**Data Set: Mutagenicity Data**

**QAPP: NHEERL/EPHD/IG/2014-001-r1**

**Evaluation of an Air Quality Health Index for Predicting**

**the Mutagenicity of Simulated Atmospheres**

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Definitions and descriptions

The data presented below are from the *Salmonella* (Ames) mutagenicity assay, which has been used for more than 45 years to assess the mutagenicity of agents. The data represent the number of mutant colonies per Petri plate.

1. A revertant (rev) is a mutant colony on the Petri plate. Each revertant (rev) represents a mutation, and the greater the number of colonies/plate, the greater the mutagenicity response.

2. Each strain of *Salmonella* bacteria used in this assay (the Ames assay) has a unique ability to detect certain types of mutations and certain classes of mutagens.

3. S9 refers to “supernatant 9,000 *g*,” which is the supernatant (i.e., the liquid) on top of a pellet. In this case, it is the supernatant after centrifuging homogenized rat liver at 9,000 *g*, which is a measure of centrifugal force. This supernatant contains many of the membrane-bound enzymes that provide metabolic activation for compounds. This is necessary sometimes because some compounds need to be metabolically activated before they are mutagenic, and bacteria do not have these enzymes.

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| **Table S1. Mutagenicity of SA-PM at a Flow Rate of 3.5 L/min with the Light Off in TA100** | | | |
|  |  | Rev/plate (date of experiment) | |
| S9 | Dose (h)a | Exp 1 | Exp 2 |
|  |  | (11/11/14) | (12/9/14) |
| - | 0 | 118, 155, 139 | 177, 153, 150 |
|  | 6 | 144, 162 | 161, 149 |
|  | 14 | 141, 97 | 128, 136 |
|  | NaN3 | 689, 755, 688 | 612, 707, 554 |
|  |  |  |  |
|  |  | (11/11/14) | (12/9/14) |
| + | 0 | 145, 153, 111 | 179, 162, 138 |
|  | 6 | 133, 135 | 147, 138 |
|  | 14 | 126, 138 | 146, 147 |
|  | 2AA | 618, 548, 742 | 525, 540, 525 |

aPositive controls were sodium azide (NaN3) at 3 µg/plate –S9 and 2-aminoanthracene (2AA) at 0.5 µg/plate +S9.

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| **Table S2. Mutagenicity of SA-O3 at a Flow Rate of 3.5 L/min with the Lights Off** | | | | | |
|  |  |  | Rev/plate (date of experiment) | | |
| Strain | S9 | Dose (h)a | Exp 1 | Exp 2 | Exp 3 |
|  |  |  | (7/28/15) | (9/22/15) | (9/23/15) |
| TA100 | - | 0 | 113, 111, 116 | 138, 123, 93 | 107, 116, 81 |
|  |  | 2 | 104, 130 | 105, 66 | 65, 73 |
|  |  | 3 |  | 150, 164 | 88, 90 |
|  |  | 4 | 117, 140 |  |  |
|  |  | NaN3 | 860, 802, 773 | 668, 739, 717 | 725, 684, 619 |
|  |  |  |  |  |  |
|  |  |  | (7/28/15) | (9/22/15) | (9/23/15) |
|  | + | 0 | 98, 89, 102 | 127, 112, 91 | 109, 91, 89 |
|  |  | 2 | 76, 101 | 81, 88 | 90, 86 |
|  |  | 3 |  | 135, 154 | 79, 85 |
|  |  | 4 | 122, 123 |  |  |
|  |  | 2AA | 538, 548, 392 | 526, 535, 478 | 585, 505, 470 |
|  |  |  |  |  |  |
|  |  |  | (7/28/15) | (9/22/15) | (9/23/15) |
| TA104 | - | 0 | 241, 257, 239 | 215, 233, 205 | 192, 204, 194 |
|  |  | 2 | 206, 197 | 179, 169 | 160, 164 |
|  |  | 3 |  | 179, 168 | 139, 112 |
|  |  | 4 | 229, 224 |  |  |
|  |  | MG | 1491, 1430, 1483 | 1057, 1174, 1139 | 1292, 1359, 1150 |
|  |  |  |  |  |  |
|  |  |  | (7/28/15) | (9/22/15) | (9/23/15) |
|  | + | 0 | 288, 314, 298 | 263, 285, 219 | 261, 295, 253 |
|  |  | 2 | 255, 251 | 280, 227 | 238, 248 |
|  |  | 3 |  | 255, 260 | 223, 225 |
|  |  | 4 | 300, 296 |  |  |
|  |  | 2AA | 658, 634, 638 | 537, 515, 524 | 520, 547, 418 |

aPositive controls were sodium azide (NaN3) at 3 µg/plate, 2-aminoanthracene (2AA) at 0.5 µg/plate, and methyl glyoxal (MG) at 200 µg/plate.

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| **Table S3. Mutagenicity of SA-O3 at a Flow Rate of 1 L/min with the Lights Off** | | | | |
|  |  |  | Rev/plate (date of experiment) | |
| Strain | S9 | Dose (h)a | Exp 1 | Exp 2 |
|  |  |  | (11/17/15) | (11/18/15) |
| TA100 | - | 0 | 147, 166, 142 | 140, 134, 158 |
|  |  | 2 | 132, 151 | 132, 78 |
|  |  | 3 | 148, 126 | 117, 135 |
|  |  | NaN3 | 807, 763, 728 | 776, 770, 733 |
|  |  |  |  |  |
|  |  |  | (11/17/15) | (11/18/15) |
|  | + | 0 | 162, 135, 120 | 126, 132, 97 |
|  |  | 2 | 148, 130 | 113, 86 |
|  |  | 3 | 112, 156 | 142, 121 |
|  |  | 2AA | 670, 583, 620 | 596, 569, 605 |
|  |  |  |  |  |
|  |  |  | (11/17/15) | (11/18/15) |
| TA104 | - | 0 | 209, 246, 242 | 234, 231, 254 |
|  |  | 2 | 269, 239 | 214, 222 |
|  |  | 3 | 207, 244 | 222, 195 |
|  |  | MG | 1383, 1309, 1342 | 1635, 1597, 1615 |
|  |  |  |  |  |
|  |  |  | (11/17/15) | (11/18/15) |
|  | + | 0 | 265, 282, 278 | 292, 280, 285 |
|  |  | 2 | 258, 244 | 270, 274 |
|  |  | 3 | 260, 254 | 323, 321 |
|  |  | 2AA | 522, 503, 489 | 521, 541, 534 |

aPositive controls were sodium azide (NaN3) at 3 µg/plate, 2-aminoanthracene (2AA) at 0.5 µg/plate, and methyl glyoxal (MG) at 200 µg/plate.

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| **Table S4. Mutagenicity of SA-PM at a Flow Rate of 3.5 L/min with the Lights On** | | | | | | | |  |
|  |  |  | Rev/plate (date of experiment)a | | | | |  |
| Strain | S9 | Dose (h)b | Exp 1 | Exp 2 | Exp 3 | Exp 4 | Exp 5 | Exp 6 |
|  |  |  | (9/17/14) | (10/8/14) |  |  |  |  |
| TA98 | - | 0 | 30 | 59, 49, 57 |  |  |  |  |
|  |  | 1 | 52 |  |  |  |  |  |
|  |  | 2 | 40 |  |  |  |  |  |
|  |  | 4 | 49 | 49 |  |  |  |  |
|  |  | 2NF | 502, 439 | 671, 685, 462 |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  | (9/17/14) | (10/8/14) | (5/19/15) | (5/20/15) |  |  |
|  | + | 0 | 49, 43 | 66, 49, 69 | 30, 36, 37 | 23, 23, 35 |  |  |
|  |  | 1 | 50 |  |  |  |  |  |
|  |  | 2 | 32 |  |  |  |  |  |
|  |  | 4 | 45 | 45 |  |  |  |  |
|  |  | 6 |  |  | 47, 29 | 37, 25 |  |  |
|  |  | 14 |  |  | 26, 38 | 28, 25 |  |  |
|  |  | 2AA | 408, 442 | 518, 527, 538 | 260, 278, 262 | 184, 141, 140 |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  | (5/19/15) | (5/20/15) |  |  |  |  |
|  | HIc | 0 | 23, 30, 29 | 20, 24, 22 |  |  |  |  |
|  |  | 6 | 40, 36 | 22, 19 |  |  |  |  |
|  |  | 14 | 39, 29 | 32, 24 |  |  |  |  |
|  |  | 2AA HI | 33, 31, 23 | 24, 26, 20 |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  | (9/17/14) | (10/7/14) | (11/13/14) | (5/12/15) | (5/13/15) |  |
| TA100 | - | 0 | 121 | 148, 167, 185 | 202, 210, 238 | 126, 115, 115 | 111, 121 |  |
|  |  | 1 | 140 |  |  |  |  |  |
|  |  | 2 | 154 |  |  |  |  |  |
|  |  | 4 | 223 |  |  |  |  |  |
|  |  | 6 |  | 181T | 272, 323 | 258, 243 | 127T, 217 |  |
|  |  | 14 |  | 131T | 390, 387 | 121T, 163T | 112T, 93 |  |
|  |  | NaN3 | 734, 717 | 850, 882, 890 | 674, 711, 779 | 636, 586, 651 | 675, 659, 634 |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  | (9/17/14) | (10/7/14) | (11/13/14) | (11/18/14) | (12/11/14) | (5/12/15) |
|  | + | 0 | 147, 170 | 138, 148, 135 | 194, 201, 194 | 169, 152 | 147, 180, 138 | 125, 144, 117 |
|  |  | 1 | 181 |  |  |  |  |  |
|  |  | 2 | 210 |  |  |  |  |  |
|  |  | 4 | 305 |  |  |  |  |  |
|  |  | 6 |  | 234 | 366, 328 | 283, 250 | 328,353 | 340, 318 |
|  |  | 14 |  | 386 | 503, 476 | 411, 390 | 481, 450 | 273T, 395 |
|  |  | 2AA |  | 674, 765, 754 | 818, 771, 845 | 639, 585, 550 | 481, 433, 438 | 342, 677, 450 |
|  |  |  |  |  |  |  |  |  |
|  |  |  | (11/18/14) | (12/11/14) | (5/13/15) |  |  |  |
|  | HIc | 0 | 148, 162 | 136, 178, 160 | 112, 84 |  |  |  |
|  |  | 6 | 280, 306 | 427, 326 | 229, 256 |  |  |  |
|  |  | 14 | 279, 386 | 293, 303 | 339T, 265T |  |  |  |
|  |  | 2AA HI | 146, 135 | 162, 165, 136 | 135, 134, 137 |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  | (10/7/14) | (10/8/14) |  |  |  |  |
| TA104 | - | 0 | 308, 254, 264 | 358, 384, 362 |  |  |  |  |
|  |  | 1 | 296 |  |  |  |  |  |
|  |  | 2 | 287 |  |  |  |  |  |
|  |  | 4 |  | 365 |  |  |  |  |
|  |  | 6 | 326 |  |  |  |  |  |
|  |  | 14 | 312 |  |  |  |  |  |
|  |  | MG | 657, 662, 733 | 543, 553, 568 |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  | (10/7/14) | (10/8/14) | (5/12/15) | (5/13/15) |  |  |
|  | + | 0 | 385, 386, 343 | 433, 437, 441 | 301, 250 | 249, 271 |  |  |
|  |  | 1 | 399 |  |  |  |  |  |
|  |  | 2 | 452 |  |  |  |  |  |
|  |  | 4 |  | 547 |  |  |  |  |
|  |  | 6 | 486 |  | 458, 452 | 486 |  |  |
|  |  | 14 | 570 |  | 317T, 471T | 210T, 465 |  |  |
|  |  | 2AA | 737, 675, 775 | 671, 633, 599 | 349, 502, 503 | 395, 421, 460 |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  | (5/12/15) | (5/13/15) |  |  |  |  |
|  | HIc | 0 | 294, 332 | 287, 269 |  |  |  |  |
|  |  | 1 |  |  |  |  |  |  |
|  |  | 6 | 442 | 357, 347 |  |  |  |  |
|  |  | 14 | 418T, 464 | 313T, 386 |  |  |  |  |
|  |  | 2AA HI | 270, 241, 266 | 284, 293, 246 |  |  |  |  |

aT = toxic as evidence by a thinning of the background lawn and/or small, pinpoint colonies.

bPositive controls were 2-nitrofluorene (2NF) at 3 µg/plate, 2-aminoanthracene (2AA) at 0.5 µg/plate, sodium azide (NaN3) at 3 µg/plate and methyl glyoxal (MG) at 50 µg/plate.

cHI = heat-inactivated S9 (see Methods).

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| **Table S5. Mutagenicity of SA-O3 at a Flow Rate of 3.5 L/min with the Lights On** | | | | | |
|  |  |  | Rev/plate (date of experiment)a | | |
| Strain | S9 | Dose (h)b | Exp 1 | Exp 2 | Exp 3 |
|  |  |  | (7/23/15) |  |  |
| TA98 | - | 0 | 39, 35, 34 |  |  |
|  |  | 3 | 45, 39 |  |  |
|  |  | 14 | 0T, 7T |  |  |
|  |  | 2NF | 296, 311, 316 |  |  |
|  |  |  |  |  |  |
|  |  |  | (7/23/15) |  |  |
|  | + | 0 | 46,47, 40 |  |  |
|  |  | 3 | 35, 42 |  |  |
|  |  | 14 | 24T, 17T |  |  |
|  |  | 2AA | 395, 400, 446 |  |  |
|  |  |  |  |  |  |
|  |  |  | (7/21/15) | (7/31/15) |  |
| TA100 | - | 0 | 109, 94, 85 | 113, 109, 108 |  |
|  |  | 2 |  | 136, 156 |  |
|  |  | 4 |  | 112T, 133T |  |
|  |  | 6 | 103T, 62T |  |  |
|  |  | 14 | 0T, 0T |  |  |
|  |  | NaN3 | 684, 589, 648 | 619, 625, 628 |  |
|  |  |  |  |  |  |
|  |  |  | (7/21/15) | (7/23/15) | (7/31/15) |
|  | + | 0 | 103, 126, 113 | 133, 121, 121 | 109, 119, 104 |
|  |  | 2 |  |  | 182, 155 |
|  |  | 3 |  | 252, 278 |  |
|  |  | 4 |  |  | 181T, 243T |
|  |  | 6 | 154T, 158T |  |  |
|  |  | 14 | 15T, 4T | 242T, 375c |  |
|  |  | 2AA | 578, 573, 565 | 1095, 836, 833 | 520, 523, 389 |
|  |  |  |  |  |  |
|  |  |  | (7/23/15) |  |  |
|  | HId | 0 | 141, 164, 136 |  |  |
|  |  | 3 | 358, 328 |  |  |
|  |  | 14 | 41T, 346T,c |  |  |
|  |  | 2AA HI | 135, 126, 128 |  |  |
|  |  |  |  |  |  |
|  |  |  | (7/21/15) | (7/31/15) |  |
| TA104 | - | 0 | 208, 216, 170 | 228, 255, 217 |  |
|  |  | 2 |  | 272, 274 |  |
|  |  | 4 |  | 247T, 298T |  |
|  |  | 6 | 175T, 186T |  |  |
|  |  | 14 | 0T, 0T |  |  |
|  |  | MG | 413, 393, 379 | 1157, 1340, 1108 |  |
|  |  |  |  |  |  |
|  |  |  | (7/21/15) | (7/31/15) |  |
|  | + | 0 | 258, 241, 261 | 256, 314, 273 |  |
|  |  | 2 |  | 373, 460 |  |
|  |  | 4 |  | 415T, 403T |  |
|  |  | 6 | 274T, 312T |  |  |
|  |  | 14 | 187T, 69T |  |  |
|  |  | 2AA | 400, 448, 460 | 462, 495, 509 |  |

aT = toxic as evidenced by a thinning of the background lawn and/or small, pinpoint colonies.

bPositive controls were 2-nitrofluorene (2NF) at 3 µg/plate, sodium azide (NaN3) at 3 µg/plate, 2-aminoanthracene (2AA) at 0.5 µg/plate, and methyl glyoxal (MG) at 200 µg/plate.

cThis group of plates experienced an unstable flow rate between 1-3.5 L/min during exposure.

dHI = heat-inactivated S9 (see Methods).

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| **Table S6. Mutagenicity of SA-PM at a Flow Rate of 1 L/min with the Lights On** | | | | | | | | |
|  |  |  | Rev/plate (date of experiment) | | | | | |
| Strain | S9 | Dose (h)b | Exp 1 | Exp 2 | Exp 3 | Exp 4 | Exp 5 | Exp 6 |
|  |  |  | (1/27/15) | (1/28/15) |  |  |  |  |
| TA100 | - | 0 | 152, 148, 140 | 153, 156, 153 |  |  |  |  |
|  |  | 6 | 217, 184 | 232, 200 |  |  |  |  |
|  |  | 14 | 304, 256 | 250, 285 |  |  |  |  |
|  |  | NaN3 | 691, 696, 706 | 768, 760, 824 |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  | (1/27/15) | (1/28/15) | (1/29/15) | (1/30/15) | (5/14/15) | (5/15/15) |
|  | + | 0 | 141, 121, 150 | 148, 136, 148 | 135, 144, 149 | 136, 145, 115 | 96, 103 | 114, 110 |
|  |  | 6 | 244, 216 | 194, 228 | 240, 199 | 214, 243 | 165, 139 | 203, 163 |
|  |  | 14 | 319, 353 | 273, 312 | 316, 376 |  | 226, 284c | 233, 199 |
|  |  | 2AA | 798, 682, 719 | 771, 816, 671 | 825, 835 | 564, 526, 448 | 557, 426, 230 | 390, 480, 505 |
|  |  |  |  |  |  |  |  |  |
|  |  |  | (1/29/15) | (1/30/15) | (5/14/15) | (5/15/15) |  |  |
|  | HI a | 0 | 133, 148, 138 | 128, 139, 137 | 130, 110c | 143, 122 |  |  |
|  |  | 6 | 250, 206 | 236, 222 | 157, 187 | 161, 227 |  |  |
|  |  | 14 | 303, 269 |  | 276, 248 | 223, 284 |  |  |
|  |  | 2AA HI | 151, 125 | 116, 79 | 109, 128, 114 | 128, 110, 118 |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  | (5/14/15) | (5/15/15) |  |  |  |  |
| TA104 | + | 0 | 270, 253 | 374, 351 |  |  |  |  |
|  |  | 6 | 341, 390 | 366, 403 |  |  |  |  |
|  |  | 14 | 436, 453 | 372, 460 |  |  |  |  |
|  |  | 2AA | 447, 334, 454 | 512, 505, 430 |  |  |  |  |
|  |  | 2AAd |  | 700 |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  | (5/14/15) | (5/15/15) |  |  |  |  |
|  | HI a | 0 | 267, 260 | 368, 291 |  |  |  |  |
|  |  | 6 | 349, 312 | 372, 333 |  |  |  |  |
|  |  | 14 | 391, 418 | 368, 351 |  |  |  |  |
|  |  | 2AA HI | 114, 277, 236 | 274, 260, 281 |  |  |  |  |
|  |  | 2AAd HI |  | 257 |  |  |  |  |

aHI = heat-inactivated S9 (see Methods).

bPositive controls were sodium azide (NaN3) at 3 µg/plate –S9 and 2-aminoanthracene (2AA) at 0.5 µg/plate (except where noted at footnote “d”).

cRevertants from these groups of plates were selected for DNA sequence analysis.

d2-aminoanthracene (2AA) was at 1.0 µg/plate.

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| **Table S7. Mutagenicity of SA-O3 at a Flow Rate of 1 L/min with the Lights On** | | | | |
|  |  |  | Rev/plate (date of experiment) | |
| Strain | S9 | Dose (h)a | Exp 1 | Exp 2 |
|  |  |  | (11/19/15) | (11/20/15) |
| TA100 | - | 0 | 117, 122, 118b | 116, 109, 100 |
|  |  | 2 | 168, 143 | 213, 219 |
|  |  | 3 | 214, 206b | 159, 160 |
|  |  | NaN3 | 682, 674, 627 | 725, 780, 754 |
|  |  |  |  |  |
|  |  |  | (11/19/15) | (11/20/15) |
|  | + | 0 | 136, 112, 127b | 124, 132, 102 |
|  |  | 2 | 165, 177 | 213, 191 |
|  |  | 3 | 204, 211b | 150, 211 |
|  |  | 2AA | 664, 689, 690 | 645, 660, 624 |
|  |  |  |  |  |
|  |  |  | (11/19/15) | (11/20/15) |
| TA104 | - | 0 | 239, 210, 255 | 214, 218, 237 |
|  |  | 2 | 248, 241 | 265, 241 |
|  |  | 3 | 248, 257 | 263, 272 |
|  |  | MG | 1330, 1377, 1365 | 1211, 1334, 1379 |
|  |  |  |  |  |
|  |  |  | (11/19/15) | (11/20/15) |
|  | + | 0 | 280, 303, 294 | 300, 312, 280 |
|  |  | 2 | 348, 386 | 330, 352 |
|  |  | 3 | 384, 376 | 374, 384 |
|  |  | 2AA | 508, 464, 486 | 503, 521, 461 |

aThe positive controls were sodium azide (NaN3) at 3 µg/plate, 2 aminoanthracene (2AA) at 0.5 µg/plate, and methyl glyoxal (MG) at 200 µg/plate.

bThe revertants in this group were selected for DNA sequence analysis.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| **Table S8. Mutagenicity in Strain TA100 of Extracts of PM2.5 of SA-PMa** | | | | | | | | | | | | | | | | | | | |
| Dose | S9 | Rev/plate | | | | | | | | | | | | |  | Blanks (rev/plate) | | | |
| (µg EOM/ |  | MeOH | |  | H2O |  | DCM/MeOH (1:1) | |  | HIB | |  | DCM | |  | MeOH | DCM/MeOH | HIB | DCM |
| plate |  | Exp 1 | Exp 2 |  | Exp 1 |  | Exp 1 | Exp 2 |  | Exp 1 | Exp 2 |  | Exp 1 | Exp 2 |  |  |  |  |  |
| 0 | - | 84, 82, 79 | 122, 153, 170 |  | 82b |  | 82b | 148c |  | 82b | 148c |  | 82b | 148c |  | 148c | 148c | 148c | 148c |
| 5 |  | 105 |  |  | 85 |  | 84 |  |  | 86 |  |  | 77 |  |  |  |  |  |  |
| 10 |  | 83 |  |  | 87 |  | 90 |  |  | 93 |  |  | 96 |  |  |  |  |  |  |
| 20 |  | 86 | 147 |  | 83 |  | 77 | 113 |  | 87 | 114 |  | 72 | 126 |  |  |  |  |  |
| 40 |  |  | 113 |  |  |  |  | 114 |  |  | 114 |  | 116 | 140 |  |  |  |  |  |
| 50 |  | 75 |  |  | 94 |  | 66 |  |  | 91 |  |  |  |  |  |  |  |  |  |
| 100 |  | 93 | 135 |  | 89 |  | 88 | 144 |  | 93 | 145 |  | 113 | 150 |  | 150 | 148 | 154 | 135 |
| 200 |  | 103 | 157 |  | 72 |  | 85 | 147 |  | 94 | 161 |  | 107 | 152 |  | 161 | 151 | 154 | 108 |
| 400 |  |  | 148 |  |  |  |  | 159 |  |  |  |  |  | 182 |  | 145 | 156 | 138 | 134 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 0 | + | 97, 88, 85 | 167, 139, 128 |  | 90 |  | 90 | 145 |  | 90 | 145 |  | 90 | 145 |  | 145 | 145 | 145 | 145 |
| 5 |  | 96 |  |  | 90 |  | 101 |  |  | 92 |  |  | 97 |  |  |  |  |  |  |
| 10 |  | 99 |  |  | 96 |  | 90 |  |  | 88 |  |  | 120 |  |  |  |  |  |  |
| 20 |  | 88 | 117 |  | 93 |  | 87 | 160 |  | 82 | 110 |  | 119 | 152 |  |  |  |  |  |
| 40 |  |  | 128 |  |  |  |  | 152 |  |  | 139 |  | 129 | 160 |  |  |  |  |  |
| 50 |  | 104 |  |  | 89 |  | 87 |  |  | 119 |  |  |  |  |  |  |  |  |  |
| 100 |  | 89 | 156 |  | 94 |  | 93 | 177 |  | 80 | 165 |  | 148 | 165 |  | 115 | 122 | 123 | 120 |
| 200 |  | 110 | 178 |  | 83 |  | 86 | 201 |  | 92 | 206 |  | 216 | 161 |  | 110 | 114 | 121 | 130 |
| 400 |  |  | 215 |  |  |  |  | 186 |  |  | 208 |  |  | 191 |  | 116 | 130 | 124 | 126 |

aPositive control data (rev/plate) for Exp 1: 2-aminoanthracene (0.5 µg/plate) +S9 (774, 659, 684); for sodium azide (3 µg/plate) –S9 (602, 557, 533). For Exp 2: 2-aminoanthracene +S9 (793, 756, 821); for sodium azide –S9 (717, 733, 627).

bThe average rev/plate for the 0 dose control values for Exp 1 (84, 82, 79) is 82.

cThe average rev/plate for the 0 dose control values for Exp 2 (122, 153, 170) is 148.

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| **Table S9. Mutagenicity of O3 and NO2 in Strain TA100 ±S9 at a Flow Rate of 1 L/min** | | | | |
|  |  |  | Rev/plate (date of experiment) | |
| Agent (ppm) | S9 | Exposure (h)a | Exp 1 | Exp 2 |
|  |  |  | (8/30/16) | (8/31/16) |
| Ozone (415 ppb) | - | 0 | 111, 115, 114 | 119, 121, 128 |
|  |  | 2 | 104, 126 | 107, 106 |
|  |  | 3 | 97, 81 | 117, 117 |
|  |  | NaN3 | 911, 953, 934 | 806, 769, 805 |
|  |  |  |  |  |
|  |  |  | (8/30/16) | (8/31/16) |
|  | + | 0 | 92, 98, 136 | 113, 104, 108 |
|  |  | 2 | 91, 113 | 112, 103 |
|  |  | 3 | 87, 96 | 99, 110 |
|  |  | 2AA | 737, 751, 674 | 727, 808, 824 |
|  |  |  |  |  |
|  |  |  | (9/7/16) | (9/8/16) |
| NO2 (633 ppb) | - | 0 | 127, 146, 109 | 154, 152, 144 |
|  |  | 2 | 111, 120 | 130, 111 |
|  |  | 3 | 126, 92 | 127, 123 |
|  |  | NaN3 | 983, 946, 953 | 893, 898, 875 |
|  |  |  |  |  |
|  |  |  | (9/7/16) | (9/8/16) |
|  | + | 0 | 127, 106, 115 | 129, 131, 127 |
|  |  | 2 | 127, 226 | 93, 137 |
|  |  | 3 | 129, 114 | 152, 130 |
|  |  | 2AA | 791, 868, 825 | -------- |
|  |  |  |  |  |

aThe positive control was 2-aminoanthracene (2AA) at 0.5 µg/plate.

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| --- | --- | --- | --- | --- |
| **Table S10. Mutation Spectra of SA-PM in TA100 +S9 at a Flow Rate of 1 L/min** | | | | |
| Mutation  class | Number of background mutants sequenceda | Expected number of background mutants based on fold increase over backgroundb | Number of exposed mutants sequenceda | Induced number of mutants (%)b |
| TCC | 14 | 5 | 10 | 5 (8) |
| ACC | 17 | 7 | 18 | 11 (17) |
| GCC | 6 | 2 | 0 | 0 (0) |
| CTC | 13 | 5 | 31 | 26 (41) |
| CAC | 50 | 19 | 41 | 22 (34) |

aAll data are from experiment date 5/14/15 and are based on DNA sequence analysis of 100 background (control) and 100 exposed mutants (revertants). Background mutants (revertants) that were sequenced came from those shown in Table S4 and are the revertants from control plates containing heat-inactivated (HI) S9. Exposed mutants (revertants) that were sequenced came from those shown in Table S4 and are revertants from plates exposed for 14 h containing +S9.

bThe average number of exposed mutants/plate from the 2 plates +S9 was 255, and the average number of background mutants/plate from the 3 plates with HI was 100. Thus, the fold increase was 255 ÷ 100 = 2.6. Consequently, ~38% of the exposed mutants 100 ÷ 2.6 = 38) were actually background (spontaneous) mutants because the fold increase over background was 2.6. We subtracted this background mutation spectrum from the exposed mutation spectrum to obtain the induced mutation spectrum—i.e., the percentage of each of the classes of mutations actually induced by the exposure as follows. The expected number of background mutations among the mutants from the exposed plates was calculated by first dividing the total number of mutations found in each class by the fold increase above the background (2.6). Because 100 mutants were sequenced, 100 ÷ 2.6-fold increase = 38 background mutants were among the 100 mutants sequenced from the exposed plates. This expected number of background mutants (38) was then distributed among the mutant classes according to the frequency of the occurrence of each mutant class in the background mutation spectrum. The induced number of mutants was calculated by subtracting the expected number of background mutants from the number of mutants from the exposed cells. These numbers of induced mutants were then expressed as a percentage. Collapsing the mutation classes shows that 49% of the mutations induced by SA-PM were C → T, and 51% were C → A base substitutions.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Table S11. Mutation Spectra of SA-O3 in TA100 +S9 at a Flow Rate of 1 L/min** | | | | |
| Mutation  class | Number of background mutants sequenceda | Expected number of background mutants based on fold increase over backgroundb | Number of exposed mutants sequenceda | Induced number of mutants (%)b |
| TCC | 15 | 9 | 20 | 11 (26) |
| ACC | 25 | 15 | 16 | 1 (2) |
| GCC | 5 | 3 | 1 | 0 (0) |
| CTC | 18 | 11 | 25 | 14 (33) |
| CAC | 37 | 21 | 38 | 17 (39) |

aAll data are from experiment date 5/14/15 and are based on DNA sequence analysis of 100 background (control) and 100 exposed mutants (revertants) shown in Table S7.

bThe average number of exposed mutants/plate from the 2 plates was 208, and the average number of background mutants/plate from the 3 plates 125. Thus, the fold increase was 208 ÷ 125 = 1.7. Consequently, ~59% (100 ÷ 1.7 = 59) of the exposed mutants were actually background (spontaneous) mutants because the fold increase over background was 1.7. We subtracted this background mutation spectrum from the exposed mutation spectrum to obtain the induced mutation spectrum—i.e., the percentage of each of the classes of mutations actually induced by the exposure as follows. The expected number of background mutations among the mutants from the exposed plates was calculated by first dividing the total number of mutations found in each class by the fold increase above the background (2.6). Because 100 mutants were sequenced, 100 ÷ 1.7-fold increase = 59 background mutants were among the 100 mutants sequenced from the exposed plates. This expected number of background mutants (59) was then distributed among the mutant classes according to the frequency of the occurrence of each mutant class in the background mutation spectrum. The induced number of mutants was calculated by subtracting the expected number of background mutants from the number of mutants from the exposed cells. These numbers of induced mutants were then expressed as a percentage. Collapsing the mutation classes shows that 59% of the mutations induced by SA-O3 were C → T, and 41% were C → A base substitutions.