**Supplementary Material** attached to the paper “Jet-cooled ethylene cavity ring-down spectroscopy between 5880 and 6200 cm-1” bySolène Perot, Julien Lecomte, Nicolas Suas-David, Lucile Rutkowski, Michaël Rey, Samir Kassi, Andrei V. Nikitin, Robert Georges.

**Fitted rotational-vibrational parameters for 17 vibrational bands of ethylene**

*Fitted rotational-vibrational parameters for band ν5+ν9:*

Band type: a

|  |  |  |
| --- | --- | --- |
| *Parameter* | *Fitted value (cm-1)* | *Standard deviation (cm-1)* |
| Origin | 6151.00199 | 0.00014 |
| A | 4.82300 | 0.00018 |
| B | 0.99362 |  |
| C | 0.82669 |  |
| ΔK | 3.50156 |  |
| ΔJK | 0.00018 |  |
| ΔJ | -1.20473 |  |
| δK | -0.00123 |  |
| δJ | -3.53867 |  |

*Fitted rotational-vibrational parameters for band ν5+ν11:*

Band type: b

|  |  |  |
| --- | --- | --- |
| Parameter | Fitted value (cm-1) | Standard deviation (cm-1) |
| Origin | 5994.80623 | 0.00074 |
| A | 4.83419 | 0.00035 |
| B | 0.99784 | 0.00027 |
| C | 0.82420 | 0.00031 |
| ΔK |  |  |
| ΔJK | 1.7 |  |
| ΔJ | -1.4 |  |
| δK | -0.00034 |  |
| δJ | 1.8 |  |

*Fitted rotational-vibrational parameters for band ν2+ν3+ν11:*

Band type: a

|  |  |  |
| --- | --- | --- |
| Parameter | Fitted value (cm-1) | Standard deviation (cm-1) |
| Origin | 5918.79341 | 0.00034 |
| A | 4.88534 | 0.00041 |
| B | 0.99754 | 0.00121 |
| C | 0.82188 | 0.00117 |
| ΔK | 0.00051 |  |
| ΔJK |  |  |
| ΔJ | -1.3 |  |
| δK | -0.00095 |  |
| δJ |  |  |

*Fitted rotational-vibrational parameters for band ν1+ν11:*

Band type: a

|  |  |  |
| --- | --- | --- |
| Parameter | Fitted value (cm-1) | Standard deviation (cm-1) |
| Origin | 5950.60178 | 0.00015 |
| A | 5.07031 | 0.00058 |
| B | 0.99641 | 0.00073 |
| C | 0.81704 | 0.00064 |
| ΔK | 0.25767 | 0.00044 |
| ΔJK | 0.00035 |  |
| ΔJ | -4.2 |  |
| δK | 0.00186 | 0.00034 |
| δJ |  |  |

*Fitted rotational-vibrational parameters for band ν2+ν6+ν9:*

Band type: a

|  |  |  |
| --- | --- | --- |
| Parameter | Fitted value (cm-1) | Standard deviation (cm-1) |
| Origin | 5927.59488 | 0.00017 |
| A | 5.16346 | 0.0204 |
| B | 1.00109 | 0.00081 |
| C | 0.81463 | 0.00073 |
| ΔK | 0.25842 | 0.02041 |
| ΔJK | 0.00017 |  |
| ΔJ | -2.98551 |  |
| δK | -0.00230 |  |
| δJ | 2.25431 |  |

*Fitted rotational-vibrational parameters for band ν1+ν2+ν12:*

Band type: a

|  |  |  |
| --- | --- | --- |
| Parameter | Fitted value (cm-1) | Standard deviation (cm-1) |
| Origin | 6071.59942 | 0.0003 |
| A | 5.09807 | 0.00082 |
| B | 1.00112 | 0.00133 |
| C | 0.81476 | 0.00114 |
| ΔK | 0.26051 | 0.00055 |
| ΔJK |  |  |
| ΔJ |  |  |
| δK | 0.00245 |  |
| δJ |  |  |

*Fitted rotational-vibrational parameters for band ν9+2ν12:*

Band type: b

|  |  |  |
| --- | --- | --- |
| Parameter | Fitted value (cm-1) | Standard deviation (cm-1) |
| Origin | 5959.52497 | 0.00156 |
| A | 4.94600 | 0.00170 |
| B | 1.01017 | 0.00188 |
| C | 0.82109 | 0.00182 |
| ΔK |  | 0.00039 |
| ΔJK | -0.00024 |  |
| ΔJ |  |  |
| δK | 0.00036 | 0.00087 |
| δJ |  |  |

*Fitted rotational-vibrational parameters for band ν1+2ν10+ν12:*

Band type: a

|  |  |  |
| --- | --- | --- |
| Parameter | Fitted value (cm-1) | Standard deviation (cm-1) |
| Origin | 6105.16700 | 0.00025 |
| A | 4.73432 | 0.00032 |
| B | 0.96295 | 0.00188 |
| C | 0.83194 | 0.00179 |
| ΔK | 0.14500 |  |
| ΔJK | 0.00063 |  |
| ΔJ |  |  |
| δK | -0.00492 | 0.00091 |
| δJ |  |  |

*Fitted rotational-vibrational parameters for band 2ν2+ν6+ν12:*

Band type: b

|  |  |  |
| --- | --- | --- |
| Parameter | Fitted value (cm-1) | Standard deviation (cm-1) |
| Origin | 5900.16771 | 0.04865 |
| A | 4.78705 | 0.01563 |
| B | 0.95895 | 0.02560 |
| C | 0.82605 | 0.01144 |

*Fitted rotational-vibrational parameters for band ν5+ν6+ν7+ν8:*

Band type: a

|  |  |  |
| --- | --- | --- |
| Parameter | Fitted value (cm-1) | Standard deviation (cm-1) |
| Origin | 6176.16168 | 0.00010 |
| A | 4.87748 |  |
| B | 0.99163 |  |
| C | 0.82337 |  |

*Fitted rotational-vibrational parameters for band ν2+ν5+ν12:*

Band type: b

|  |  |  |
| --- | --- | --- |
| Parameter | Fitted value (cm-1) | Standard deviation (cm-1) |
| Origin | 6171.85984 | 0.00315 |
| A | 4.80892 | 0.00122 |
| B | 0.98616 | 0.00145 |
| C | 0.82272 | 0.00082 |

*Fitted rotational-vibrational parameters for band ν4+2ν7+ν8+ν10+ν12:*

Band type: a

|  |  |  |
| --- | --- | --- |
| Parameter | Fitted value (cm-1) | Standard deviation (cm-1) |
| Origin | 6146.44391 | 0.00211 |
| A | 3.43601 | 0.00138 |
| B | 1.90778 | 0.00027 |
| C | 0.82031 | 0.00036 |

*Fitted rotational-vibrational parameters for band ν4+ν6+ν7+ν11:*

Band type: a

|  |  |  |
| --- | --- | --- |
| Parameter | Fitted value (cm-1) | Standard deviation (cm-1) |
| Origin | 6159.43507 | 0.00016 |
| A | 5.07364 | 0.00017 |
| B | 1.01025 | 0.00010 |
| C | 0.82029 |  |

*Fitted rotational-vibrational parameters for band 2ν2+ν3+ν12:*

Band type: a

|  |  |  |
| --- | --- | --- |
| Parameter | Fitted value (cm-1) | Standard deviation (cm-1) |
| Origin | 6031.77331 |  |
| A | 4.71523 | 0.00103 |
| B | 0.98638 | 0.00107 |
| C | 0.82021 | 0.00095 |

*Fitted rotational-vibrational parameters for band ν3+ν9+2ν10:*

Band type: b

|  |  |  |
| --- | --- | --- |
| Parameter | Fitted value (cm-1) | Standard deviation (cm-1) |
| Origin | 6104.02450 | 0.00073 |
| A | 4.72234 | 0.00013 |
| B | 0.99134 | 0.00037 |
| C | 0.83104 | 0.00059 |