

Tables

Table S1 Ammonia synthesis activity and the equilibrium value with various H₂/N₂/Ar ratio of reaction gas composition.

| Sample | T [°C] | Reaction gas [mL/min] | | | r [mmol/h/g-cat] | Outlet NH ₃ [vol%] | Equilibrium NH ₃ [vol%] |
|---|--------|-----------------------|----------------|----|------------------|-------------------------------|------------------------------------|
| | | N ₂ | H ₂ | Ar | | | |
| Ru/C12A7:e ⁻ | 360 | 6 | 30 | 24 | 1.357 | 0.021 | 0.455 |
| | | 10 | 30 | 20 | 1.690 | 0.026 | 0.528 |
| | | 15 | 30 | 15 | 2.060 | 0.032 | 0.574 |
| | | 20 | 30 | 10 | 2.356 | 0.037 | 0.596 |
| | | 10 | 20 | 30 | 1.057 | 0.016 | 0.384 |
| | | 10 | 25 | 25 | 1.357 | 0.021 | 0.460 |
| | | 10 | 30 | 20 | 1.534 | 0.024 | 0.528 |
| | | 10 | 40 | 10 | 2.097 | 0.033 | 0.649 |
| Ru/C12A7:O ²⁻ | 360 | 6 | 30 | 24 | 0.148 | 0.002 | 0.455 |
| | | 10 | 30 | 20 | 0.283 | 0.004 | 0.528 |
| | | 15 | 30 | 15 | 0.392 | 0.006 | 0.574 |
| | | 20 | 30 | 10 | 0.498 | 0.008 | 0.596 |
| | | 10 | 20 | 30 | 0.281 | 0.004 | 0.384 |
| | | 10 | 30 | 20 | 0.317 | 0.005 | 0.528 |
| | | 10 | 40 | 10 | 0.265 | 0.004 | 0.649 |
| | | 10 | 50 | 0 | 0.280 | 0.004 | 0.753 |
| Ru/CaO · Al ₂ O ₃ | 400 | 6 | 30 | 24 | 0.136 | 0.002 | 0.254 |
| | | 10 | 30 | 20 | 0.215 | 0.003 | 0.295 |
| | | 15 | 30 | 15 | 0.306 | 0.005 | 0.320 |
| | | 20 | 30 | 10 | 0.371 | 0.006 | 0.333 |
| | | 10 | 20 | 30 | 0.245 | 0.004 | 0.214 |
| | | 10 | 25 | 25 | 0.229 | 0.004 | 0.256 |
| | | 10 | 30 | 20 | 0.196 | 0.003 | 0.295 |
| | | 10 | 40 | 10 | 0.164 | 0.003 | 0.362 |
| Ru/MgO | 340 | 6 | 30 | 24 | 0.109 | 0.002 | 0.625 |
| | | 10 | 30 | 20 | 0.180 | 0.003 | 0.725 |
| | | 15 | 30 | 15 | 0.249 | 0.004 | 0.788 |
| | | 20 | 30 | 10 | 0.316 | 0.005 | 0.817 |
| | | 10 | 20 | 30 | 0.216 | 0.003 | 0.528 |
| | | 10 | 25 | 25 | 0.201 | 0.003 | 0.632 |
| | | 10 | 30 | 20 | 0.181 | 0.003 | 0.725 |
| | | 10 | 40 | 10 | 0.169 | 0.003 | 0.890 |
| Ru-Cs/MgO | 340 | 6 | 30 | 24 | 1.166 | 0.073 | 0.625 |
| | | 10 | 30 | 20 | 1.709 | 0.106 | 0.725 |
| | | 15 | 30 | 15 | 2.431 | 0.151 | 0.788 |
| | | 20 | 30 | 10 | 3.004 | 0.187 | 0.817 |
| | | 10 | 20 | 30 | 1.965 | 0.122 | 0.528 |
| | | 10 | 25 | 25 | 1.867 | 0.116 | 0.632 |
| | | 10 | 30 | 20 | 1.713 | 0.107 | 0.725 |
| | | 10 | 40 | 10 | 1.427 | 0.089 | 0.890 |
| Ru/Ca ₂ N:e ⁻ | 340 | 6 | 30 | 24 | 1.852 | 0.029 | 0.625 |
| | | 10 | 30 | 20 | 2.586 | 0.040 | 0.725 |
| | | 15 | 30 | 15 | 3.034 | 0.047 | 0.788 |
| | | 20 | 30 | 10 | 3.576 | 0.056 | 0.817 |
| | | 10 | 20 | 30 | 2.002 | 0.031 | 0.528 |
| | | 10 | 25 | 25 | 2.306 | 0.036 | 0.632 |
| | | 10 | 30 | 20 | 2.755 | 0.043 | 0.725 |
| | | 10 | 40 | 10 | 3.507 | 0.055 | 0.890 |
| Ru/CaNH | 340 | 6 | 30 | 24 | 0.751 | 0.012 | 0.625 |
| | | 10 | 30 | 20 | 1.119 | 0.017 | 0.725 |
| | | 15 | 30 | 15 | 1.521 | 0.024 | 0.788 |
| | | 20 | 30 | 10 | 1.899 | 0.030 | 0.817 |
| | | 10 | 20 | 30 | 0.823 | 0.013 | 0.528 |
| | | 10 | 25 | 25 | 0.728 | 0.011 | 0.632 |
| | | 10 | 30 | 20 | 0.733 | 0.011 | 0.725 |
| | | 10 | 40 | 10 | 0.709 | 0.011 | 0.890 |