

## Appendix C

### *In Vitro* Data for Substances Tested in the IRE Test Method

|           |                                      |             |
|-----------|--------------------------------------|-------------|
| <b>C1</b> | <b>Balls et al. (1995)</b> .....     | <b>C-3</b>  |
| <b>C2</b> | <b>Guerriero et al. (2004)</b> ..... | <b>C-13</b> |
| <b>C3</b> | <b>Gettings et al. (1996)</b> .....  | <b>C-21</b> |
| <b>C4</b> | <b>CEC (1991)</b> .....              | <b>C-27</b> |

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## **Appendix C1**

### **Balls et al. (1995) Data Sorted by Reference**

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| Form Tested | Testing Lab | Opacity |      | Swelling |       | In Vitro Irritancy Classification | Overall In Vitro Irritancy Classification |
|-------------|-------------|---------|------|----------|-------|-----------------------------------|---|
|             |             | 1 Hr    | 4 Hr | 1 Hr     | 4 Hr  |                                   |   |
| Liquid      | IREA 26     | 3       | 2    | 10       | 25    | Severe                            | Severe                                    |
| Liquid      | IREA 23     | 3       | 2    | 32.6     | 76.3  | Severe                            |   |
| Liquid      | IREA 28     | 3.7     | 0.2  | 5.5      | 11.3  | Nonsevere                         |   |
| Liquid      | IREA 29     | 2       | 0    | 13       | 15    | Nonsevere                         |   |
| Solid       | IREA 26     | 0       | 0    | 10       | 25    | Severe                            | Nonsevere                                 |
| Solid       | IREA 23     | 0       | 0    | 3        | 3     | Nonsevere                         |   |
| Solid       | IREA 28     | 0       | 0    | 9.1      | 12.7  | Nonsevere                         |   |
| Solid       | IREA 29     | 0       | 0    | 7        | 0     | Nonsevere                         |   |
| Solid       | IREA 26     | 0       | 0    | 5        | 5     | Nonsevere                         | Nonsevere                                 |
| Solid       | IREA 23     | 0       | 0    | 0        | 0     | Nonsevere                         |   |
| Solid       | IREA 28     | 0       | 0    | 9.2      | 15.3  | Nonsevere                         |   |
| Solid       | IREA 29     | 1       | 1    | 6        | 4     | Nonsevere                         |   |
| Solution    | IREA 26     | 2       | 3    | 20       | 80    | Severe                            | Severe                                    |
| Solution    | IREA 23     | 2       | 3    | 41.7     | 62.9  | Severe                            |   |
| Solution    | IREA 28     | 1       | 2    | 24       | 37.4  | Severe                            |   |
| Solution    | IREA 29     | 1.7     | 2    | 60       | 112   | Severe                            |   |
| Solution    | IREA 26     | 2       | 2    | 29.2     | 66.4  | Severe                            | Severe                                    |
| Solution    | IREA 23     | 2       | 2.7  | 21.5     | 115.6 | Severe                            |   |
| Solution    | IREA 28     | 0       | 1.3  | 27.6     | 114.9 | Severe                            |   |
| Solution    | IREA 29     | 1.3     | 1    | 51       | 100   | Severe                            |   |
| Solution    | IREA 26     | 1       | 0    | 20.8     | 20.8  | Severe                            | Severe                                    |
| Solution    | IREA 23     | 2       | 0    | 18.8     | 61.7  | Severe                            |   |
| Solution    | IREA 28     | 0.7     | 0    | 24.8     | 47.8  | Severe                            |   |
| Solution    | IREA 29     | 0       | 0    | 31       | 81    | Severe                            |   |
| Liquid      | IREA 26     | 0       | 0    | 0        | 5     | Nonsevere                         | Nonsevere                                 |
| Liquid      | IREA 23     | 0       | 0    | 9.4      | 29.1  | Severe                            |   |
| Liquid      | IREA 28     | 0       | 0.7  | 5.8      | 7.8   | Nonsevere                         |   |
| Liquid      | IREA 29     | 0       | 0.7  | 11       | 17    | Nonsevere                         |   |
| Liquid      | IREA 26     | 1       | 3    | 19.3     | 29.1  | Severe                            | Severe                                    |
| Liquid      | IREA 23     | 0       | 2    | 27.4     | 49.6  | Severe                            |   |
| Liquid      | IREA 28     | 0       | 1    | 20       | 30.6  | Severe                            |   |
| Liquid      | IREA 29     | 0       | 0.7  | 19       | 44    | Severe                            |   |
| Solid       | IREA 26     | 2       | 2    | 0        | 10    | Nonsevere                         | Nonsevere                                 |

## Balls et al. (1995) Data Sorted By Substance

| Form Tested | Testing Lab | Opacity |      | Swelling |      | In Vitro Irritancy Classification | Overall In Vitro Irritancy Classification |
|-------------|-------------|---------|------|----------|------|-----------------------------------|---|
|             |             | 1 Hr    | 4 Hr | 1 Hr     | 4 Hr |                                   |   |
| Solid       | IREA 23     | 0       | 1.7  | 12       | 31.6 | Severe                            |   |
| Solid       | IREA 28     | 0       | 0    | 8.9      | 13.4 | Nonsevere                         |   |
| Solid       | IREA 29     | 1       | 0.3  | 5        | 20   | Nonsevere                         |   |
| Solid       | IREA 26     | 0       | 0    | 5        | 5    | Nonsevere                         | Nonsevere                                 |
| Solid       | IREA 23     | 0       | 0    | 11.1     | 25.6 | Severe                            |   |
| Solid       | IREA 28     | 0       | 0.7  | 2.8      | 13.2 | Nonsevere                         |   |
| Solid       | IREA 29     | 1       | 1    | 6        | 8    | Nonsevere                         |   |
| Solution    | IREA 26     | 1       | 2    | 23.7     | 31.6 | Severe                            | Severe                                    |
| Solution    | IREA 23     | 2       | 3    | 23       | 87.4 | Severe                            |   |
| Solution    | IREA 28     | 0       | 1    | 11.7     | 30.1 | Severe                            |   |
| Solution    | IREA 29     | 0.33    | 0.7  | 13       | 25   | Severe                            |   |
| Solution    | IREA 26     | 1       | 2    | 30       | 30   | Severe                            | Severe                                    |
| Solution    | IREA 23     | 0       | 2.7  | 28.1     | 46.7 | Severe                            |   |
| Solution    | IREA 28     | 0.3     | 1.3  | 13.6     | 26.3 | Severe                            |   |
| Solution    | IREA 29     | 1       | 1    | 14       | 25   | Severe                            |   |
| Solution    | IREA 26     | 0       | 0    | 24.2     | 25   | Severe                            | Severe                                    |
| Solution    | IREA 23     | 0       | 0    | 14.9     | 30.6 | Severe                            |   |
| Solution    | IREA 28     | 0       | 0    | 8.6      | 8.6  | Nonsevere                         |   |
| Solution    | IREA 29     | 0       | 0    | 11       | 15   | Nonsevere                         |   |
| Solid       | IREA 26     | 3       | 4    | *        | *    | Severe                            | Severe                                    |
| Solid       | IREA 23     | 0       | 2    | 19.4     | 37.8 | Severe                            |   |
| Solid       | IREA 28     | 1       | 2.7  | 17       | 54.7 | Severe                            |   |
| Solid       | IREA 29     | 1       | 2    | 44       | 115  | Severe                            |   |
| Liquid      | IREA 26     | 2       | 3    | 13.8     | 68.1 | Severe                            | Severe                                    |
| Liquid      | IREA 23     | 0       | 2    | 18.4     | 60.3 | Severe                            |   |
| Liquid      | IREA 28     | 1       | 2    | 29       | 103  | Severe                            |   |
| Liquid      | IREA 29     | 1.33    | 3    | 36       | 97   | Severe                            |   |
| Solid       | IREA 26     | 3       | 3    | 50       | 50   | Severe                            | Nonsevere                                 |
| Solid       | IREA 23     | 0       | 2.3  | 5.9      | 13.3 | Nonsevere                         |   |
| Solid       | IREA 28     | 0       | 0.3  | 11.8     | 16.7 | Nonsevere                         |   |
| Solid       | IREA 29     | 1       | 2    | 5        | 18   | Nonsevere                         |   |
| Solid       | IREA 26     | 1       | 1    | 5.1      | 5.1  | Nonsevere                         | Nonsevere                                 |
| Solid       | IREA 23     | 0       | 2    | 7.4      | 25.9 | Severe                            |   |
| Solid       | IREA 28     | 0       | 1    | 14.6     | 20.8 | Nonsevere                         |   |
| Solid       | IREA 29     | 1       | 0.3  | 11       | 14   | Nonsevere                         |   |
| Liquid      | IREA 26     | 1       | 2.3  | 3.3      | 9.9  | Nonsevere                         | Nonsevere                                 |

## Balls et al. (1995) Data Sorted By Substance

| Form Tested | Testing Lab | Opacity |      | Swelling |      | In Vitro Irritancy Classification | Overall In Vitro Irritancy Classification |
|-------------|-------------|---------|------|----------|------|-----------------------------------|---|
|             |             | 1 Hr    | 4 Hr | 1 Hr     | 4 Hr |                                   |   |
| Liquid      | IREA 23     | 0       | 2    | 21.6     | 36.3 | Severe                            |   |
| Liquid      | IREA 28     | 1       | 2.3  | 5.2      | 24.2 | Nonsevere                         |   |
| Liquid      | IREA 29     | 1       | 1    | 4        | 14   | Nonsevere                         |   |
| Liquid      | IREA 26     | 3       | 3    | 29.8     | 45.6 | Severe                            | Severe                                    |
| Liquid      | IREA 23     | 3       | 3    | 41.5     | 72.6 | Severe                            |   |
| Liquid      | IREA 28     | 3       | 2.3  | 34       | 76   | Severe                            |   |
| Liquid      | IREA 29     | 2       | 2.7  | 29       | 78   | Severe                            |   |
| Solid       | IREA 26     | 1       | 1    | 35       | 35   | Severe                            | Nonsevere                                 |
| Solid       | IREA 23     | 0       | 0    | 10.3     | 14   | Nonsevere                         |   |
| Solid       | IREA 28     | 0       | 0    | 5.9      | 11.8 | Nonsevere                         |   |
| Solid       | IREA 29     | 0.33    | 0.7  | 10       | 5    | Nonsevere                         |   |
| Liquid      | IREA 26     | 2       | 3    | 50       | 60.8 | Severe                            | Severe                                    |
| Liquid      | IREA 23     | 1       | 3    | 14.2     | 48.5 | Severe                            |   |
| Liquid      | IREA 28     | 1.2     | 2.3  | 17.8     | 41   | Severe                            |   |
| Liquid      | IREA 29     | 2.67    | 2    | 25       | 60   | Severe                            |   |
| Liquid      | IREA 26     | 0       | 2    | 6.5      | 13.7 | Nonsevere                         | Severe                                    |
| Liquid      | IREA 23     | 0       | 2    | 18       | 45.1 | Severe                            |   |
| Liquid      | IREA 28     | 0       | 0.7  | 19.8     | 38.7 | Severe                            |   |
| Liquid      | IREA 29     | 0       | 1    | 14       | 25   | Severe                            |   |
| Liquid      | IREA 26     | 1       | 1    | 16.7     | 16.7 | Nonsevere                         | Nonsevere                                 |
| Liquid      | IREA 23     | 0       | 1    | 5.9      | 20.7 | Nonsevere                         |   |
| Liquid      | IREA 28     | 0       | 1.7  | 8.3      | 24.7 | Nonsevere                         |   |
| Liquid      | IREA 29     | 0       | 2    | 12       | 19   | Nonsevere                         |   |
| Liquid      | IREA 26     | 0       | 1    | 2.5      | 5    | Nonsevere                         | Severe                                    |
| Liquid      | IREA 23     | 1       | 2.7  | 25.2     | 29.4 | Severe                            |   |
| Liquid      | IREA 28     | 0       | 2    | 25.5     | 36.5 | Severe                            |   |
| Liquid      | IREA 29     | 0.67    | 1    | 12       | 14   | Nonsevere                         |   |
| Liquid      | IREA 26     | 0       | 1    | 5.3      | 10.5 | Nonsevere                         | Nonsevere                                 |
| Liquid      | IREA 23     | 0       | 2    | 14.3     | 19.3 | Nonsevere                         |   |
| Liquid      | IREA 28     | 0       | 0.3  | 2.9      | 13.3 | Nonsevere                         |   |
| Liquid      | IREA 29     | 0       | 0    | 4        | 5    | Nonsevere                         |   |
| Solid       | IREA 26     | 3       | 3    | 25       | 25   | Severe                            | Severe                                    |
| Solid       | IREA 23     | 0       | 1.7  | 2.3      | 29.3 | Severe                            |   |
| Solid       | IREA 28     | 0       | 0    | 5.5      | 12   | Nonsevere                         |   |
| Solid       | IREA 29     | 0.33    | 0    | 4        | -1   | Nonsevere                         |   |
| Liquid      | IREA 26     | 0       | 1    | 9.2      | 10   | Nonsevere                         | Nonsevere                                 |

## Balls et al. (1995) Data Sorted By Substance

| Form Tested | Testing Lab | Opacity |      | Swelling |      | In Vitro Irritancy Classification | Overall In Vitro Irritancy Classification |
|-------------|-------------|---------|------|----------|------|-----------------------------------|---|
|             |             | 1 Hr    | 4 Hr | 1 Hr     | 4 Hr |                                   |   |
| Liquid      | IREA 23     | 0       | 0    | 5.2      | 5.2  | Nonsevere                         |   |
| Liquid      | IREA 28     | 0       | 0.3  | 11.3     | 11.3 | Nonsevere                         |   |
| Liquid      | IREA 29     | 0       | 0    | 5        | 4    | Nonsevere                         |   |
| Liquid      | IREA 26     | 1.3     | 2    | 20.5     | 38.5 | Severe                            | Severe                                    |
| Liquid      | IREA 23     | 0       | 3    | 13.7     | 43.6 | Severe                            |   |
| Liquid      | IREA 28     | 0       | 2.7  | 19.1     | 62.1 | Severe                            |   |
| Liquid      | IREA 29     | 1.33    | 3    | 21       | 49   | Severe                            |   |
| Solid       | IREA 26     | 2       | 3    | 50       | 80   | Severe                            | Severe                                    |
| Solid       | IREA 23     | 3       | 3    | 45.5     | 75.8 | Severe                            |   |
| Solid       | IREA 28     | 3       | 3    | 45.8     | 63.2 | Severe                            |   |
| Solid       | IREA 29     | 2       | 2    | 38       | 80   | Severe                            |   |
| Liquid      | IREA 26     | 2       | 3    | 20       | 85   | Severe                            | Severe                                    |
| Liquid      | IREA 23     | 0       | 2    | 14.5     | 47   | Severe                            |   |
| Liquid      | IREA 28     | 2       | 3    | 26       | 78.9 | Severe                            |   |
| Liquid      | IREA 29     | 1.33    | 2    | 40       | 91   | Severe                            |   |
| Liquid      | IREA 26     | 1.7     | 3    | 4        | 22.4 | Severe                            | Severe                                    |
| Liquid      | IREA 23     | 2       | 2.3  | 30.9     | 65.5 | Severe                            |   |
| Liquid      | IREA 28     | 0       | 0.7  | 13.1     | 23.4 | Nonsevere                         |   |
| Liquid      | IREA 29     | 1.67    | 1.7  | 16       | 32   | Severe                            |   |
| Solid       | IREA 26     | 3       | 2    | 49.2     | 52.5 | Severe                            | Severe                                    |
| Solid       | IREA 23     | 0       | 2    | 29.9     | 37.3 | Severe                            |   |
| Solid       | IREA 28     | 1       | 0    | 10.8     | 16.5 | Nonsevere                         |   |
| Solid       | IREA 29     | 0       | 0    | 6        | 0    | Nonsevere                         |   |
| Liquid      | IREA 26     | 1       | 3    | 21       | 49.6 | Severe                            | Severe                                    |
| Liquid      | IREA 23     | 0       | 0    | 12       | 18.8 | Nonsevere                         |   |
| Liquid      | IREA 28     | 1       | 1.7  | 12.2     | 28.1 | Severe                            |   |
| Liquid      | IREA 29     | 0       | 1.7  | 15       | 26   | Severe                            |   |
| Liquid      | IREA 26     | 0       | 0    | 5.1      | 5.1  | Nonsevere                         | Nonsevere                                 |
| Liquid      | IREA 23     | 0       | 2    | 5.8      | 8.7  | Nonsevere                         |   |
| Liquid      | IREA 28     | 0       | 0.3  | 2.9      | 6.8  | Nonsevere                         |   |
| Liquid      | IREA 29     | 0.33    | 0.3  | 6        | 7    | Nonsevere                         |   |
| Liquid      | IREA 26     | 0       | 0    | 7.4      | 7.4  | Nonsevere                         | Nonsevere                                 |
| Liquid      | IREA 23     | 0       | 0    | 17.6     | 21   | Nonsevere                         |   |
| Liquid      | IREA 28     | 0       | 0    | 2.8      | 5.6  | Nonsevere                         |   |
| Liquid      | IREA 29     | 0       | 0    | 5        | 4    | Nonsevere                         |   |
| Liquid      | IREA 26     | 2       | 3    | 20.8     | 91.7 | Severe                            | Severe                                    |



## Balls et al. (1995) Data Sorted By Substance

| Form Tested | Testing Lab | Opacity |      | Swelling |       | In Vitro Irritancy Classification | Overall In Vitro Irritancy Classification |
|-------------|-------------|---------|------|----------|-------|-----------------------------------|---|
|             |             | 1 Hr    | 4 Hr | 1 Hr     | 4 Hr  |                                   |   |
| Liquid      | IREA 23     | 1       | 2    | 20.7     | 56.3  | Severe                            |   |
| Liquid      | IREA 28     | 0       | 2.3  | 29.4     | 51    | Severe                            |   |
| Liquid      | IREA 29     | 0.67    | 2.3  | 14       | 46    | Severe                            |   |
| Liquid      | IREA 26     | 1       | 2    | 34.5     | 40.4  | Severe                            | Severe                                    |
| Liquid      | IREA 23     | 0       | 3    | 29.3     | 64.6  | Severe                            |   |
| Liquid      | IREA 28     | 0       | 1.3  | 0        | 8.7   | Nonsevere                         |   |
| Liquid      | IREA 29     | 0       | 0    | 9        | 23    | Nonsevere                         |   |
| Solid       | IREA 26     | 0       | 0.3  | 15       | 15    | Nonsevere                         | Nonsevere                                 |
| Solid       | IREA 23     | 0       | 2.3  | 21.9     | 24.1  | Nonsevere                         |   |
| Solid       | IREA 28     | 0       | 0    | 1        | 2.8   | Nonsevere                         |   |
| Solid       | IREA 29     | 1       | 1    | 10       | 13    | Nonsevere                         |   |
| Solid       | IREA 26     | 2       | 3    | 67       | 108.7 | Severe                            | Severe                                    |
| Solid       | IREA 23     | 0       | 2.7  | 16.1     | 41.6  | Severe                            |   |
| Solid       | IREA 28     | 0       | 3    | 61       | 125.1 | Severe                            |   |
| Solid       | IREA 29     | 2       | 2    | 84       | 155   | Severe                            |   |
| Liquid      | IREA 26     | 0       | 1    | 4.4      | 14.8  | Nonsevere                         | Severe                                    |
| Liquid      | IREA 23     | 0       | 2    | 17.6     | 26.1  | Severe                            |   |
| Liquid      | IREA 28     | 0       | 1.8  | 14.2     | 29.9  | Severe                            |   |
| Liquid      | IREA 29     | 0       | 1    | 11       | 16    | Nonsevere                         |   |
| Liquid      | IREA 26     | 2       | 2    | 25       | 55    | Severe                            | Severe                                    |
| Liquid      | IREA 23     | 0       | 2    | 27.4     | 63.7  | Severe                            |   |
| Liquid      | IREA 28     | 1.3     | 3    | 33.7     | 68.7  | Severe                            |   |
| Liquid      | IREA 29     | 1.67    | 2.2  | 25       | 70    | Severe                            |   |
| Liquid      | IREA 26     | 1       | 1    | 29.4     | 31.1  | Severe                            | Severe                                    |
| Liquid      | IREA 23     | 0       | 1    | 20.7     | 27.4  | Severe                            |   |
| Liquid      | IREA 28     | 0       | 0    | 6        | 12.8  | Nonsevere                         |   |
| Liquid      | IREA 29     | 0       | 0    | 4        | -1    | Nonsevere                         |   |
| Solid       | IREA 26     | 0       | 0    | 9.1      | 9.1   | Nonsevere                         | Nonsevere                                 |
| Solid       | IREA 23     | 0       | 0    | 1.5      | 1.5   | Nonsevere                         |   |
| Solid       | IREA 28     | 0       | 0    | 5.3      | 11.5  | Nonsevere                         |   |
| Solid       | IREA 29     | 0       | 0    | 5        | -1    | Nonsevere                         |   |
| Solid       | IREA 26     | 2       | 2    | 17.5     | 45    | Severe                            | Severe                                    |
| Solid       | IREA 23     | 1       | 3    | 76.1     | 117.1 | Severe                            |   |
| Solid       | IREA 28     | 1       | 2.3  | 20.8     | 86.9  | Severe                            |   |
| Solid       | IREA 29     | 2       | 2    | 62       | 110   | Severe                            |   |
| Liquid      | IREA 26     | 1       | 3    | 18.2     | 53.7  | Severe                            | Severe                                    |

| Form Tested | Testing Lab | Opacity |      | Swelling |       | In Vitro Irritancy Classification | Overall In Vitro Irritancy Classification |
|-------------|-------------|---------|------|----------|-------|-----------------------------------|---|
|             |             | 1 Hr    | 4 Hr | 1 Hr     | 4 Hr  |                                   |   |
| Liquid      | IREA 23     | 2       | 3    | 10.3     | 48.5  | Severe                            |   |
| Liquid      | IREA 28     | 2       | 3    | 34.9     | 42.4  | Severe                            |   |
| Liquid      | IREA 29     | 2.33    | 2.3  | 40       | 75    | Severe                            |   |
| Solid       | IREA 26     | 0       | 0    | 10.5     | 10.5  | Nonsevere                         | Nonsevere                                 |
| Solid       | IREA 23     | 0       | 0    | 0        | 0.7   | Nonsevere                         |   |
| Solid       | IREA 28     | 0       | 0.7  | 13       | 16.7  | Nonsevere                         |   |
| Solid       | IREA 29     | 0       | 0    | 5        | 4     | Nonsevere                         |   |
| Solution    | IREA 26     | 3       | 4    | 86       | 110.5 | Severe                            | Severe                                    |
| Solution    | IREA 23     | 3       | 4    | 107.8    | 144.3 | Severe                            |   |
| Solution    | IREA 28     | 3.7     | 4    | *        | *     | Severe                            |   |
| Solution    | IREA 29     | 2       | 4    | 111      | 160   | Severe                            |   |
| Solution    | IREA 26     | 1.3     | 2    | 40       | 85    | Severe                            | Severe                                    |
| Solution    | IREA 23     | 0       | 3    | 41.7     | 65.2  | Severe                            |   |
| Solution    | IREA 28     | 1       | 3    | 57.1     | 121.9 | Severe                            |   |
| Solution    | IREA 29     | 1.67    | 3    | 62       | 102   | Severe                            |   |
| Solution    | IREA 26     | 0       | 1    | 21.1     | 21.1  | Nonsevere                         | Nonsevere                                 |
| Solution    | IREA 23     | 0       | 2    | 13.5     | 26.3  | Severe                            |   |
| Solution    | IREA 28     | 0       | 0.3  | 14.5     | 22.3  | Nonsevere                         |   |
| Solution    | IREA 29     | 0.33    | 2    | 16       | 24    | Nonsevere                         |   |
| Solution    | IREA 26     | 0       | 1    | 5.3      | 15.8  | Nonsevere                         | Nonsevere                                 |
| Solution    | IREA 23     | 0       | 0    | 13.4     | 22.4  | Nonsevere                         |   |
| Solution    | IREA 28     | 0       | 0    | 8.4      | 9.3   | Nonsevere                         |   |
| Solution    | IREA 29     | 0       | 1    | 12       | 14    | Nonsevere                         |   |
| Solid       | IREA 26     | 0       | 0    | 5        | 5     | Nonsevere                         | Nonsevere                                 |
| Solid       | IREA 23     | 0       | 0    | 0.8      | 6.7   | Nonsevere                         |   |
| Solid       | IREA 28     | 0       | 0    | 17.3     | 22    | Nonsevere                         |   |
| Solid       | IREA 29     | 0       | 0    | 6        | 5     | Nonsevere                         |   |
| Solid       | IREA 26     | 0       | 0    | 5        | 5     | Nonsevere                         | Nonsevere                                 |
| Solid       | IREA 23     | 0       | 0    | 0.8      | 2.3   | Nonsevere                         |   |
| Solid       | IREA 28     | 0       | 0    | 2.9      | 14.7  | Nonsevere                         |   |
| Solid       | IREA 29     | 0       | 0    | 4        | 0     | Nonsevere                         |   |
| Solid       | IREA 26     | 2       | 1    | 12.5     | 25    | Severe                            | Nonsevere                                 |
| Solid       | IREA 23     | 0       | 0    | 0.7      | 4.4   | Nonsevere                         |   |
| Solid       | IREA 28     | 0       | 0    | 1        | 2.9   | Nonsevere                         |   |
| Solid       | IREA 29     | 1       | 2    | 3        | 9     | Nonsevere                         |   |
| Solid       | IREA 26     | 0       | 0    | 10       | 10    | Nonsevere                         | Nonsevere                                 |

## Balls et al. (1995) Data Sorted By Substance

| Form Tested | Testing Lab | Opacity |      | Swelling |       | In Vitro Irritancy Classification | Overall In Vitro Irritancy Classification |
|-------------|-------------|---------|------|----------|-------|-----------------------------------|---|
|             |             | 1 Hr    | 4 Hr | 1 Hr     | 4 Hr  |                                   |   |
| Solid       | IREA 23     | 0       | 0    | 5.1      | 5.1   | Nonsevere                         |   |
| Solid       | IREA 28     | 0       | 0    | 5.7      | 5.7   | Nonsevere                         |   |
| Solid       | IREA 29     | 0       | 0.7  | 7        | 4     | Nonsevere                         |   |
| Liquid      | IREA 26     | 1       | 1    | 28.3     | 30    | Severe                            | Severe                                    |
| Liquid      | IREA 23     | 0       | 0    | 11.1     | 37.6  | Severe                            |   |
| Liquid      | IREA 28     | 0.7     | 1    | 10.1     | 17.5  | Nonsevere                         |   |
| Liquid      | IREA 29     | 1       | 0    | 8        | 6     | Nonsevere                         |   |
| Solution    | IREA 26     | 4       | 4    | *        | *     | Severe                            | Severe                                    |
| Solution    | IREA 23     | 3       | 4    | 44       | 100.8 | Severe                            |   |
| Solution    | IREA 28     | 3.7     | 3.7  | *        | *     | Severe                            |   |
| Solution    | IREA 29     | 3       | 3    | 4        | 54    | Severe                            |   |
| Solution    | IREA 26     | 0       | 1    | 6        | 6     | Nonsevere                         | Nonsevere                                 |
| Solution    | IREA 23     | 1       | 2    | 12.1     | 36.2  | Severe                            |   |
| Solution    | IREA 28     | 0.7     | 0    | 7.2      | 20.6  | Nonsevere                         |   |
| Solution    | IREA 29     | 1       | 0    | 7        | 11    | Nonsevere                         |   |
| Solution    | IREA 26     | 2       | 3    | 8.8      | 19.2  | Severe                            | Severe                                    |
| Solution    | IREA 23     | 0       | 2    | 24.2     | 32.6  | Severe                            |   |
| Solution    | IREA 28     | 0       | 2    | 36.2     | 95.3  | Severe                            |   |
| Solution    | IREA 29     | 0.67    | 2.3  | 39       | 80    | Severe                            |   |
| Solution    | IREA 26     | 2       | 3    | 25.4     | 31.6  | Severe                            | Severe                                    |
| Solution    | IREA 23     | 0       | 2    | 23.3     | 30.1  | Severe                            |   |
| Solution    | IREA 28     | 0       | 1.3  | 10       | 25.2  | Severe                            |   |
| Solution    | IREA 29     | 0.33    | 1.5  | 20       | 45    | Severe                            |   |
| Liquid      | IREA 26     | 0       | 0    | 12.6     | 15.1  | Nonsevere                         | Nonsevere                                 |
| Liquid      | IREA 23     | 0       | 1    | 28.1     | 29.6  | Severe                            |   |
| Liquid      | IREA 28     | 0       | 0    | 6.4      | 14.7  | Nonsevere                         |   |
| Liquid      | IREA 29     | 0       | 0    | 7        | 4     | Nonsevere                         |   |

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## **Appendix C2**

### **Guerriero et al. (2004) Data Sorted by Substance**

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| Substance   | CASRN      | Form Tested | Testing Lab | Maximum Corneal Opacity |      | Maximum Fluorescein Uptake |      |
|---|------------|-------------|-------------|-------------------------|------|----------------------------|------|
|   |            |             |             | Cloudiness              | Area | Intensity                  | Area |
| Acetanilide (F22)   | NA         | Solid       | GSK         | 0                       | 0    | 0                          | 0    |
| Acetone (F33)   | 67-64-1    | Liquid      | GSK         | 2                       | 3    | 3                          | 4    |
| Acetophenone (F27)  | 98-86-2    | Solid       | GSK         | 0                       | 0    | 0                          | 0    |
| Dimethyl carbonate (F30)  | 616-38-6   | Solid       | GSK         | 0                       | 0    | 0                          | 0    |
| Allyl alcohol (F34)   | 107-18-6   | Liquid      | GSK         | 3                       | 3    | 4                          | 4    |
| Ammonium nitrate (F36)  | 6484-52-2  | Solid       | GSK         | 0                       | 0    | 0                          | 0    |
| di-Isopropyl aminoethyl diphenyl acetamide (F15)  | NA         | Solid       | GSK         | 0                       | 0    | 0                          | 0    |
| 3,4-Dimethoxybenzaldehyde (F19)   | NA         | Solid       | GSK         | 0                       | 0    | 0                          | 0    |
| 5-Chloro-N-[4-methoxy-3-(1-piperazinyl)phenyl]-3-methylbenzo[B]thiophene-2-sulfonamide monohydrochloride (F4) | NA         | Solid       | GSK         | 2                       | 3    | 2                          | 1    |
| 2,6-Dichlorobenzenesulfonyl chloride (F1)   | NA         | Solid       | GSK         | 3                       | 4    | 2                          | 3    |
| (S)-1-Phenyl-N-propylamine (F13)  | NA         | Liquid      | GSK         | 2                       | 4    | 2                          | 4    |
| n-Butanol (F35)   | 71-36-3    | Liquid      | GSK         | 3                       | 4    | 3                          | 4    |
| n-Butyl acetate (F39)   | 123-86-4   | Liquid      | GSK         | 1                       | 3    | 2                          | 1    |
| gamma-(Aminocarbonyl)-N-methyl-N,N-bis(1-methylethyl)-gamma-phenyl-, iodide (F14)                             | NA         | Solid       | GSK         | 0                       | 0    | 0                          | 0    |
| Cetylpyridium bromide (F37)   | 140-72-7   | Solid       | GSK         | 2                       | 3    | 3                          | 3    |
| 3,4-Dichloroaniline hydrochloride (F11)   | NA         | Solid       | GSK         | 4                       | 4    | 3                          | 4    |
| Sodium dicyanamide (F3)   | NA         | Solid       | GSK         | 2                       | 3    | 2                          | 2    |
| Isopropyl dicyanamide (F9)  | 35695-36-4 | Solid       | GSK         | 3                       | 4    | 3                          | 4    |
| Glycerol (F41)  | 56-81-5    | Liquid      | GSK         | 0                       | 0    | 0                          | 0    |
| 1-(3,4-Dichlorophenyl)-5-isopropylbiguanide HCl (F6)  | 537-21-3   | Solid       | GSK         | 2                       | 3    | 4                          | 2    |

| Substance  | CASRN      | Form Tested | Testing Lab | Maximum Corneal Opacity |      | Maximum Fluorescein Uptake |      |
|--|------------|-------------|-------------|-------------------------|------|----------------------------|------|
|  |            |             |             | Cloudiness              | Area | Intensity                  | Area |
| 2-(4-Oxopentyl)-1H-isoindole-1,3 (2H)-dione (F26)          | 3197-25-9  | Solid       | GSK         | 0                       | 0    | 1                          | 3    |
| 4,4'-Methylenebis-(2,6-di-tert-butylphenol) (F43)          | 118-82-3   | Solid       | GSK         | 0                       | 0    | 0                          | 0    |
| 1H-Indole-2,3-dione (F28)                                  | 91-56-5    | Solid       | GSK         | 0                       | 0    | 0                          | 0    |
| Methyl ethyl ketone (F38)                                  | 78-93-3    | Liquid      | GSK         | 3                       | 4    | 4                          | 3    |
| 1-(5-Amino-2-methoxyphenyl) piperazine hydrochloride (F20) | NA         | Solid       | GSK         | 2                       | 2    | 2                          | 2    |
| 1-(2-Methoxyphenyl)piperazine hydrogen sulfate (F2)        | NA         | Solid       | GSK         | 1                       | 4    | 1                          | 4    |
| Polyethylene glycol 400 (F44)                              | 25322-68-3 | Liquid      | GSK         | 0                       | 0    | 0                          | 0    |
| Propylene glycol (F42)                                     | 57-55-6    | Liquid      | GSK         | 0                       | 0    | 0                          | 0    |
| Iodine chloride with pyridine (1:1) (F10)                  | 6443-90-9  | Solid       | GSK         | 2                       | 2    | 2                          | 3    |
| tetra-N-Octylammonium bromide (F8)                         | 14866-33-2 | Solid       | GSK         | 2                       | 4    | 4                          | 4    |
| 3-Hydroxy-2-phenyl-4-quinolinecarboxylic acid (F24)        | 485-89-2   | Solid       | GSK         | 0                       | 0    | 0                          | 0    |
| Sodium hydroxide (F31)                                     | 1310-73-2  | Liquid      | GSK         | 4                       | 4    | 4                          | 4    |
| 2-Nitro-4-thio-N-propylaniline (F21)                       | 54393-89-4 | Solid       | GSK         | 0                       | 0    | 1                          | 4    |
| 2-Nitro-4-propoxyaniline (F23)                             | NA         | Solid       | GSK         | 0                       | 0    | 1                          | 3    |
| 2-Nitro-4-thiocyananiline (F7)                             | 54029-45-7 | Solid       | GSK         | 0                       | 0    | 2                          | 2    |
| Mebrophen hydramine HCl (F5)                               | 13977-28-1 | Solid       | GSK         | 2                       | 4    | 3                          | 4    |
| 4,4'-Pyridylpiperidine (F12)                               | NA         | Solid       | GSK         | 4                       | 4    | 4                          | 3    |



| Substance   | CASRN      | Form Tested | Testing Lab | Maximum Corneal Opacity |      | Maximum Fluorescein Uptake |      |
|---|------------|-------------|-------------|-------------------------|------|----------------------------|------|
|   |            |             |             | Cloudiness              | Area | Intensity                  | Area |
| 2,6-Dichloro-5-fluoro-beta-oxo-3-pyridinepropanoate (F16)     | 96568-04-6 | Solid       | GSK         | 0                       | 0    | 0                          | 0    |
| 6-(Methylamino)-2-pyridine ethanol formate (1:1) (salt) (F17) | NA         | Solid       | GSK         | 1                       | 4    | 0                          | 0    |
| 3-((Benzylthio)methyl)-6-chloro-,1,1-dioxide (F29)            | NA         | Solid       | GSK         | 0                       | 0    | 0                          | 0    |
| 4,4'-Sulfonylbisbenzenamine (F25)                             | NA         | Solid       | GSK         | 0                       | 0    | 0                          | 0    |
| Sulfonyl chloride #18   | 80-08-0    | Solid       | GSK         | 1                       | 2    | 1                          | 2    |
| Toluene (F40)   | 108-88-3   | Liquid      | GSK         | 0                       | 0    | 0                          | 0    |
| Trichloroacetic acid (F32)                                    | 76-03-9    | Liquid      | GSK         | 4                       | 4    | 4                          | 4    |

NA = Not Applicable; GSK = GlaxoSmithKline

| Substance   | Mean Corneal Swelling (Hr) |      |       |       | Corneal Epithelial Observations                           | In Vitro Irritancy Classification |
|---|----------------------------|------|-------|-------|---|-----------------------------------|
|   | 1                          | 2    | 3     | 4     |   |                                   |
| Acetanilide (F22)   | 3.2                        | 1.4  | 1.5   | 2.6   | Normal  | Nonsevere Irritant                |
| Acetone (F33)   | 19.3                       | 24.5 | 39.0  | 49.6  | Loosening/roughening of epithelium                        | Severe Irritant                   |
| Acetophenone (F27)  | 6.1                        | 3.4  | 2.0   | 2.5   | Residual test material present                            | Nonsevere Irritant                |
| Dimethyl carbonate (F30)  | 16.6                       | 22.8 | 30.7  | 39.4  | Slight pitting  | Severe Irritant                   |
| Allyl alcohol (F34)   | 41.0                       | 56.1 | 68.5  | 77.2  | Pitting, sloughing  | Severe Irritant                   |
| Ammonium nitrate (F36)  | 10.5                       | 12.2 | NA    | 15.0  | Normal  | Nonsevere Irritant                |
| di-Isopropyl aminoethyl diphenyl acetamide (F15)  | 6.3                        | 6.9  | 6.6   | 7.6   | Normal  | Nonsevere Irritant                |
| 3,4-Dimethoxybenzaldehyde (F19)   | 7.2                        | 13.0 | 16.5  | 17.4  | Normal  | Nonsevere Irritant                |
| 5-Chloro-N-[4-methoxy-3-(1-piperazinyl)phenyl]-3-methylbenzo[B]thiophene-2-sulfonamide monohydrochloride (F4) | 3.2                        | 4.8  | 4.0   | 7.6   | Residual test material present                            | Severe Irritant                   |
| 2,6-Dichlorobenzenesulfonyl chloride (F1)   | 21.8                       | 30.4 | 39.5  | 45.4  | Residual test material present                            | Severe Irritant                   |
| (S)-1-Phenyl-N-propylamine (F13)  | 20.3                       | 75.4 | 80.5  | 98.2  | Cloudy, pitted  | Severe Irritant                   |
| n-Butanol (F35)   | 54.6                       | 68.3 | 81.4  | 91.8  | Pitting, loosening of epithelium                          | Severe Irritant                   |
| n-Butyl acetate (F39)   | 18.5                       | 17.2 | 21.5  | 30.1  | Normal  | Severe Irritant                   |
| gamma-(Aminocarbonyl)-N-methyl-N,N-bis(1-methylethyl)-gamma-phenyl-, iodide (F14)                             | 7.3                        | 4.8  | 5.2   | 5.9   | Normal  | Nonsevere Irritant                |
| Cetylpyridium bromide (F37)   | 49.0                       | 48.8 | 61.0  | 31.1+ | Loosening of epithelium                                   | Severe Irritant                   |
| 3,4-Dichloroaniline hydrochloride (F11)   | 51.4                       | 98.0 | 112.6 | 118.2 | Mottled, residual test material, smooth cloudy appearance | Severe Irritant                   |
| Sodium dicyanamide (F3)   | 40.7                       | 58.7 | 64.3  | 71.0  | Sloughing   | Severe Irritant                   |
| Isopropyl dicyanamide (F9)  | 31.8                       | 43.6 | 53.0  | 62.2  | Mottled, sloughing  | Severe Irritant                   |
| Glycerol (F41)  | 13.1                       | 15.5 | 16.5  | 21.4  | Normal  | Nonsevere Irritant                |
| 1-(3,4-Dichlorophenyl)-5-isopropylbiguanide HCl (F6)  | 13.2                       | 21.7 | 27.0  | 27.7  | Sloughing   | Severe Irritant                   |

| Substance  | Mean Corneal Swelling (Hr) |       |      |       | Corneal Epithelial Observations                   | In Vitro Irritancy Classification |
|--|----------------------------|-------|------|-------|---|-----------------------------------|
|  | 1                          | 2     | 3    | 4     |   |                                   |
| 2-(4-Oxopentyl)-1H-isoindole-1,3 (2H)-dione (F26)          | 5.9                        | 9.8   | 10.9 | 14.8  | Residual test material present                    | Nonsevere Irritant                |
| 4,4'-Methylenebis-(2,6-di-tert-butylphenol) (F43)          | 9.4                        | 12.3  | 12.8 | 15.1  | Normal  | Nonsevere Irritant                |
| 1H-Indole-2,3-dione (F28)                                  | 1.3                        | 0.2   | 0.4  | 2.0   | Normal  | Nonsevere Irritant                |
| Methyl ethyl ketone (F38)                                  | 34.8                       | 62.6  | 85.6 | 104.7 | Loosening of epithelium                           | Severe Irritant                   |
| 1-(5-Amino-2-methoxyphenyl) piperazine hydrochloride (F20) | 12.4                       | 12.0  | 19.1 | 22.4  | Mottled Appearance                                | Severe Irritant                   |
| 1-(2-Methoxyphenyl)piperazine hydrogen sulfate (F2)        | 9.3                        | 14.1  | 15.7 | 20.0  | Normal  | Severe Irritant                   |
| Polyethylene glycol 400 (F44)                              | 12.7                       | 13.4  | 16.9 | 17.8  | Normal  | Nonsevere Irritant                |
| Propylene glycol (F42)                                     | 10.1                       | 10.2  | 10.8 | 16.3  | Normal  | Nonsevere Irritant                |
| Iodine chloride with pyridine (1:1) (F10)                  | 16.6                       | 23.6  | 28.4 | 25.4  | Normal  | Severe Irritant                   |
| tetra-N-Octylammonium bromide (F8)                         | 22.2                       | 74.7  | 83.9 | 109.9 | Pitting/Sloughing                                 | Severe Irritant                   |
| 3-Hydroxy-2-phenyl-4-quinolinecarboxylic acid (F24)        | 2.4                        | 3.7   | 5.0  | 7.1   | Residual test material present                    | Nonsevere Irritant                |
| Sodium hydroxide (F31)                                     | 110.5                      | NA    | NA   | NA    | Rippling, loosening of epithelium                 | Severe Irritant                   |
| 2-Nitro-4-thio-N-propylaniline (F21)                       | 17.6                       | 22.5  | 28.3 | 31.5  | Normal  | Severe Irritant                   |
| 2-Nitro-4-propoxyaniline (F23)                             | 4.8                        | 5.6   | 3.4  | 6.8   | Residual test material adhered to cornea          | Nonsevere Irritant                |
| 2-Nitro-4-thiocyananiline (F7)                             | 6.6                        | 8.1   | 9.3  | 7.4   | Residual test material adhered to cornea, pitting | Severe Irritant                   |
| Mebrophen hydramine HCl (F5)                               | 58.8                       | 79.6  | 99.2 | 113.0 | Mottled Appearance                                | Severe Irritant                   |
| 4,4'-Pyridylpiperidine (F12)                               | 111.5                      | 117.5 | 83.9 | 101.1 | Sloughing/mottled                                 | Severe Irritant                   |

| Substance   | Mean Corneal Swelling (Hr) |      |      |      | Corneal Epithelial Observations | In Vitro Irritancy Classification |
|---|----------------------------|------|------|------|---------------------------------|-----------------------------------|
|   | 1                          | 2    | 3    | 4    |                                 |                                   |
| 2,6-Dichloro-5-fluoro-beta-oxo-3-pyridinepropanoate (F16)     | 4.6                        | 4.9  | 4.7  | 2.7  | Normal                          | Nonsevere Irritant                |
| 6-(Methylamino)-2-pyridine ethanol formate (1:1) (salt) (F17) | 4.5                        | 4.9  | 4.3  | 2.5  | Normal                          | Severe Irritant                   |
| 3-((Benzylthio)methyl)-6-chloro-,1,1-dioxide (F29)            | 1.5                        | 1.4  | 1.5  | 2.0  | Normal                          | Nonsevere Irritant                |
| 4,4'-Sulfonylbisbenzenamine (F25)                             | 2.9                        | 2.7  | 3.2  | 4.4  | Normal                          | Nonsevere Irritant                |
| Sulfonyl chloride #18   | 8.6                        | 12.9 | 14.2 | 14.9 | Residual test material present  | Nonsevere Irritant                |
| Toluene (F40)   | 7.4                        | 9.8  | 13.4 | 14.6 | Normal                          | Nonsevere Irritant                |
| Trichloroacetic acid (F32)                                    | 12.2                       | 21.1 | 38.2 | 54.1 | Roughening of epithelium        | Severe Irritant                   |

NA = Not Applicable; GSK =

## **Appendix C3**

### **Gettings et al. (1996) Data Sorted by Substance**

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| Substance | CASRN | Form Tested        | Testing Lab | REET I Corneal Thickness Measurement | REET 2 Corneal Thickness Score (1-4) | Overall In Vitro Irritancy Classification |
|-----------|-------|--------------------|-------------|--------------------------------------|--------------------------------------|---|
| HZA-1     | NA    | Liquid formulation | Unilever    | 32.1                                 | 2.3                                  | Severe irritant                           |
| HZB-1     | NA    | Liquid formulation | Unilever    | 24.8                                 | 1.7                                  | Nonsevere irritant                        |
| HZC-1     | NA    | Liquid formulation | Unilever    | 21.2                                 | 1.0                                  | Nonsevere irritant                        |
| HZD-1     | NA    | Liquid formulation | Unilever    | 20.3                                 | 1.0                                  | Nonsevere irritant                        |
| HZE-1     | NA    | Liquid formulation | Unilever    | 6.4                                  | 0.0                                  | Nonsevere irritant                        |
| HZF-1     | NA    | Liquid formulation | Unilever    | 14.3                                 | 1.0                                  | Nonsevere irritant                        |
| HZG-1     | NA    | Liquid formulation | Unilever    | 29.5                                 | 2.0                                  | Severe irritant                           |
| HZH-1     | NA    | Liquid formulation | Unilever    | 7.7                                  | 0.0                                  | Nonsevere irritant                        |
| HZI-1     | NA    | Liquid formulation | Unilever    | 28.6                                 | 1.7                                  | Severe irritant                           |
| HZJ-1     | NA    | Liquid formulation | Unilever    | 16.3                                 | 1.0                                  | Nonsevere irritant                        |
| HZK-1     | NA    | Liquid formulation | Unilever    | 36.4                                 | 2.7                                  | Severe irritant                           |
| HZL-1     | NA    | Liquid formulation | Unilever    | 36.2                                 | 2.7                                  | Severe irritant                           |

## Gettings et al. (1996) Data Sorted by Substance

| Substance | CASRN | Form Tested        | Testing Lab | REET I Corneal Thickness Measurement | REET 2 Corneal Thickness Score (1-4) | Overall In Vitro Irritancy Classification |
|-----------|-------|--------------------|-------------|--------------------------------------|--------------------------------------|---|
| HZM-1     | NA    | Liquid formulation | Unilever    | 26.0                                 | 1.7                                  | Severe irritant                           |
| HZN-1     | NA    | Liquid formulation | Unilever    | 37.7                                 | 2.7                                  | Severe irritant                           |
| HZP-1     | NA    | Liquid formulation | Unilever    | 25.0                                 | 1.7                                  | Severe irritant                           |
| HZQ-1     | NA    | Liquid formulation | Unilever    | 7.5                                  | 0.3                                  | Nonsevere irritant                        |
| HZR-1     | NA    | Liquid formulation | Unilever    | 13.4                                 | 1.0                                  | Nonsevere irritant                        |
| HZS-1     | NA    | Liquid formulation | Unilever    | 33.3                                 | 2.3                                  | Severe irritant                           |
| HZT-1     | NA    | Liquid formulation | Unilever    | 2.5                                  | 0.0                                  | Nonsevere irritant                        |
| HZU-1     | NA    | Liquid formulation | Unilever    | 36.7                                 | 3.0                                  | Severe irritant                           |
| HZV-1     | NA    | Liquid formulation | Unilever    | 25.6                                 | 1.3                                  | Severe irritant                           |
| HZW-1     | NA    | Liquid formulation | Unilever    | 23.9                                 | 1.7                                  | Nonsevere irritant                        |
| HZX-1     | NA    | Liquid formulation | Unilever    | 20.9                                 | 1.3                                  | Nonsevere irritant                        |
| HZY-1     | NA    | Liquid formulation | Unilever    | 18.6                                 | 1.0                                  | Nonsevere irritant                        |



## Gettings et al. (1996) Data Sorted by Substance

| <b>Substance</b> | <b>CASRN</b> | <b>Form Tested</b> | <b>Testing Lab</b> | <b>REET I Corneal Thickness Measurement</b> | <b>REET 2 Corneal Thickness Score (1-4)</b> | <b>Overall In Vitro Irritancy Classification</b> |
|------------------|--------------|--------------------|--------------------|---|---|--|
| HZZ-1            | NA           | Liquid formulation | Unilever           | 2.8   | 0.0   | Nonsevere irritant                               |

NA = Not Applicable; REET = Rabbit Enucleated Eye Test

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## **Appendix C4**

### **CEC (1991) Data Sorted by Substance**

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## CEC (1991) Data Sorted By Substance

| Substance             | CASRN     | Form Tested | Testing Lab | Mean Corneal Swelling (%) - Minutes |    |     |      |      |
|-----------------------|-----------|-------------|-------------|-------------------------------------|----|-----|------|------|
|                       |           |             |             | 30                                  | 75 | 120 | 180  | 240  |
| Acetic acid           | 64-19-7   | Liquid      | TNO-CIVO    | 2                                   | 8  | 16  | 22   | 27   |
| Acetic acid           | 64-19-7   | Liquid      | I.H.E.      | 16                                  | 23 | 31  | 40   | 50   |
| Acetic acid           | 64-19-7   | Liquid      | SHELL       | -                                   | 31 | 34  | 42   | 45   |
| Brij 35               | 9002-92-0 | Solution    | TNO-CIVO    | 7                                   | 11 | 12  | 13   | 15   |
| Brij 35               | 9002-92-0 | Solution    | I.H.E.      | 2                                   | 6  | 9   | 11   | 9    |
| Brij 35               | 9002-92-0 | Solution    | SHELL       | -                                   | 6  | 11  | 14   | 13   |
| Benzalkonium chloride | 8001-54-5 | Solution    | TNO-CIVO    | 14                                  | 26 | 37  | 51   | 52   |
| Benzalkonium chloride | 8001-54-5 | Solution    | I.H.E.      | 28                                  | 50 | 65  | 75   | 81   |
| Benzalkonium chloride | 8001-54-5 | Solution    | SHELL       | -                                   | 45 | 83  | 107  | 115  |
| Dimethyl sulfoxide    | 67-68-5   | Solution    | TNO-CIVO    | 11                                  | 14 | 16  | 17.0 | 20.0 |
| Dimethyl sulfoxide    | 67-68-5   | Solution    | I.H.E.      | 4                                   | 6  | 6   | 3.0  | -1.0 |
| Dimethyl sulfoxide    | 67-68-5   | Solution    | SHELL       | -                                   | 4  | 11  | 15.0 | 16.0 |
| Sodium fluorecein     | 518-47-8  | Solution    | TNO-CIVO    | 1                                   | 0  | 0   | -1   | -1   |
| Sodium fluorecein     | 518-47-8  | Solution    | I.H.E.      | -1                                  | 1  | 3   | 3    | 1    |
| Sodium fluorecein     | 518-47-8  | Solution    | SHELL       | -                                   | 6  | 9   | 11   | 14   |
| Glycerol              | 56-81-5   | Solution    | TNO-CIVO    | 6                                   | 6  | 5   | 5    | 4    |
| Glycerol              | 56-81-5   | Solution    | I.H.E.      | 2                                   | 4  | 6   | 6    | 4    |
| Glycerol              | 56-81-5   | Solution    | SHELL       | -                                   | 0  | 1   | 4    | 8    |
| Triacetin             | 102-76-1  | Solution    | TNO-CIVO    | 3                                   | 2  | 1   | 0    | 0    |
| Triacetin             | 102-76-1  | Solution    | I.H.E.      | 4                                   | 4  | 5   | 5    | 0    |
| Triacetin             | 102-76-1  | Solution    | SHELL       | -                                   | 1  | 1   | 2    | 3    |
| Mercury chloride      | 7546-30-7 | Solution    | TNO-CIVO    | 7                                   | 23 | 38  | 52   | 57   |
| Mercury chloride      | 7546-30-7 | Solution    | I.H.E.      | 5                                   | 15 | 35  | 65   | 95   |
| Mercury chloride      | 7546-30-7 | Solution    | SHELL       | -                                   | -  | NT  | NT   | NT   |
| Silver nitrate        | 7761-88-8 | Solution    | TNO-CIVO    | 15                                  | 13 | 8   | 9    | 9    |
| Silver nitrate        | 7761-88-8 | Solution    | I.H.E.      | 9                                   | 14 | 18  | 21   | 20   |
| Silver nitrate        | 7761-88-8 | Solution    | SHELL       | -                                   | 15 | 17  | 20   | 21   |
| Sodium hydroxide      | 1310-73-2 | Solution    | TNO-CIVO    | 27                                  | 34 | 35  | 44   | 52   |
| Sodium hydroxide      | 1310-73-2 | Solution    | I.H.E.      | 37                                  | 47 | 64  | 69   | 81   |
| Sodium hydroxide      | 1310-73-2 | Solution    | SHELL       | -                                   | 35 | 49  | 60   | 69   |
| Toluene               | 108-88-3  | Liquid      | TNO-CIVO    | 3                                   | 11 | 13  | 13   | 13   |
| Toluene               | 108-88-3  | Liquid      | I.H.E.      | 4                                   | 7  | 8   | 9    | 7    |
| Toluene               | 108-88-3  | Liquid      | SHELL       | -                                   | 9  | 11  | 11   | 12   |
| Triethanolamine       | 102-71-6  | Solution    | TNO-CIVO    | 1                                   | 0  | 0   | 1    | 1    |
| Triethanolamine       | 102-71-6  | Solution    | I.H.E.      | 4                                   | 9  | 12  | 14   | 13   |
| Triethanolamine       | 102-71-6  | Solution    | SHELL       | -                                   | 1  | 2   | 4    | 5    |

## CEC (1991) Data Sorted By Substance

| Substance              | CASRN    | Form Tested | Testing Lab | Mean Corneal Swelling (%) - Minutes |    |     |     |     |
|------------------------|----------|-------------|-------------|-------------------------------------|----|-----|-----|-----|
|                        |          |             |             | 30                                  | 75 | 120 | 180 | 240 |
| n-Hexane               | 110-54-3 | Liquid      | TNO-CIVO    | 2                                   | 2  | 2   | 0   | 0   |
| n-Hexane               | 110-54-3 | Liquid      | I.H.E.      | 9                                   | 10 | 14  | 17  | 15  |
| n-Hexane               | 110-54-3 | Liquid      | SHELL       | -                                   | 0  | 1   | 3   | 6   |
| Chloroform             | 67-66-3  | Liquid      | TNO-CIVO    | 14                                  | 19 | 22  | 29  | 29  |
| Chloroform             | 67-66-3  | Liquid      | I.H.E.      | 16                                  | 26 | 34  | 30  | 46  |
| Chloroform             | 67-66-3  | Liquid      | SHELL       | -                                   | 6  | 10  | 13  | 17  |
| 2-Methoxyethanol       | 109-86-4 | Liquid      | TNO-CIVO    | 8                                   | 15 | 21  | 32  | 42  |
| 2-Methoxyethanol       | 109-86-4 | Liquid      | I.H.E.      | 15                                  | 25 | 30  | 39  | 46  |
| 2-Methoxyethanol       | 109-86-4 | Liquid      | SHELL       | -                                   | 18 | 30  | 34  | 40  |
| Butanol                | 71-36-3  | Liquid      | TNO-CIVO    | 22                                  | 29 | 35  | 44  | 49  |
| Butanol                | 71-36-3  | Liquid      | I.H.E.      | 23                                  | 32 | 46  | 59  | 67  |
| Butanol                | 71-36-3  | Liquid      | SHELL       | -                                   | 33 | 42  | 53  | 65  |
| Acetaldehyde           | 75-07-0  | Liquid      | TNO-CIVO    | 12                                  | 15 | 17  | 18  | 27  |
| Acetaldehyde           | 75-07-0  | Liquid      | I.H.E.      | 7                                   | 10 | 17  | 29  | 36  |
| Acetaldehyde           | 75-07-0  | Liquid      | SHELL       | -                                   | 12 | 31  | 36  | 41  |
| 2-Butoxyethyl acetate  | 112-07-2 | Liquid      | TNO-CIVO    | 7                                   | 8  | 10  | 12  | 12  |
| 2-Butoxyethyl acetate  | 112-07-2 | Liquid      | I.H.E.      | 6                                   | 10 | 13  | 14  | 16  |
| 2-Butoxyethyl acetate  | 112-07-2 | Liquid      | SHELL       | -                                   | 12 | 31  | 36  | 41  |
| Sodium dodecyl sulfate | 151-21-3 | Solution    | TNO-CIVO    | 8                                   | 13 | 17  | 19  | 21  |
| Sodium dodecyl sulfate | 151-21-3 | Solution    | I.H.E.      | 8                                   | 10 | 12  | 12  | 11  |
| Sodium dodecyl sulfate | 151-21-3 | Solution    | SHELL       | -                                   | 24 | 31  | 34  | 40  |
| Dibutyltin             | 683-18-1 | Solution    | TNO-CIVO    | NT                                  | NT | NT  | NT  | NT  |
| Dibutyltin             | 683-18-1 | Solution    | I.H.E.      | 6                                   | 13 | 20  | 31  | 38  |
| Dibutyltin             | 683-18-1 | Solution    | SHELL       | -                                   | 9  | 11  | 10  | 21  |
| Tributyltin            | 688-73-3 | Solution    | TNO-CIVO    | 7                                   | 10 | 16  | 43  | 58  |
| Tributyltin            | 688-73-3 | Solution    | I.H.E.      | 4                                   | 17 | 29  | 57  | 109 |
| Tributyltin            | 688-73-3 | Solution    | SHELL       | 32                                  | 40 | 75  | 95  | 124 |

Abbreviations: CASRN = Chemical Abstracts Service Registry Number; NT = Not Tested; TNO = Institute CIVO-Toxicology and Nutrition; I.H.E. = Institute for Hygiene and Epidemiology; Shell = Shell Oil Company

## CEC (1991) Data Sorted By Substance

| Substance             | Mean Corneal Opacity - Minutes |     |     |     |     | Mean Corneal Swelling (%) - Minutes |     |           |           |
|-----------------------|--------------------------------|-----|-----|-----|-----|-------------------------------------|-----|-----------|-----------|
|                       | 30                             | 75  | 120 | 180 | 240 | 30                                  | 75  | 120       | 180       |
| Acetic acid           | 1.8                            | 2.0 | 2.0 | 2.0 | 2.0 | 2.0                                 | 2.0 | Severe    | Severe    |
| Acetic acid           | 1.6                            | -   | -   | -   | 1.4 | 1.6                                 | 3.0 | Severe    |           |
| Acetic acid           | -                              | -   | -   | -   | -   | -                                   | 2.0 | Severe    |           |
| Brij 35               | 1.0                            | 1.0 | 1.0 | 1.0 | 1.0 | 1.0                                 | 1.0 | Nonsevere | Nonsevere |
| Brij 35               | 0.0                            | -   | -   | -   | 0.0 | 3.0                                 | 1.6 | Severe    |           |
| Brij 35               | -                              | -   | -   | -   | -   | -                                   | 0.0 | Nonsevere |           |
| Benzalkonium chloride | 3.0                            | 3.0 | 3.0 | 3.0 | 3.0 | 3.0                                 | 3.0 | Severe    | Severe    |
| Benzalkonium chloride | 1.2                            | -   | -   | -   | 3.0 | 3.0                                 | 3.0 | Severe    |           |
| Benzalkonium chloride | -                              | -   | -   | -   | -   | -                                   | 2.0 | Severe    |           |
| Dimethyl sulfoxide    | 1.0                            | 1.0 | 1.0 | 1.0 | 1.0 | 2.0                                 | 2.0 | Nonsevere | Nonsevere |
| Dimethyl sulfoxide    | 0.0                            | -   | -   | -   | 0.0 | 0.0                                 | 0.0 | Nonsevere |           |
| Dimethyl sulfoxide    | -                              | -   | -   | -   | -   | -                                   | 2.0 | Nonsevere |           |
| Sodium fluorecein     | 0.0                            | 0.0 | 0.0 | 0.0 | 0.0 | 0.0                                 | 0.0 | Nonsevere | Nonsevere |
| Sodium fluorecein     | 0.0                            | -   | -   | -   | 0.0 | 0.0                                 | 0.0 | Nonsevere |           |
| Sodium fluorecein     | -                              | -   | -   | -   | -   | -                                   | 1.0 | Nonsevere |           |
| Glycerol              | 0.8                            | 0.8 | 0.8 | 0.8 | 0.8 | 1.0                                 | 1.0 | Nonsevere | Nonsevere |
| Glycerol              | 0.0                            | -   | -   | -   | 0.0 | 0.0                                 | 0.0 | Nonsevere |           |
| Glycerol              | -                              | -   | -   | -   | -   | -                                   | 0.0 | Nonsevere |           |
| Triacetin             | 0.0                            | 0.0 | 0.0 | 0.0 | 0.0 | 0.0                                 | 0.0 | Nonsevere | Nonsevere |
| Triacetin             | 0.0                            | -   | -   | -   | 0.0 | 0.0                                 | 0.0 | Nonsevere |           |
| Triacetin             | -                              | -   | -   | -   | -   | -                                   | 0.0 | Nonsevere |           |
| Mercury chloride      | NM                             | 3.0 | 3.0 | 2.7 | 2.0 | NM                                  | 3.0 | Severe    | Severe    |
| Mercury chloride      | 3.0                            | -   | -   | -   | 2.8 | 1.0                                 | 2.0 | Severe    |           |
| Mercury chloride      | NT                             | NT  | NT  | NT  | NT  | NT                                  | NT  | NT        |           |
| Silver nitrate        | 1.0                            | 1.0 | 1.0 | 1.5 | 1.5 | 1.0                                 | 1.0 | Nonsevere | Nonsevere |
| Silver nitrate        | 2.0                            | -   | -   | -   | 2.0 | 0.0                                 | 0.0 | Nonsevere |           |
| Silver nitrate        | -                              | -   | -   | -   | -   | -                                   | 2.0 | Nonsevere |           |
| Sodium hydroxide      | 3.0                            | 3.0 | 3.0 | 3.0 | 3.0 | 2.0                                 | 3.0 | Severe    | Severe    |
| Sodium hydroxide      | 3.0                            | -   | -   | -   | 3.0 | 3.0                                 | 3.0 | Severe    |           |
| Sodium hydroxide      | -                              | -   | -   | -   | -   | -                                   | 3.0 | Severe    |           |
| Toluene               | 1.2                            | 1.2 | 1.2 | 1.2 | 1.2 | 2.0                                 | 2.2 | Nonsevere | Nonsevere |
| Toluene               | 0.0                            | -   | -   | -   | 0.0 | 1.8                                 | 2.0 | Nonsevere |           |
| Toluene               | -                              | -   | -   | -   | -   | -                                   | 1.0 | Nonsevere |           |
| Triethanolamine       | 0.0                            | 0.0 | 0.0 | 0.0 | 0.0 | 0.2                                 | 0.2 | Nonsevere | Nonsevere |
| Triethanolamine       | 0.0                            | -   | -   | -   | 0.0 | 0.0                                 | 0.0 | Nonsevere |           |
| Triethanolamine       | -                              | -   | -   | -   | -   | -                                   | 0.0 | Nonsevere |           |

## CEC (1991) Data Sorted By Substance

| Substance              | Mean Corneal Opacity - Minutes |     |     |     |     | Mean Corneal Swelling (%) - Minutes |     |           |           |
|------------------------|--------------------------------|-----|-----|-----|-----|-------------------------------------|-----|-----------|-----------|
|                        | 30                             | 75  | 120 | 180 | 240 | 30                                  | 75  | 120       | 180       |
| n-Hexane               | 0.0                            | 0.0 | 0.0 | 0.0 | 0.0 | 0.0                                 | 0.0 | Nonsevere | Nonsevere |
| n-Hexane               | 0.0                            | -   | -   | -   | 0.0 | 2.0                                 | 1.0 | Nonsevere |           |
| n-Hexane               | -                              | -   | -   | -   | -   | -                                   | 0.0 | Nonsevere |           |
| Chloroform             | 1.5                            | 2.0 | 2.0 | 2.0 | 2.0 | 3.0                                 | 3.0 | Severe    | Severe    |
| Chloroform             | 0.0                            | -   | -   | -   | 1.4 | 2.8                                 | 3.0 | Severe    |           |
| Chloroform             | -                              | -   | -   | -   | -   | -                                   | 3.0 | Severe    |           |
| 2-Methoxyethanol       | 1.0                            | 1.5 | 2.0 | 2.0 | 2.0 | 3.0                                 | 3.0 | Severe    | Severe    |
| 2-Methoxyethanol       | 0.0                            | -   | -   | -   | 2.8 | 2.0                                 | 2.0 | Severe    |           |
| 2-Methoxyethanol       | -                              | -   | -   | -   | -   | -                                   | 3.0 | Severe    |           |
| Butanol                | 3.0                            | 3.0 | 3.0 | 3.0 | 3.0 | 3.0                                 | 3.0 | Severe    | Severe    |
| Butanol                | 1.0                            | -   | -   | -   | 2.0 | 2.4                                 | 3.0 | Severe    |           |
| Butanol                | -                              | -   | -   | -   | -   | -                                   | 3.0 | Severe    |           |
| Acetaldehyde           | 1.4                            | 1.5 | 1.5 | 1.5 | 1.5 | 2.8                                 | 2.8 | Severe    | Severe    |
| Acetaldehyde           | 2.0                            | -   | -   | -   | 2.0 | 3.0                                 | 3.0 | Severe    |           |
| Acetaldehyde           | -                              | -   | -   | -   | -   | -                                   | 3.0 | Severe    |           |
| 2-Butoxyethyl acetate  | 0.5                            | 0.9 | 0.9 | 0.9 | 0.9 | 2.0                                 | 2.0 | Nonsevere | Nonsevere |
| 2-Butoxyethyl acetate  | 1.0                            | -   | -   | -   | 1.0 | 2.0                                 | 0.0 | Nonsevere |           |
| 2-Butoxyethyl acetate  | -                              | -   | -   | -   | -   | -                                   | 2.0 | Severe    |           |
| Sodium dodecyl sulfate | 0.8                            | 1.0 | 1.8 | 1.8 | 1.8 | 3.0                                 | 3.0 | Severe    | Severe    |
| Sodium dodecyl sulfate | 0.0                            | -   | -   | -   | 1.0 | 0.0                                 | 0.2 | Nonsevere |           |
| Sodium dodecyl sulfate | -                              | -   | -   | -   | -   | -                                   | 3.0 | Severe    |           |
| Dibutyltin             | NT                             | NT  | NT  | NT  | NT  | NT                                  | NT  | NT        | Severe    |
| Dibutyltin             | 1.0                            | -   | -   | -   | 1.0 | 1.0                                 | 2.0 | Severe    |           |
| Dibutyltin             | -                              | -   | -   | -   | -   | -                                   | 2.0 | Nonsevere |           |
| Tributyltin            | 2.0                            | 2.0 | 2.0 | 2.5 | 2.0 | 3.0                                 | 3.0 | Severe    | Severe    |
| Tributyltin            | 1.0                            | -   | -   | -   | 2.2 | 2.0                                 | 2.6 | Severe    |           |
| Tributyltin            | -                              | -   | -   | -   | -   | -                                   | 2.0 | Severe    |           |