | 1.87 | 0.33 | 1.85 | 60.0 | |
| 3 | **- 3 | 1 | 34910.00 | 1.95 | 0.30 | 2.77 | 58.0 | |
| 4 | **- 4 | 1 | 47132.00* | 1.84 | 0.25 | 3.65 | 65.0 | |
| 5 | **- 5 | 1 | 23175.55 | 1.96 | 0.45 | 4.73 | 58.0 | |
| 6 | **- 6 | 1 | 23122.22 | 1.96 | 0.45 | 5.81 | 58.0 | |
| 7 | **- 7 | 1 | 11241.11 | 1.99 | 0.90 | 7.36 | 57.0 | |
| 8 | **- 8 | 1 | 11069.47 | 1.95 | 0.95 | 8.94 | 57.0 | |
| 9 | **- 9 | 1 | 11197.78 | 1.99 | 0.90 | 10.48 | 60.0 | |
| 10 | **-10 | 1 | 5472.00 | 2.70 | 1.00 | 12.13 | 59.0 | |
| 11 | **-11 | 1 | 5523.00 | 2.69 | 1.00 | 13.78 | 57.0 | |
| 12 | **-12 | 1 | 5312.00 | 2.74 | 1.00 | 15.46 | 54.0 | |
| 13 | **- 1 | 1 | 2208.00 | 4.26 | 1.00 | 17.22 | 60.0 | |
| 14 | **- 2 | 1 | 2226.00 | 4.24 | 1.00 | 18.87 | 59.0 | |
| 15 | **- 3 | 1 | 2121.00 | 4.34 | 1.00 | 20.56 | 59.0 | |
| 16 | **- 4 | 1 | 1051.00 | 6.17 | 1.00 | 22.20 | 58.0 | |
| 17 | **- 5 | 1 | 1052.00 | 6.17 | 1.00 | 23.89 | 60.0 | |
| 18 | **- 6 | 1 | 1085.00 | 6.07 | 1.00 | 25.53 | 59.0 | |
| 19 | **- 7 | 1 | 10.00 | 63.25 | 1.00 | 27.17 | 61.0 | |
| 20 | **- 8 | 1 | 8.00 | 70.71 | 1.00 | 28.86 | 60.0 | |
| 21 | **- 9 | 1 | 17.00 | 48.51 | 1.00 | 30.51 | 59.0 | |
| 22 | **-10 | 1 | 7.00 | 75.59 | 1.00 | 32.15 | 59.0 | |
| 23 | **-11 | 1 | 10.00 | 63.25 | 1.00 | 33.78 | 60.0 | |
| 24 | **-12 | 1 | 9.00 | 66.67 | 1.00 | 35.43 | 59.0 | |
| 25 | **- 1 | 1 | 7.00 | 75.59 | 1.00 | 37.17 | 60.0 | |
| 26 | **- 2 | 1 | 9.00 | 66.67 | 1.00 | 38.86 | 59.0 | |
| 27 | **- 3 | 1 | 7.00 | 75.59 | 1.00 | 40.50 | 60.0 | |
| 28 | **- 4 | 1 | 10.00 | 63.25 | 1.00 | 42.18 | 60.0 | |
| 29 | **- 5 | 1 | 8.00 | 70.71 | 1.00 | 43.87 | 59.0 | |
| 30 | **- 6 | 1 | 10.00 | 63.25 | 1.00 | 45.57 | 58.0 | |

* 30 µl of medium was added twice

**TABLE-1**

**Expt. # :** 1 **Date/Time :** 09/21/98; 6-30 p.m.

| Tube # | Medium count for ~~10~~ 3 ul (cpm) | Avg. cpm | dpm [cpm/~~0.7056~~ 1] | µ Ci/ml ($A_t$) on counting [dpm/~~22200~~ 66600] | µ Ci/ml ($A_o$) on addition [$A_t/e^{-\lambda t}$] |
|---|---|---|---|---|---|
| 1 | 10, 8, 10 | | | | |
| 2 | 7, 9, 7 | | | | |
| 3 | 7, 10, 9 | | | | |
| 4 | 10, 8, 17 | | | | |
| 5 | 1051, 1052, 1085 | 1062.6 | 1062.6 | 0.0159 | |
| 6 | 2208, 2226, 2121 | 2185 | 2185 | 0.0328 | |
| 7 | 5472, 5523, 5312 | 5435.6 | 5435.6 | 0.0816 | |
| 8 | 11241, 11069, 11197 | 11169 | 11169 | 0.1677 | |
| 9 | 47132*, 23175, 23122 | 23357 | 23357 | 0.3507 | |
| 10 | 35824, 35083, 34910 | 35272 | 35272 | 0.5296 | |

$$\mu Ci/ml = \frac{dpm}{60 \times 37000} \times \frac{1000}{30} = \frac{dpm}{66600}$$

* 2x 30 µl

USER: 5 ID:PD-210 PRESET TIME: 1.00 THU 24 SEP 1998 [illegible]:55
SAMPLE REPEAT: 1 CYCLE REPEAT: 1 SCR:N RS232:N
H#: 1 AQC:N QCF:N RCM:N 2 PHASE MONITOR:N
CHANNEL 1-LL:600 UL: 900 2SIGMA: 2.00 BKG SUB: 0.00 BKG 2SIG: 0.00 [illegible]: 0
DATA CALC: CPM, UNKNOWN REPLICATES: 1 NORM FACTOR:Q 1.00000
HALF LIFE(DAYS):N

| SAM | POS | CH | CPM | 2SIG% | TIME | EL TIME | AVG H# | | ERR |
|---|---|---|---|---|---|---|---|---|---|
| 1 | **- 1 | 1 | 536.00 | 8.64 | 1.00 | 1.50 | 105.0 | 10C | |
| 2 | **- 2 | 1 | 537.00 | 8.63 | 1.00 | 3.13 | 106.0 | 10C | |
| 3 | **- 3 | 1 | 431.00 | 9.63 | 1.00 | 4.77 | 105.0 | 9C | |
| 4 | **- 4 | 1 | 430.00 | 9.64 | 1.00 | 6.41 | 105.0 | 9C | |
| 5 | **- 5 | 1 | 210.00 | 13.80 | 1.00 | 8.04 | 103.0 | 8C | |
| 6 | **- 6 | 1 | 194.00 | 14.36 | 1.00 | 9.68 | 104.0 | 8C | |
| 7 | **- 7 | 1 | 122.00 | 18.11 | 1.00 | 11.33 | 103.0 | 7C | |
| 8 | **- 8 | 1 | 114.00 | 18.73 | 1.00 | 12.97 | 106.0 | 7C | |
| 9 | **- 9 | 1 | 45.00 | 29.81 | 1.00 | 14.60 | 104.0 | 6C | |
| 10 | **-10 | 1 | 47.00 | 29.17 | 1.00 | 16.23 | 104.0 | 6C | |
| 11 | **-11 | 1 | 33.00 | 34.82 | 1.00 | 17.87 | 104.0 | 5C | |
| 12 | **-12 | 1 | 18.00 | 47.14 | 1.00 | 19.49 | 107.0 | 5C | |
| 13 | **- 1 | 1 | 16.00 | 50.00 | 1.00 | 21.23 | 104.0 | 4C | |
| 14 | **- 2 | 1 | 14.00 | 53.45 | 1.00 | 22.87 | 105.0 | 4C | |
| 15 | **- 3 | 1 | 4.00 | 100.0 | 1.00 | 24.50 | 105.0 | 3C | |
| 16 | **- 4 | 1 | 9.00 | 66.67 | 1.00 | 26.15 | 104.0 | 3C | |
| 17 | **- 5 | 1 | 7.00 | 75.59 | 1.00 | 27.78 | 103.0 | 2C | |
| 18 | **- 6 | 1 | 5.00 | 89.44 | 1.00 | 29.42 | 105.0 | 2C | |
| 19 | **- 7 | 1 | 12.00 | 57.74 | 1.00 | 31.07 | 106.0 | 1C | |
| 20 | **- 8 | 1 | 10.00 | 63.25 | 1.00 | 32.70 | 103.0 | 1C | |

500µl cell suspension

Controls

**TABLE-2**

**Expt. # :** 1 **Date/Time :** 09/24/98; 1-00 P.m.

| Tube # | Radioactivity for ~~300~~ 500 ul cell suspension (cpm) | Avg. cpm | dpm [cpm/~~0.7056~~ 1] | µ Ci/ml ($A_t$) on counting [dpm/~~666000~~ 1110000] | µ Ci/ml ($A_o$) after 12 h incubation [$A_t/e^{-\lambda t}$] |
|---|---|---|---|---|---|
| 1 | 10, 12 | | | | |
| 2 | 5, 7 | | | | |
| 3 | 4, 9 | | | | |
| 4 | 16, 14 | | | | |
| 5 | 33, 18 | 25·5 | 25·5 | 0·0000229 | |
| 6 | 45, 47 | 46 | 46 | 0·0000414 | |
| 7 | 122, 114 | 118 | 118 | 0·000106 | |
| 8 | 210, 194 | 202 | 202 | 0·000181 | |
| 9 | 431, 430 | 430·5 | 430·5 | 0·000387 | |
| 10 | 536, 537 | 536·5 | 536·5 | 0·000483 | |

$$\mu Ci/ml = \frac{dpm}{60 \times 37000} \times 2 = \frac{dpm}{1110000}$$

#:

**TABLE-3**

**Expt. # :** 1 **Date/Time :** 09/29/98

| Tube # | Coulter count for 100 ul cell suspension | Avg. count | Cells/ml [Avg. count x 4000] | μCi/cell [uCi/ml x $10^9$ / Cells/ml] | mBq/cell |
|---|---|---|---|---|---|
| 1 | 420, 435, 455 | 436.6 | 174666 | | |
| 2 | 465, 440, 421 | 442 | 176,800 | | |
| 3 | 425, 411, 401 | 412 | 164,933 | | |
| 4 | 398, 388, 375 | 387 | 154,800 | | |
| 5 | 435, 422, 417 | 424.6 | 169,866 | 0.1760 | 0.0067 |
| 6 | 455, 426, 436 | 439 | 175,600 | 0.2357 | 0.0089 |
| 7 | 375, 381, 394 | 383.3 | 153,333 | 0.6913 | 0.0262 |
| 8 | 355, 372, 381 | 369.3 | 147,733 | 1.2251 | 0.0465 |
| 9 | 402, 398, 385 | 395 | 158,000 | 2.4493 | 0.0930 |
| 10 | 454, 418, 432 | 434.6 | ~~213,866~~ | ~~2.2584~~ | 0.1055 |
| | | | 173,866 | 2.7779 | |

| K (KBq/ml) | λ (mBq/cell) | λ (mBq/cell) [expected] | |
|---|---|---|---|
| 0.65 | 0.0067 | 0.026 | 0.8 |
| 1.29 | 0.0089 | 0.051 | 0.6 |
| 3.25 | 0.0262 | 0.13 | 0.32 |
| 6.51 | 0.0465 | 0.26 | 0.1 |
| 13.06 | 0.0930 | 0.522 | 0.025 |
| 19.61 | 0.1055 | 0.784 | 0.005 |

0.2

**TABLE-4**

Expt. #: 1

Date: 10/01/98

## Colony Counts and Survival Fraction

| Tube.dilution | Colony 1 | Colony 2 | Colony 3 | Avg Colony for X-2 | SF |
|---|---|---|---|---|---|
| 1·2 | 125 | 115 | 132 | 126·33 | |
| 2·2 | 136 | 121 | 129 | | |
| 3·2 | 129 | 119 | 115 | 116·66 | |
| 4·2 | 113 | 107 | 117 | | |
| 5·2 | 112 | 102 | 91 | 101·66 | 0·8047 |
| 6·2 | 65 | 76 | 84 | 75 | 0·5936 |
| 7·2 | 47 | 41 | 35 | 41 | 0·3245 |
| 8·3 | 127 | 134 | 119 | 12·66 | 0·1002 |
| 9·3 | 39 | 32 | 24 | 3·16 | 0·025 |
| 10·4 | 68 | 62 | 68 | 0·66 | 0·0052 |

## Check concentration of Po-210

Stock = 100 μCi in 1 ml on 8/1/98

(A) Dilute 1:10 in 1 M Na Citrate pH 7.0

(B) Dilute (A) 1:10 w/ deionized $H_2O$

Count 10 ml (B) in Aquasol

Compare counts in 20 ml vials (plastic – glass) with and without 300 μl MEMA. Two different Aquasol volumes (3 ml, 6 ml) also compared.

Results: Aquasol volume does not change count

Glass vs. plastic vial does not change count in absence of MEMA

Plastic 2.5% more efficient in presence of MEMA.

Avg. 15700 dpm 10 μl of 100:1 dilution of stock

$\frac{15700}{60\,(37000)}$ = 0.00707 μCi per 10 ml

= 0.707 μCi per ml of B

Stock = 70.7 μCi/ml on 9/21/98

$e^{\frac{-0.693(52\ days)}{138}}$ = 0.77

91.8 $\frac{\mu Ci}{ml}$ on 8/1/98

(C) Po-citrate Stock = 7.07 μci/ml on 9/21/98

09/21/98 (2)

Calibration of Po-210 (Po-citrate)

10 µl of 1:10 dilution of Po-citrate

PAGE: 1

USER: 5 ID:PO-210 PRESET TIME: 1.00 MON 21 SEP 1998 11:06
SAMPLE REPEAT: 1 CYCLE REPEAT: 1 SCR:N RS232:N
H#: 1 AQC:N QCF:N RCM:N 2 PHASE MONITOR:N
CHANNEL 1-LL:600 UL: 900 2SIGMA: 2.00 BKG SUB: 0.00 BKG 2SIG: 0.00 LSR: 0
DATA CALC: CPM, UNKNOWN REPLICATES: 1 NORM FACTOR:Q 1.00000
HALF LIFE(DAYS):N

| SAM | POS | CH | CPM | 2SIG% | TIME | EL TIME | AVG H# | ERR | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | **- 1 | 1 | 14300.00 | 1.93 | 0.75 | 1.42 | 55.0 | | Glass + 3ml + 10µl Po-210 |
| 2 | **- 2 | 1 | 15467.69 | 1.99 | 0.65 | 2.72 | 50.0 | | Glass + 6ml + 10µl Po-210 |
| 3 | **- 3 | 1 | 15650.37 | 1.95 | 0.68 | 4.17 | 109.0 | | Glass + 3ml + 10µl Po-210 + 300µl MBMA |
| 4 | **- 4 | 1 | 15601.54 | 1.99 | 0.65 | 5.46 | 85.0 | | Glass + 6ml + 10µl Po210 + 300µl MBMA |
| 5 | **- 5 | 1 | 15586.15 | 1.99 | 0.65 | 6.84 | 64.0 | | |
| 6 | **- 6 | 1 | 15629.23 | 1.98 | 0.65 | 8.13 | 50.0 | | Same as above except plastic in place of glass |
| 7 | **- 7 | 1 | 15996.92 | 1.96 | 0.65 | 9.52 | 124.0 | | |
| 8 | **- 8 | 1 | 15972.31 | 1.96 | 0.65 | 10.81 | 94.0 | | |

B013675

# Cellular uptake of Po-210

09/15/98

1. Take 1 ml of MEMB containing ~400,000 cells (Actual cell conc. 368,006 cells/ml) in two 17x100 mm plastic tube.
2. Roll the cells for 3-4h at 37°C
3. After 4h, add 940 µl MEMB, Vortex
4. Add 60 µl Po-210 (~ 0.6 µci) in each tube (Total vol. : 2 ml)
5. Transfer the tubes in Roller at 37°C for 30 min
6. After 30 min, wash cells three times with room temp MEMA.
7. After final wash, resuspend in 2 ml ~~wash~~ MEMA, perform cell count
8. Transfer 300 µl of cell suspension in triplicate in 20 ml scintilation vial & 6 ml scintilation cocktail (aqueous) and count them.

# Po-210

9/15/98

| Tube | cell count for 100 µl cells | cell conc. (cells/ml) | |
|---|---|---|---|
| 1A | 518, 492, 487 | 199600 | } 231200 cells/ml |
| 1B | 682, 677, 612 | 262800 | |

Determine extracellular conc. Po-210 citrate 7.07 µCi/ml on 9/21/98

Used 60µl in 2ml => 0.21 µCi/ml

Determine cellular uptake:

$$\text{Cell } \frac{cpm}{} \text{ (300µl)} = (413 + 369 + 343 + 318 + 326 + 313)/6$$

$$= 347 \text{ cpm}$$

$$\frac{cpm}{cell} = \frac{347 \text{ cpm}}{3(23120 \text{ cells})} = 0.00500 \frac{cpm}{cell} \quad \frac{1}{60(\frac{0.21}{3700})}$$

$$= 2.25 \times 10^{-9} \frac{\mu Ci}{cell}$$

$$= 2.25 \text{ fCi/cell}$$

Set concentrations for survival exp.

(A) (E) Po-210 citrate @ 7.07 µCi/ml

| Tube | µl Po-210 | µl Citrate buff | µl MEMB | µl cells |
|---|---|---|---|---|
| | 0 | 0 | 1000 | |
| 1 | 0 | 200 | 800 | 1000 |
| 2 | 0 | 200 | | 1000 |
| 3 | ~~200~~ | | | |
| 4 | ~~175~~ 150 | | | |
| 5 | ~~150~~ 100 | | | |
| 6 | ~~125~~ 50 | | | |
| 7 | ~~100~~ 25 | | | |
| 8 | ~~75~~ 10 | | | |
| 9 | ~~50~~ 5 | | | |
| 10 | ~~25~~ 0 | | | |

300 µl of cell suspension



USER: 5 ID:PQ-210 PRESET TIME: 1.00 TUE 15 SEP 1998 17:05
SAMPLE REPEAT: 1 CYCLE REPEAT: 1 SCR:N RS232:N
H#: 1 AQC:N QCF:N RCM:N 2 PHASE MONITOR:N
CHANNEL 1-LL:600 UL: 900 2SIGMA: 2.00 BKG SUB: 0.00 BKG 2SIG: 0.00 LSR: 0
DATA CALC: CPM, UNKNOWN REPLICATES: 1 NORM FACTOR:Q 1.00000
HALF LIFE(DAYS):N

| SAM | POS | CH | | CPM | 2SIG% | TIME | EL TIME | AVG H# | ERR |
|---|---|---|---|---|---|---|---|---|---|
| 1 | **- 1 | 1 | 300 µl MEMA | 12.00 | 57.74 | 1.00 | 1.49 | 88.0 | |
| 2 | **- 2 | 1 | | 12.00 | 57.74 | 1.00 | 3.14 | 89.0 | 10 |
| 3 | **- 3 | 1 | | 6.00 | 81.65 | 1.00 | 4.78 | 89.0 | |
| 4 | **- 4 | 1 | | 413.00 | 9.84 | 1.00 | 6.47 | 90.0 | |
| 5 | **- 5 | 1 | 300 µl cell suspension in MEMA | 369.00 | 10.41 | 1.00 | 8.13 | 90.0 | |
| 6 | **- 6 | 1 | | 343.00 | 10.80 | 1.00 | 9.78 | 89.0 | |
| 7 | **- 7 | 1 | | 318.00 | 11.22 | 1.00 | 11.42 | 89.0 | |
| 8 | **- 8 | 1 | | 326.00 | 11.08 | 1.00 | 13.07 | 90.0 | |
| 9 | **- 9 | 1 | | 313.00 | 11.30 | 1.00 | 14.70 | 88.0 | |

and calibration

## Preparation of Po-210 (Po-citrate)

09/15/98

1. Take 100 µl of stock (commercial pack, ~ 10 µCi) Po-210 as Po-Polonium chloride in a Nalgene (1.8 ml) vial.
2. Add 900 µl of 1M citrate buffer (pH 7.0)
   [Final conc. = 0.01 µCi/µl]
3. Take 2 x 10 µl of 1:100 dilution of the above product in 20 ml liquid scintillation vial & 6 ml cocktail (aquasol) and count for radioactivity

Calibration of Po-210



USER: 5 ID:PO-210 PRESET TIME: 1.00 TUE 15 SEP 1998 14:24
SAMPLE REPEAT: 1 CYCLE REPEAT: 1 SCR:N RS232:N
H#: 1 AQC:N QCF:N RCM:N 2 PHASE MONITOR:N
CHANNEL 1-LL:600 UL: 900 2SIGMA: 2.00 BKG SUB: 0.00 BKG 2SIG: 0.00 LSR: 0
DATA CALC: CPM, UNKNOWN REPLICATES: 1 NORM FACTOR:Q 1.00000
HALF LIFE(DAYS):N

| SAM | POS | CH | CPM | 2SIG% | TIME | EL TIME | AVG H# | ERR |
|---|---|---|---|---|---|---|---|---|
| 1 | **- 1 | 1 | 831.00 | 6.94 | 1.00 | 1.49 | 48.0 | |
| 2 | **- 2 | 1 | 786.00 | 7.13 | 1.00 | 3.19 | 50.0 | |

808.5

$t_{1/2}$ = 138.4 days

wipe test for outside the PO-210 container



USER: 3 ID:RADON PRESET TIME: 10.00 TUE 15 SEP 1998 13:13
SAMPLE REPEAT: 1 CYCLE REPEAT: 1 SCR:N RS232:N
[illegible]: 0 AQC:N QCF:N RCM:N 2 PHASE MONITOR:N
CHANNEL 1-LL: 50 UL: 825 2SIGMA:10.00 BKG SUB: 0.00 BKG 2SIG: 0.00 LSR: 0
DATA CALC: CPM, UNKNOWN REPLICATES: 1 NORM FACTOR:Q 1.00000
HALF LIFE(DAYS):N

| SAM | POS | CH | CPM | 2SIG% | TIME | EL TIME | ERR |
|---|---|---|---|---|---|---|---|
| 1 | **- 1 | 1 | 12080.00 | 8.14 | 0.05 | 0.23 | |

NOTIFICATION FOR LOADING OF DANGEROUS GOODS RADIOACTIVE MATERIALS (PART BR)

File Copy
Retain 90 Days

| | Origin: | Dest: | Date: |
|---|---|---|---|
| 6071 | BJRA | KKRHW | 9-16-94 |

| ping Name, Class, (RQ and additional as required) | Radionuclide (Product Code) | Activity | TI | Physical and Chemical Form (If not special) | # of Pkgs | P A X | C A O | Label White-I Yellow-II Yellow-III | Tracking Number | Container # / Belly Comp In | Out |
|---|---|---|---|---|---|---|---|---|---|---|---|
| [redacted] | | | | | | | | | | | |

Phone #
[redacted]

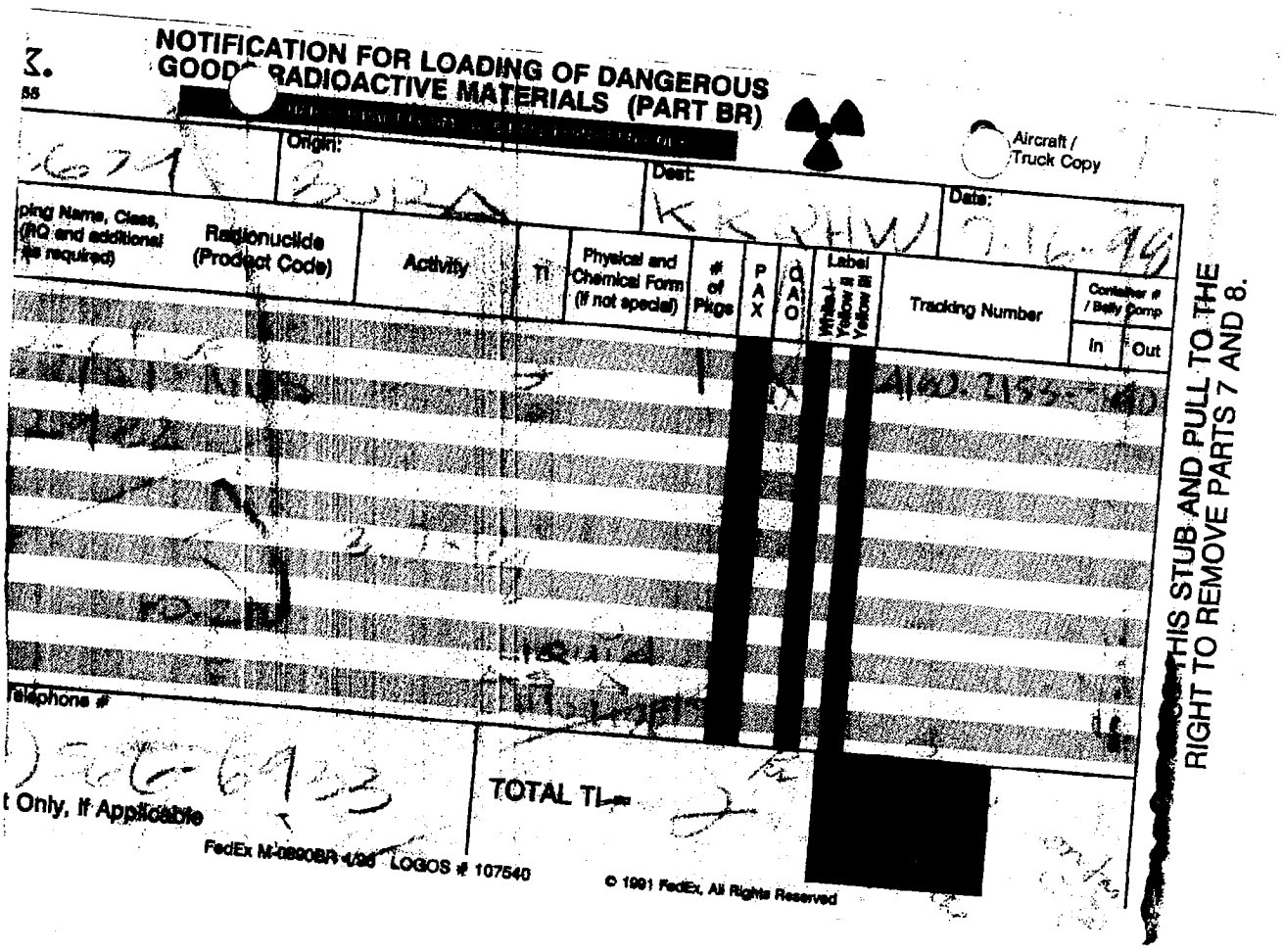
TOTAL TI = [redacted]

Only, If Applicable

FedEx M-039089 1/95 LOGOS # 107540 © 1991 FedEx, All Rights Reserved

GRASP T

B013682



NOTIFICATION FOR LOADING OF DANGEROUS GOODS / RADIOACTIVE MATERIALS (PART BR)

Aircraft / Truck Copy

Origin:

Dest:

Date:

| ping Name, Class, (RQ and additional ds required) | Radionuclide (Product Code) | Activity | TI | Physical and Chemical Form (If not special) | # of Pkgs | PAX | CAO | Label White I Yellow II Yellow III | Tracking Number | Container # / Belly Comp In | Container # / Belly Comp Out |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |

Telephone #

TOTAL TI=

t Only, If Applicable

FedEx M-0890BR 4/96 LOGOS # 107540

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THIS STUB AND PULL TO THE RIGHT TO REMOVE PARTS 7 AND 8.

**ISOTOPE PRODUCTS LABORATORIES**

1800 N. KEYSTONE STREET
BURBANK, CALIFORNIA 91504

FAX (818) 843-6168 • PHONE (818) 843-7000

# *** PACKING LIST ***

ORDER NO. 44705

PG NO. 1

PO Number: P0028058
Order Date: Jun 23, 1998
Ship Via: FEDX 2 PRE&ADD

BILL TO:
University of Medicine & Dentistry of NJ
P.O. Box 101
Accounts Payable
Piscataway, NJ 08854

SHIP TO:
University of Medicine & Dentistry of NJ
Radiation Safety, A-679
NJMS-UMDNJ, 185 S. Orange Ave.
Newark, NJ 07103

Customer Number: UNIMED01
IPL Job Number:
FOB: Burbank

Sales Person: VAR

| Line No. | Part Number | Description | Qty Orig Ordered | Qty to Ship | Qty Actually Shipped |
|---|---|---|---|---|---|
| 0001 | 6310 | Nominal Solution, Po-210<br>100 uCi 1 mL V-Vial. Nominal. | 1 | | |

± 15%

Ref. Authoriz. # 5936

Shipping Instructions:
Buyer: Jim Porter 973-972-4109

NOTES:

Date Filled: 9 July 98 By: Rachel

B013684

**ISOTOPE PRODUCTS LABORATORIES** • **1800 N. Keystone St., Burbank, CA 91504**
**(818) 843-7000 • FAX (818) 843-6168**

EMERGENCY RESPONSE INFORMATION
(49CFR 172.600, 602, 604)
January 24, 1997

1) PROPER SHIPPING NAME AND HAZARD CLASS

____ a) Radioactive material, Excepted package, limited quantity of material N.O.S., UN2910, Class 7

____ b) Radioactive material, Excepted package, Articles, UN2910, Class 7

____ c) Radioactive material, Excepted package, Empty packaging, UN2910, Class 7

____ d) Radioactive material special form N.O.S., UN2974, Class 7

____ e) Radioactive material, fissile, N.O.S., UN2918, Class 7

__✓__ f) Radioactive material, N.O.S., UN2982, Class 7

____ g) Compressed Gas, N.O.S., Non-flammable gas, UN1956, Class 2.2

____ h) Nitrogen, Compressed, Non-flammable gas, UN1066, Class 2.2

____ i) Argon, Compressed, Non-flammable gas, UN1006, Class 2.2

____ j) Neon, Compressed, Non-flammable gas, UN1065, Class 2.2

____ k) Hydrogen, Compressed, Flammable gas, UN1049, Class 2.1

____ l) Nitric Acid, 40% or less, Corrosive material, NA1760, Class 8

____ m) Hydrochloric Acid, Corrosive material, UN1789, Class 8

2) IMMEDIATE HAZARDS TO HEALTH: no significant hazards

3) RISKS OF FIRE OR EXPLOSION:

__✓__ a) none

____ b) Compressed gas: could explode on exposure to intense heat or flame.

4) IMMEDIATE PRECAUTIONS: Keep non-essential people away from area; notify radiation safety authorities.

5) EMERGENCY FIRE MEASURES: Self-contained breathing apparatus and firefighters' protective gear should be used.

6) HANDLING SPILLS OR LEAKS: Do not touch exposed contents. See 4) above.

7) FIRST AID: Use standard first aid measures as required. Advise medical personnel that victim may be contaminated with low level radioactive material.

8) 24 hour emergency response number: (818) 566-6933.

**Radioactive Sources • Devices • Nuclides**



B013685

# Material Safety Data Sheet

## I. General Information

| | |
|---|---|
| Chemical Names and Synonyms: HYDROCHLORIC ACID SOLUTION (0.04% TO 24%) | Trade Names and Synonyms: Muriatic Acid |
| Chemical Family: Inorganic Acid | Formula: HCl |
| Proper DOT Shipping Name: HYDROCHLORIC ACID SOLUTION | DOT Hazard Classification: Class 8 |
| Manufacturer: Mallinckrodt, Inc. | Manufacturer's Phone Number: 314-982-5000 |
| Manufacturer's Address: P. O. Box M, Paris, KY 40361 | Chemtrec Phone Number: 800-424-9300; Reals Phone Number: 415-540-3014 |

## II. Ingredients

| Principal Hazardous Components | Percent | Threshold Limit Value (units) |
|---|---|---|
| Hydrochloric Acid | 0.04% to 24% | 5 ppm |

* * * * CAUTION * * * *

CONTAINS RADIOACTIVE MATERIAL WHICH, ALTHOUGH BEYOND THE SCOPE OF MSDS REQUIREMENTS, SHOULD BE CONSIDERED THE PRINCIPAL HAZARD. THIS MATERIAL SHOULD BE HANDLED ONLY BY TRAINED INDIVIDUALS IN CONFORMANCE WITH 10CFR REQUIREMENTS.

## III. Physical Data

| | |
|---|---|
| Boiling Point: 100°C to 109°C | Specific Gravity ($H_2O$ = 1): 1.00 to 1.18 |
| Vapor Pressure (mm Hg): 3,040 at 17.8°C | Percent Volatile by Volume: N/A |
| Vapor Density (Air = 1): Approximately 1.2 | Evaporation Rate ($H_2O$ = 1): 1 |
| Solubility in Water: Infinite | pH: 0+ to 3.0 |
| Appearance and Color: Clear, Colorless Solution with Pungent Odor | |

## IV. Fire & Explosion Hazard Data

| | | |
|---|---|---|
| Flash Point (Test Method): N/A | Auto-Ignition Temperature: N/A | |
| Flammable Limits: N/A | LEL: N/A | UEL: N/A |
| Extinguishing Medium: Water Spray | | |
| Special Fire Fighting Procedures: Full Protective Clothing and NIOSH-Approved Positive Pressure SCBA should be worn. | | |

* * * * CAUTION * * * *

MAY PRODUCE AIRBORNE RADIOACTIVE MATERIALS DURING FIRE. CONSULT HEALTH PHYSICS/RADIATION SAFETY STAFF.

## V. Health Hazard Data

| | | | |
|---|---|---|---|
| Threshold Limit Value: 5 ppm TWA | OSHA Threshold Limit Value: 5 ppm TWA | ACGIH Threshold Limit Value: 5 ppm TWA | |
| Carcinogen--NTP Program: N/A | | Carcinogen--IARC Program: N/A | |

Symptoms of Exposure: Corrosive. Inhalation: Coughing, choking, inflammation of upper and lower respiratory tract. Ingestion: May cause burns in mouth, throat, and G.I. tract. Skin and Eye Contact: May cause severe burns.

Medical Conditions Aggravated by Exposure: Pre-existing skin conditions. Eye Disease.

Primary Routes of Entry: Inhalation, Ingestion.

Emergency First Aid: Inhalation: Move to fresh air; give artificial respiration as required. Ingestion: Give large quantities of water. Do not induce vomiting. Skin and Eyes: Flood with large amounts of water. GET MEDICAL ATTENTION.

## VI. Reactivity Data

| | |
|---|---|
| Stability: ☐ Unstable ■ Stable | Conditions to Avoid: High heat |
| Incompatibility (Materials to Avoid): Alkalis, metals, acetic anhydride, ethylenediamine, chlorosulfonic acid. | |
| Hazardous Polymerization: ☐ May occur ■ Will not occur | Conditions to Avoid: High heat |
| Hazardous Decomposition Products: HCl fumes, $H_2$ from metals, $Cl_2$ from oxidizers. | |

## VII. Environmental Protection Procedures

Spill Response: Assure adequate ventilation in area of spill or positive pressure SCBA as required. Flush with water and neutralize with alkaline material (soda ash, lime). Treat as radioactive spill.

Waste Disposal Method: Radioactive material. Notify Health Physics/Radiation Safety.

## VIII. Special Protection Information

| | |
|---|---|
| Eye Protection: Chemical Safety Goggles. | Skin Protection: Gloves, Apron or Lab Gown |
| Respiratory Protection (Specific Type): Consult Health Physics Staff. | Ventilation Recommended: Consult Health Physics Staff |

Other Protection: Handling of this material should be done in accordance with prescribed radioactive materials handling procedures.

## IX. Special Precautions

Hygienic Practices in Handling and Storing: Store in cool, dry storage area. Protect from physical damage. Consult Health Physics/Radiation Safety.

Procedures for Repair & Maintenance of Contaminated Equipment: Consult Health Physics. Treat Contaminated equipment as radioactive contamination problem.

Other Procedures: N/A

B013686

# SHIPPER'S DECLARATION FOR DANGEROUS GOODS

Shipper

**ISOTOPE PRODUCTS LABORATORIES**
**1800 NORTH KEYSTONE**
**BURBANK, CA 91504**

Air Waybill No. 1140-2153-3740

Page 1 of 1 Pages

Shipper's Reference Number 44705 *(optional)*

Consignee UNIVERSITY OF MEDICINE & DENTISTRY
RADIATION SAFETY, A-679
NJMS-UMDNJ, 185 S. ORANGE AVE.
NEWARK, NJ 07103

*(Company logo, name and address optional)*

*Two completed and signed copies of this Declaration must be handed to the operator*

**WARNING**

Failure to comply in all respects with the applicable Dangerous Goods Regulations may be in breach of the applicable law, subject to legal penalties. This Declaration must not, in any circumstances, be completed and/or signed by a consolidator, a forwarder or an IATA cargo agent.

TRANSPORT DETAILS

This shipment is within the limitations prescribed for

CARGO AIRCRAFT ONLY

Airport of Departure LOSANGELES

Airport of Destination NEWARK

Shipment type RADIOACTIVE

NATURE AND QUANTITY OF DANGEROUS GOODS

| Dangerous Goods Identification | | | | | Quantity and type of packing | Packing Inst. | Authorization |
|---|---|---|---|---|---|---|---|
| Proper Shipping Name | Class or Division | UN or ID No. | Packing Group | Subsidiary Risk | | | |
| RADIOACTIVE MATERIAL N.O.S. | 7 | UN2982 | | | Po-210 LIQUID AS A CHLORIDE X 3.7MBq, ALL PACKED IN ONE TYPE A PACKAGE. | WHITE I<br>DIM. 31X 31X 31CM. | |

Additional Handling Information

**EMERGENCY # (818) 566-6933**

**THIS SHIPMENT MAY BE CARRIED ON PASSENGER AIRCRAFT OUTSIDE U.S. JURISDICTION.**

I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labelled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Name/Title of Signatory
M.LANDEROS/SHIPPING DEPT.

Place and Date
BURBANK, CA 16 JULY 98

Signature *(see warning above)* Martin Landeros

B013687

# SHIPPER'S DECLARATION FOR DANGEROUS GOODS

Shipper

**ISOTOPE PRODUCTS LABORATORIES**
**1800 NORTH KEYSTONE**
**BURBANK, CA 91504**

Air Waybill No. A140-2153-3740

Page 1 of 1 Pages

Shipper's Reference Number 44705 *(optional)*

Consignee UNIVERSITY OF MEDICINE & DENTISTRY
RADIATION SAFETY, A-679
NJMS-UMDNJ, 185 S. ORANGE AVE.
NEWARK, NJ 07103

*(Company logo, name and address optional)*

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TRANSPORT DETAILS

This shipment is within the limitations prescribed for

CARGO AIRCRAFT ONLY

Airport of Departure: LOSANGELES

Airport of Destination: NEWARK

Shipment type: RADIOACTIVE

NATURE AND QUANTITY OF DANGEROUS GOODS

| Dangerous Goods Identification | | | | | Quantity and type of packing | Packing Inst. | Authorization |
|---|---|---|---|---|---|---|---|
| Proper Shipping Name | Class or Division | UN or ID No. | Packing Group | Subsidiary Risk | | | |
| RADIOACTIVE MATERIAL N.O.S. | 7 | UN2982 | | | Po-210 LIQUID AS A CHLORIDE X 3.7MBq, ALL PACKED IN ONE TYPE A PACKAGE. | WHITE I<br><br>DIM.<br>31X<br>31X<br>31CM. | |

Additional Handling Information

**EMERGENCY # (818) 566-6933**

**THIS SHIPMENT MAY BE CARRIED ON PASSENGER AIRCRAFT OUTSIDE U.S. JURISDICTION.**

I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labelled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Name/Title of Signatory

M.LANDEROS/SHIPPING DEPT.

Place and Date

BURBANK, CA 16 JULY 98

Signature *(see warning above)* M Landeros

B013688

# NOMINAL LIQUID SOURCE DATA SHEET

**Customer:** University of Medicine & Dentistry of NJ **Date:** 10-Jul-98

**P.O. Number:** P0028058

**Catalog No.:** 6310 **Quantity:** 1

| Source No. | Nuclide | Activity | Spec. Act. | Ref. Date | Conc. |
|---|---|---|---|---|---|
| 580-68 | Po-210 | 100 μCi | Not determined | 1 Aug 98 | 100 μCi/ml |

**Volume (ml):** 1 **Chemical Form:** $PoCl_4$ in 2M HCl

**Radionuclidic Purity:** >99%

**Leak Test Information is on the reverse side.**

**Impurities:** None detected

**Remarks:**

**Precaution:** This container must not be opened until adequate health and safety measures are taken (such as placed in a hood, glove box, cell) to protect the user from excessive exposure to the body as a result of radiation and/or contamination. This material has not been sterilized or tested for pyrogenicity. For laboratory or manufacturing use only.

**Lab Book-Page:** 580-68

13 Jul 98, [signature]
Date, Signature

ISOTOPE PRODUCTS LABORATORIES
1800 N. KEYSTONE STREET
BURBANK, CALIFORNIA 91504
818·843·7000 FAX 818·843·6168

B013689

## *THE LEAK TEST(S) INDICATED BY THE CHECKED BOX(ES) WAS (WERE) APPLIED TO DETERMINE THE INTEGRITY OF THE SOURCE DESCRIBED ON THE FRONT SIDE*

☑ ***Standard Wipe Test***

The source is wiped over its entire surface with a moistened paper disk. The total activity on the disk is measured using suitable radiation detection equipment. An activity level exceeding 0.001 µCi beta-gamma or 0.0001 µCi alpha is cause for rejection of the source.

☐ ***Special Wipe Test***

The source is wiped over its entire surface with moistened polystyrene. The polystyrene is then dissolved in a cocktail and counted in a liquid scintillation counter. An activity level exceeding 0.001 µCi beta-gamma or 0.0001 µCi alpha is cause for rejection of the source

☐ ***Soak Test***

The source is immersed in distilled water and maintained at 50°±10° C for a minimum of four hours or at room temperature for a minimum of 12 hours. After removal of the source, the liquid is a) checked for activity using a scintillation counter, or b) evaporated in a planchet and the residue is measured using suitable radiation detection equipment. An activity level exceeding 0.001 µCi beta-gamma or 0.0001 µCi alpha is cause for rejection of the source.

☐ ***Gas Source Test***

The source is placed in a vacuum desiccator and maintained at less than 10mm Hg for not less than 12 hours. The activity is checked by introducing air into the desiccator and monitoring the air with an end-window G.M. tube. An activity level exceeding 0.001 µCi beta-gamma is cause for rejection of the source.

☐ ***Ampule Leak Test***

The ampule is kept in an inverted position on a filter paper disk for a minimum of 16 hours. The total activity on the paper is measured using suitable detection equipment. An activity level exceeding 0.001 µCi beta-gamma or 0.0001 µCi alpha is cause for rejection of the source.

☐ ***Bubble Leak Test***

The container is pressurized to its fill pressure; then soapy water is applied over its valve and neck. If no growing bubbles are observed, the container is considered leak free.

☐ ***Leak Test Not Applicable***

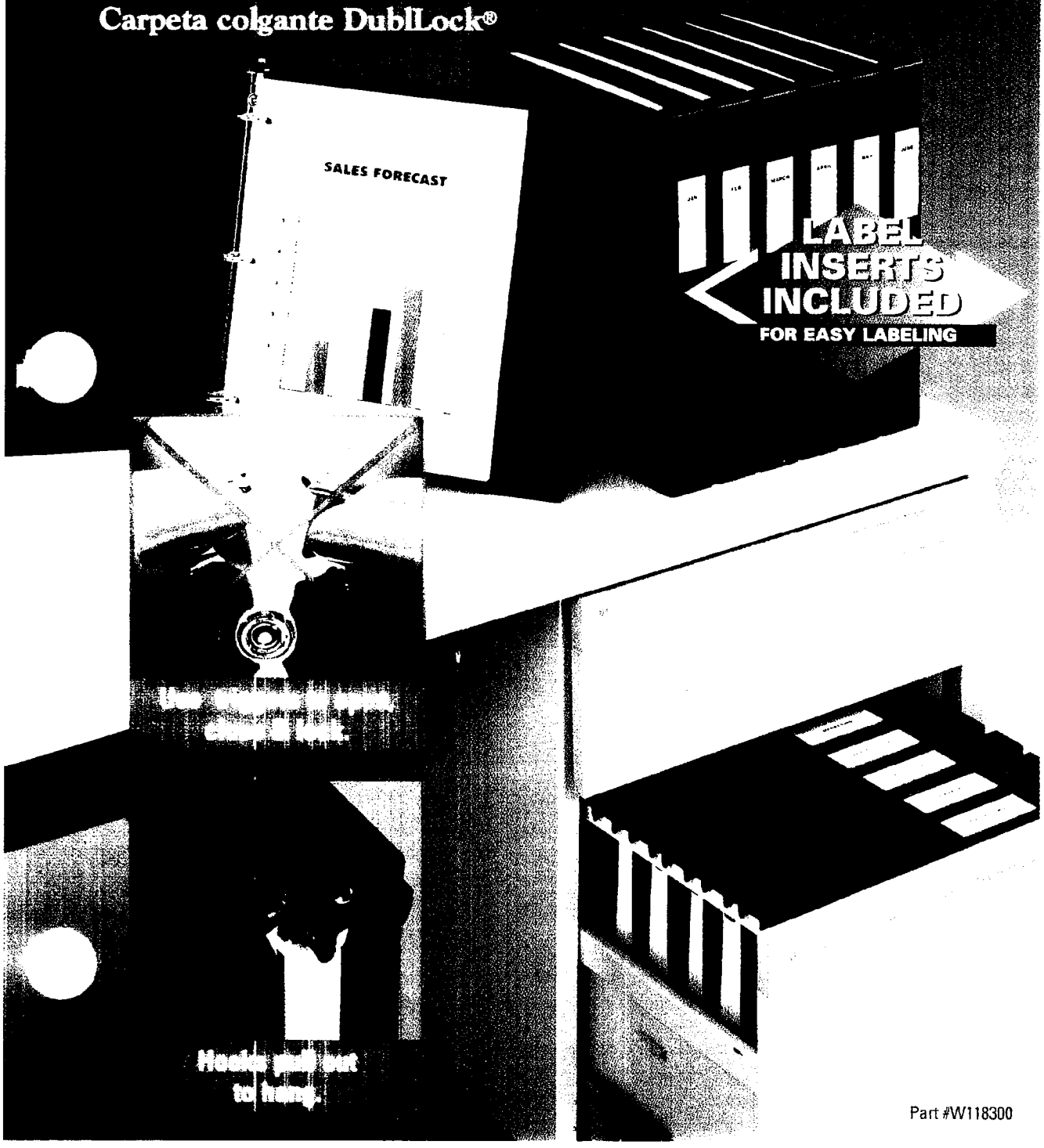
The active area of the source is uncovered or is protected by a very thin coating. Although the deposit is adherent, it is not designed or certified to pass a standard wipe test. The inactive portions of the source have been checked using the standard wipe test. Removable activity did not exceed 0.001 µCi beta-gamma or 0.0001 µCi alpha at the time of shipment.

☐ ***Other Leak Test***

# DUBLLOCK® HANGING BINDER

**Classeur suspendu DublLock®**

**Carpeta colgante DublLock®**



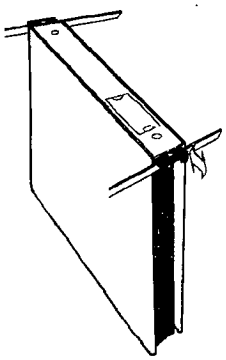

Part #W118300

B013691

# Wilson Jones 364 Line DublLock® Round Ring Binders

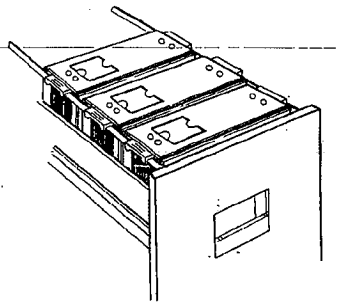
| Colors | *1" | 1½" | 2" | 3" |
|---|---|---|---|---|
| Black | **364-14NB** | **364-34NB** | **364-44NB** | **364-49NB** |
| Dark Blue | **364-14NBL** | **364-34NBL** | **364-44NBL** | **364-49NBL** |
| Burgundy | **364-14NC** | **364-34NC** | **364-44NC** | **364-49NC** |
| Green | **364-14NG** | **364-34NG** | **364-44NG** | **364-49NG** |
| Light Blue | **364-14NJ** | **364-34NJ** | **364-44NJ** | **364-49NJ** |
| Gray | **364-14NM** | **364-34NM** | **364-44NM** | **364-49NM** |
| Red | **364-14NR** | **364-34NR** | **364-44NR** | **364-49NR** |

*1" capacity includes hanging hooks. Binder hangs in any standard file drawer

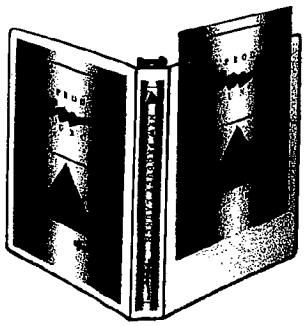


## Wilson Jones makes a full line of hanging binder products to help you organize and save space.

1" capacity holds 240 sheets and is ideal for projects and reports.



2" and 3" capacity hold up to 750 pages of policy manuals, procedures and annual reports.



Presentation style comes in all three sizes. Customize the front cover & spine with your own inserts. Great for sales presentations!

Hanging binders come in a variety of cover materials: light-weight & waterproof poly, attractive & sturdy vinyl and economical pressboard.

For Customer Services Call 1-800-222-6462

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770 S. ACCO Plaza
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S.A. de C.V.
Lerma Edo de Mexico
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