

Supplementary information for  
**Selected ion flow tube studies of the reactions of H<sub>3</sub>O<sup>+</sup>, NO<sup>+</sup>, O<sub>2</sub><sup>++</sup>  
and O<sup>-</sup> reagent anions with alkanes at different temperatures in  
He and N<sub>2</sub> carrier gases**

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**S1.** Product ions for the reactions of the reagent ions with the alkanes observed using the Voice200infinity with a N<sub>2</sub> carrier gas at a flow tube temperature of 393 K with 4 V at the LE lens. The relative molecular mass of the alkanes is shown in parentheses after the alkane name; for the product ions, the *m/z* value of the product ion is shown first, followed by the formula and the branching ratio in parentheses.

Compound (RMM / Da)	H <sub>3</sub> O <sup>+</sup>	NO <sup>+</sup>	O <sub>2</sub> <sup>++</sup>
<b><i>n</i>-Hexane (86)</b>	85 C <sub>6</sub> H <sub>13</sub> <sup>+</sup> (51) 71 C <sub>5</sub> H <sub>11</sub> <sup>+</sup> (49)	85 C <sub>6</sub> H <sub>13</sub> <sup>+</sup> (88) 83 C <sub>6</sub> H <sub>11</sub> <sup>+</sup> (12)	57 C <sub>4</sub> H <sub>9</sub> <sup>+</sup> (43) 56 C <sub>4</sub> H <sub>8</sub> <sup>++</sup> (31) 86 C <sub>6</sub> H <sub>14</sub> <sup>++</sup> (11) 42 C <sub>3</sub> H <sub>6</sub> <sup>+</sup> (8) 43 C <sub>3</sub> H <sub>7</sub> <sup>+</sup> (7)
<b>3-Methylpentane (86)</b>	85 C <sub>6</sub> H <sub>13</sub> <sup>+</sup> (48) 71 C <sub>5</sub> H <sub>11</sub> <sup>+</sup> (27) C <sub>6</sub> H <sub>14</sub> .H <sub>3</sub> O <sup>+</sup> (25)	85 C <sub>6</sub> H <sub>13</sub> <sup>+</sup> (100)	56 C <sub>4</sub> H <sub>8</sub> <sup>++</sup> (62) 57 C <sub>4</sub> H <sub>9</sub> <sup>+</sup> (35) 71 C <sub>5</sub> H <sub>11</sub> <sup>+</sup> (3)
<b>2,5-Dimethylhexane (114)</b>	113 C <sub>8</sub> H <sub>17</sub> <sup>+</sup> (86) C <sub>8</sub> H <sub>18</sub> .H <sub>3</sub> O <sup>+</sup> (14)	113 C <sub>8</sub> H <sub>17</sub> <sup>+</sup> (100)	99 C <sub>7</sub> H <sub>15</sub> <sup>+</sup> (29) 57 C <sub>4</sub> H <sub>9</sub> <sup>+</sup> (30) 71 C <sub>5</sub> H <sub>11</sub> <sup>+</sup> (13) 112 C <sub>8</sub> H <sub>16</sub> <sup>++</sup> (8) 70 C <sub>5</sub> H <sub>10</sub> <sup>++</sup> (8) 43 C <sub>3</sub> H <sub>7</sub> <sup>+</sup> (5) 42 C <sub>3</sub> H <sub>7</sub> <sup>+</sup> (3) 114 C <sub>8</sub> H <sub>18</sub> <sup>+</sup> (2) 56 C <sub>4</sub> H <sub>8</sub> <sup>++</sup> (2)
<b>2,3-Dimethylheptane (128)</b>	127 C <sub>9</sub> H <sub>19</sub> <sup>+</sup> (78) C <sub>9</sub> H <sub>20</sub> .H <sub>3</sub> O <sup>+</sup> (22)	127 C <sub>9</sub> H <sub>19</sub> <sup>+</sup> (100)	84 C <sub>6</sub> H <sub>12</sub> <sup>+</sup> (42) 85 C <sub>6</sub> H <sub>13</sub> <sup>+</sup> (32) 71 C <sub>5</sub> H <sub>11</sub> <sup>+</sup> (8) 83 C <sub>6</sub> H <sub>11</sub> <sup>++</sup> (7) 56 C <sub>4</sub> H <sub>8</sub> <sup>++</sup> (3) 70 C <sub>5</sub> H <sub>10</sub> <sup>++</sup> (3) 57 C <sub>4</sub> H <sub>9</sub> <sup>+</sup> (2) 69 C <sub>5</sub> H <sub>9</sub> <sup>++</sup> (2) 43 C <sub>3</sub> H <sub>7</sub> <sup>+</sup> (1)

**S2.** Product ions for the reactions of the reagent ions with the alkanes observed using the Voice200infinity with a N<sub>2</sub> carrier gas at a flow tube temperature of 393 K with 7 V at the LE lens. The relative molecular mass of the alkanes is shown in parentheses after the alkane name; for the product ions, the *m/z* value of the product ion is shown first, followed by the formula and the branching ratio in parentheses.

Compound (RMM / Da)	H <sub>3</sub> O <sup>+</sup>	NO <sup>+</sup>	O <sub>2</sub> <sup>+</sup>
<b><i>n</i>-Hexane (86)</b>	85 C <sub>6</sub> H <sub>13</sub> <sup>+</sup> (46) 71 C <sub>5</sub> H <sub>11</sub> <sup>+</sup> (54)	85 C <sub>6</sub> H <sub>13</sub> <sup>+</sup> (85) 83 C <sub>6</sub> H <sub>11</sub> <sup>+</sup> (15)	57 C <sub>4</sub> H <sub>9</sub> <sup>+</sup> (45) 56 C <sub>4</sub> H <sub>8</sub> <sup>+</sup> (35) 42 C <sub>3</sub> H <sub>6</sub> <sup>+</sup> (8) 43 C <sub>3</sub> H <sub>7</sub> <sup>+</sup> (7) 86 C <sub>6</sub> H <sub>14</sub> <sup>+</sup> (5)
<b>3-Methylpentane (86)</b>	85 C <sub>6</sub> H <sub>13</sub> <sup>+</sup> (68) 71 C <sub>5</sub> H <sub>11</sub> <sup>+</sup> (32)	85 C <sub>6</sub> H <sub>13</sub> <sup>+</sup> (96) 86 C <sub>6</sub> H <sub>14</sub> <sup>+</sup> (4)	56 C <sub>4</sub> H <sub>8</sub> <sup>+</sup> (62) 57 C <sub>4</sub> H <sub>9</sub> <sup>+</sup> (35) 71 C <sub>5</sub> H <sub>11</sub> <sup>+</sup> (3)
<b>2,5-Dimethylhexane (114)</b>	113 C <sub>8</sub> H <sub>17</sub> <sup>+</sup> (93) C <sub>8</sub> H <sub>18</sub> .H <sub>3</sub> O <sup>+</sup> (7)	113 C <sub>8</sub> H <sub>17</sub> <sup>+</sup> (100)	57 C <sub>4</sub> H <sub>9</sub> <sup>+</sup> (40) 99 C <sub>7</sub> H <sub>15</sub> <sup>+</sup> (24) 71 C <sub>5</sub> H <sub>11</sub> <sup>+</sup> (12) 112 C <sub>8</sub> H <sub>16</sub> <sup>+</sup> (7) 70 C <sub>5</sub> H <sub>10</sub> <sup>+</sup> (7) 43 C <sub>3</sub> H <sub>7</sub> <sup>+</sup> (5) 42 C <sub>3</sub> H <sub>7</sub> <sup>+</sup> (2) 56 C <sub>4</sub> H <sub>8</sub> <sup>+</sup> (2) 114 C <sub>8</sub> H <sub>18</sub> <sup>+</sup> (1)
<b>2,3-Dimethylheptane (128)</b>	127 C <sub>9</sub> H <sub>19</sub> <sup>+</sup> (78) C <sub>9</sub> H <sub>20</sub> .H <sub>3</sub> O <sup>+</sup> (22)	127 C <sub>9</sub> H <sub>19</sub> <sup>+</sup> (100)	84 C <sub>6</sub> H <sub>12</sub> <sup>+</sup> (37) 85 C <sub>6</sub> H <sub>13</sub> <sup>+</sup> (32) 71 C <sub>5</sub> H <sub>11</sub> <sup>+</sup> (8) 83 C <sub>6</sub> H <sub>11</sub> <sup>+</sup> (7) 56 C <sub>4</sub> H <sub>8</sub> <sup>+</sup> (6) 70 C <sub>5</sub> H <sub>10</sub> <sup>+</sup> (3) 57 C <sub>4</sub> H <sub>9</sub> <sup>+</sup> (3) 69 C <sub>5</sub> H <sub>9</sub> <sup>+</sup> (2) 43 C <sub>3</sub> H <sub>7</sub> <sup>+</sup> (2)