**BINDING ENERGIES**

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| --- | --- | --- | --- | --- |
| **Molecule** | **E\_b (K) with H2O** | **E\_b (K) with itself** | **Pre-exp. factor (s^-1, fitted)** | **Pre-exp. factor (s^-1, Hollenbach prescription)** |
| H2O | 5800 (1, ~E)  5773 (2, E) | --- | 40e(12+-2) | 2.87e12 |
| CO2 | 2267 (4, non-porous, E)  2356 (4, crystalline, E)  2440 (5, E) | 2000 (3, E?) | 9.3e11  9.5e11  1e12 | 11.5e11  11.7e11  1.2e12 |
| CO | 1388 (14, E)  1389 (12, E)  *1146, 1494 (porous H2O)* | 834 (14, E)  787 (12, E) | Hollenbach | 1.13e12, 8.5e11 |
| N2 | 1266 (14, E)  1053 (12, E)  *1085, 1361 (porous H2O)* | 767 (14, E)  787 (12, E) | Hollenbach | 9.8e11, 8.5e11 |
| CH4 | 1300 (6, E) | ? (within 10% of E\_b with H2O) | presumably Hollenbach | 1.44e12 |
| NH3 | ? (within 10% of E\_b with itself) | 2965 (11, E) | 2.1e12 | 2.11e12 |

E = experimental value

T = theoretical value

**ABUNDANCES**

|  |  |  |
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| **Molecule** | **n\_mid (n\_H)** | **n\_max (n\_H)** |
| H2O | 0.9e-4 (1) | --- |
| CO2 | 0.3e-4 (1) | --- |
| CO | 0.9e-4 (1)  1.43-4 (6) | --- |
| N | 8e-5 (13)  1.12186e-4 (7) | --- |
| N2 | (n\_N – n\_NH3) \* 2 | --- |
| NH3 | 0.055 \* n\_H2O (8) | 0.1537 \* n\_H2O (9) |
| CH4 | 0.0555 \* n\_H2O (8) | 0.13 \* n\_H2O (10) |

**Solar N/O ratio: 0.14 (13) -> factor of ~3.8 enhancement**

1. Oberg+11, *The effect of snowlines on C/O in planetary atmospheres*
2. Fraser+06, *Thermal desorption of water ice in the interstellar medium*
3. Aikawa+96, *Evolution of molecular abundance in gaseous disks around young stars: depletion of CO molecules*
4. Noble+12, *Thermal desorption characteristics of CO, O2 and CO2 on non-porous water, crystalline water and silicate surfaces at submonolayer and multilayer coverages*
5. Fayolle+11*, Laboratory H2O:CO2 ice desorption data: entrapment dependencies and its parameterization with an extended three-phase model*
6. Garrod+06, *Formation of methyl formate and other organic species in the warm-up phase of hot molecular cores*
7. Anders+89, *Abundances of the Elements: Meteoritic and Solar*
8. Oberg+11, *The Spitzer legacy: ice evolution from cores to protostars*
9. Bottinelli+10, *The c2d Spitzer spectroscopic survey of ices around low-mass young stellar objects IV: NH3 and CH3OH*
10. Oberg+08, *The c2d Spitzer spectroscopic survey of ices around low-mass young stellar objects III: CH4*
11. Martin-Domenech+14, *Thermal desorption of circumstellar and cometary ice analogs*
12. Jodi Balfe’s thesis, 2015, *Ice Sublimation During Star and Planet Formation...*
13. Loddeers 2003, *Solar System Abundances and Condensation Temperatures of the Elements*
14. Fayolle+15 (in prep.)