

New Journal of Chemistry

*Electronic Supporting Information*

**Uranyl oxide hydrate phases with heavy lanthanide ions:  
[Ln(UO<sub>2</sub>)<sub>2</sub>O<sub>3</sub>(OH)]·0.5H<sub>2</sub>O (Ln = Tb, Dy, Ho and Yb)**

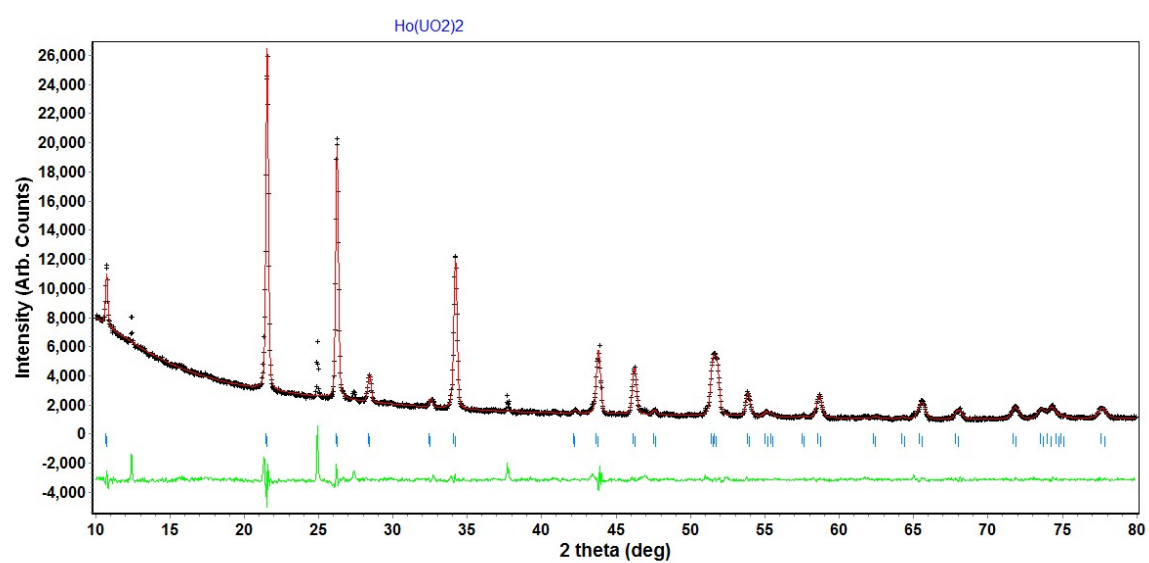
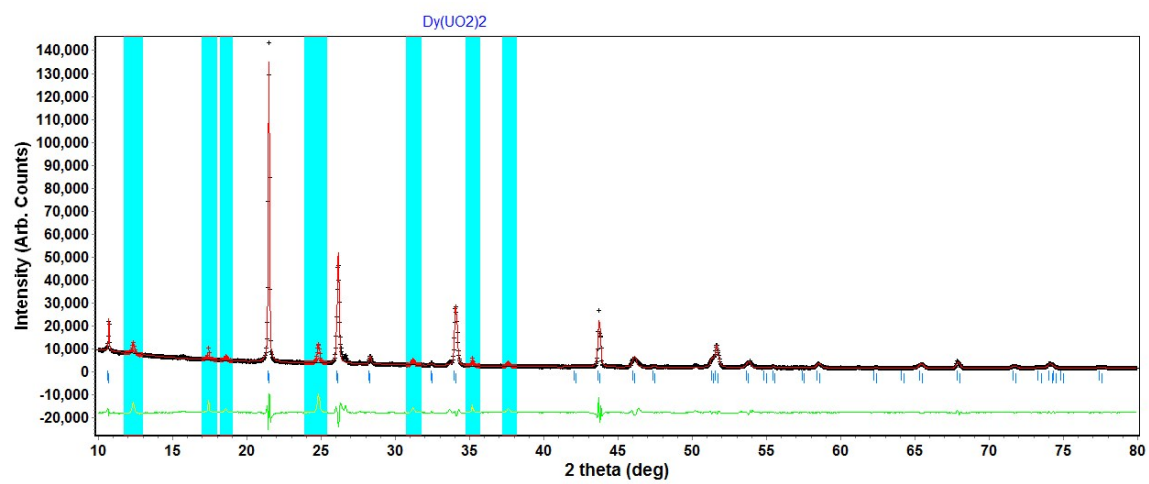
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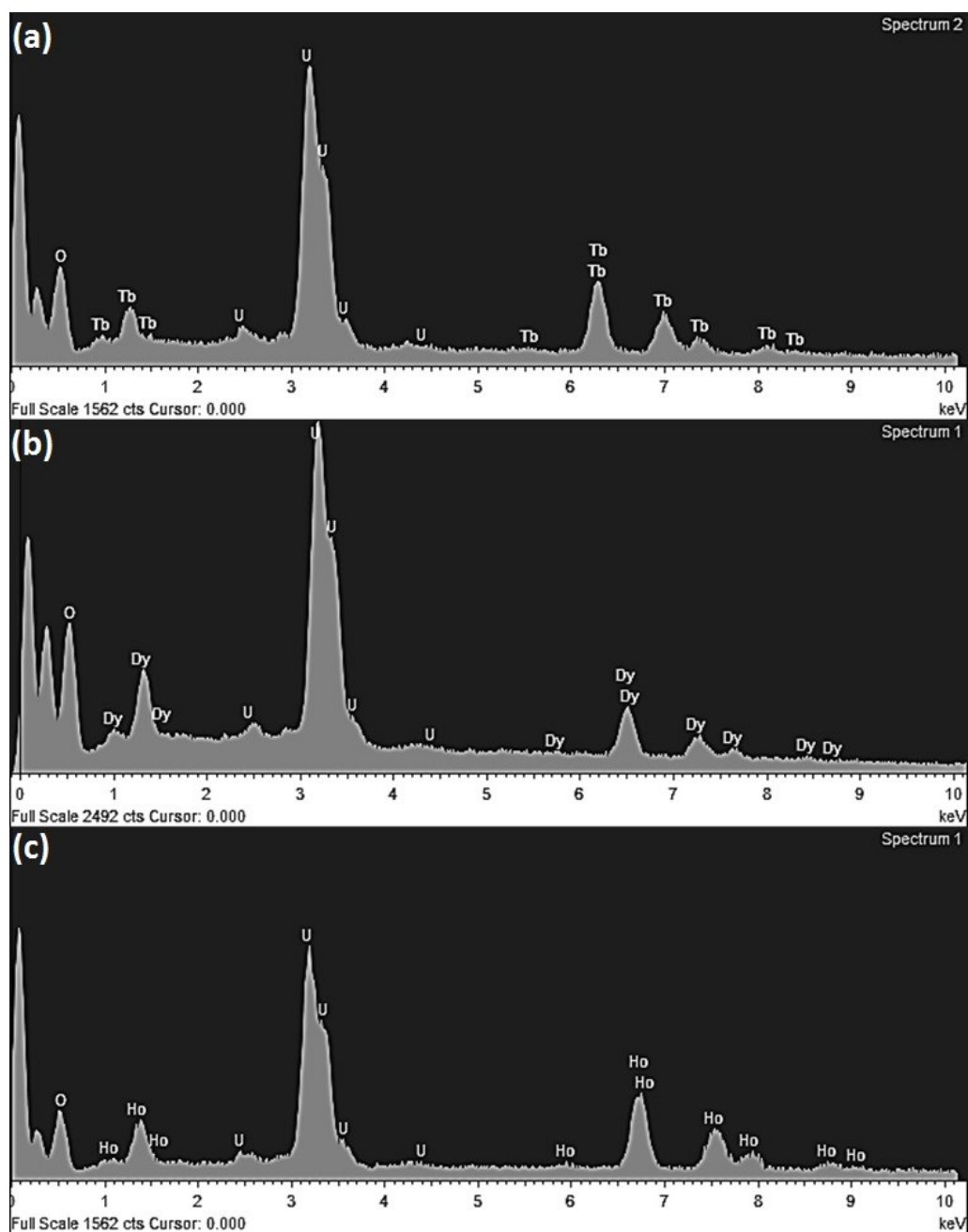
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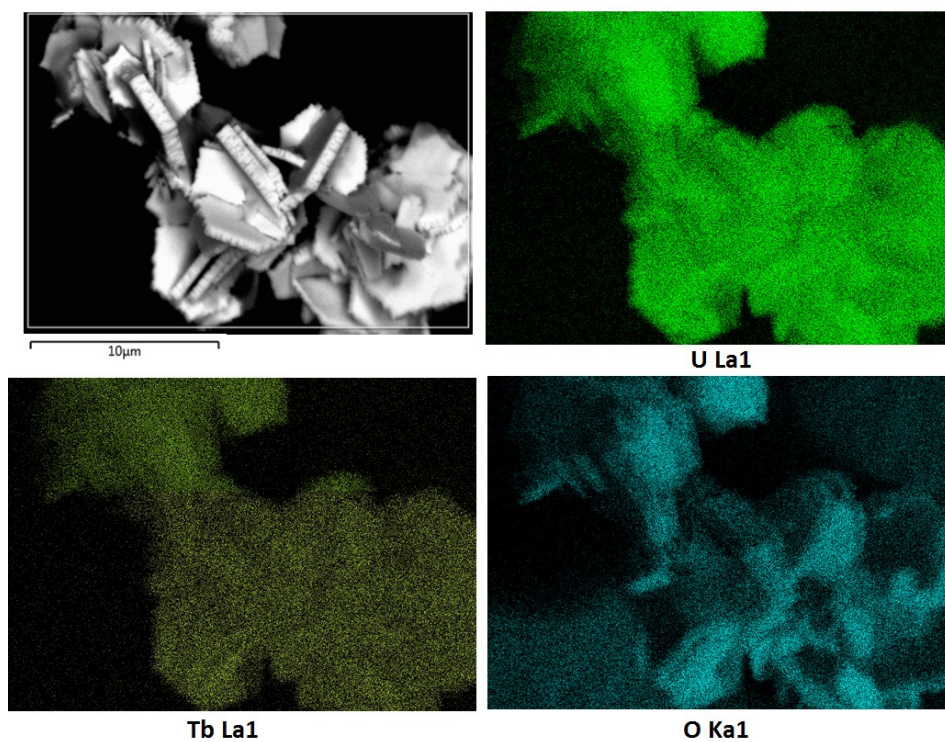
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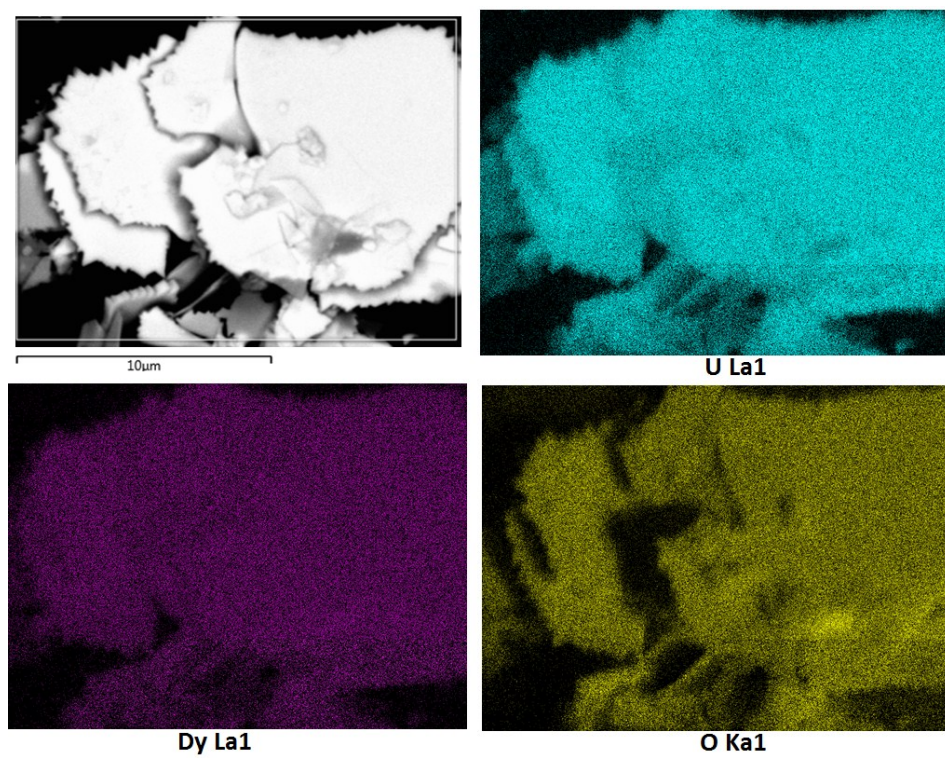
**Fig. S1.** Observed (crosses), calculated and difference (solid lines) diffraction profiles for samples **2** (top) and **3** (bottom).



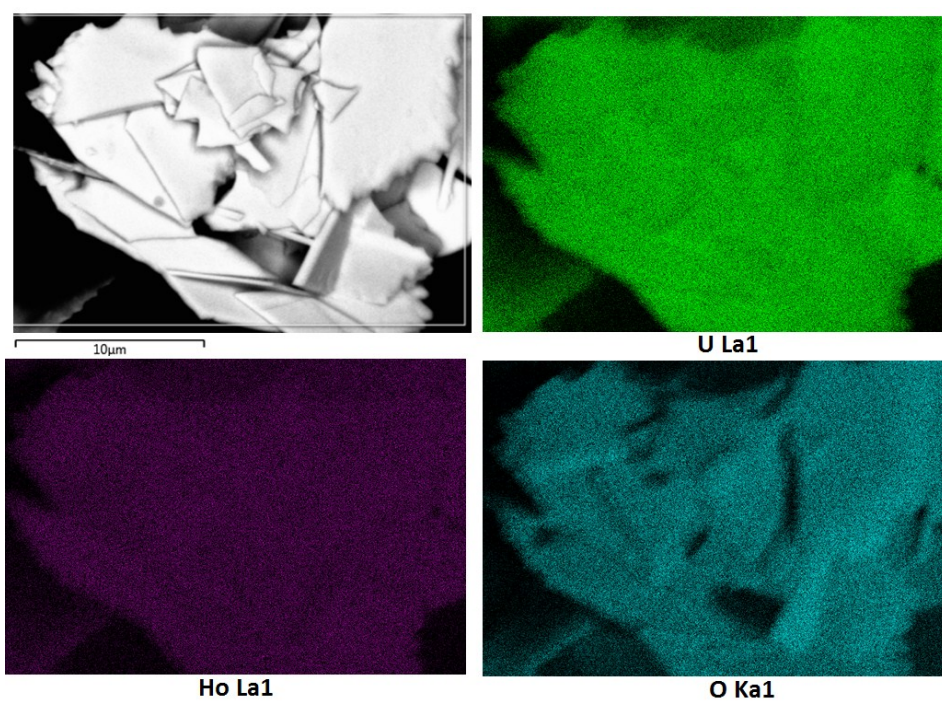
**Fig. S2.** SEM-EDS spectra for samples **1** (a), **2** (b) and **3** (c).



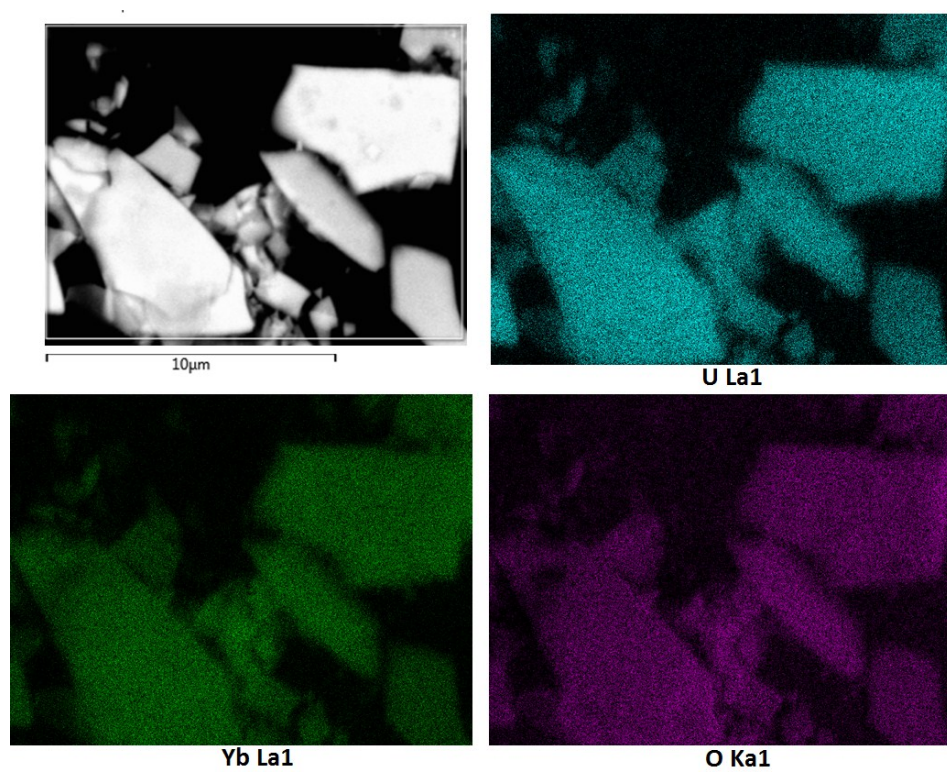
**Fig. S3.** SEM-EDS element mapping for sample 1.



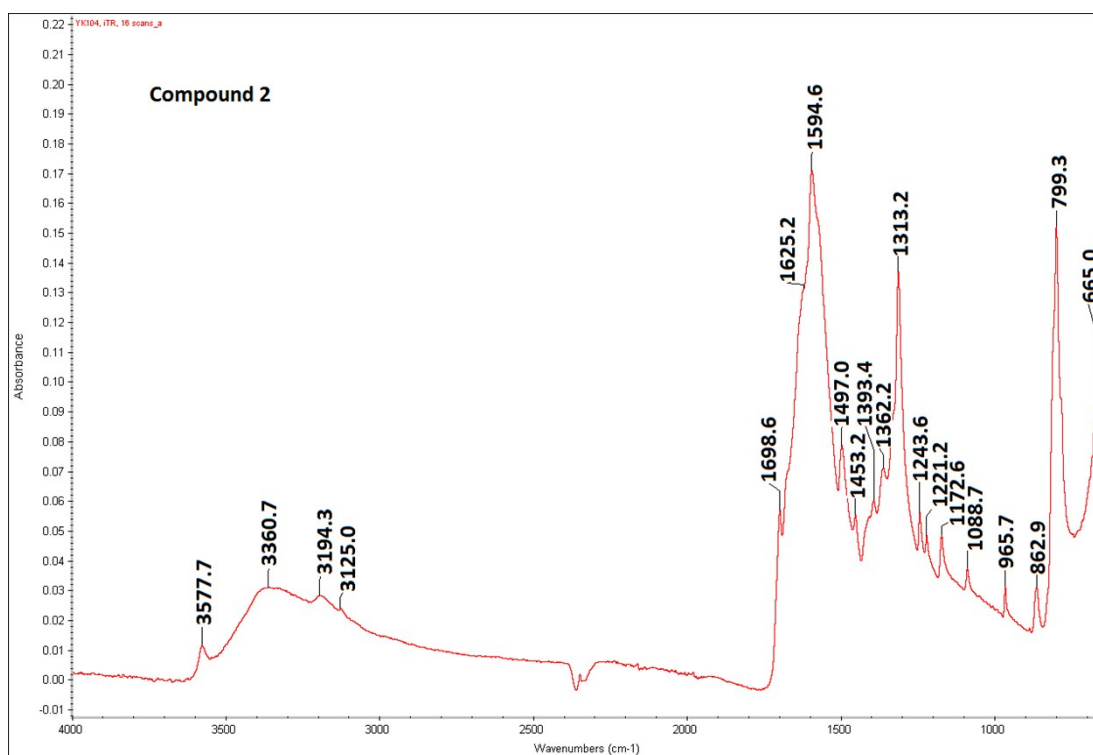
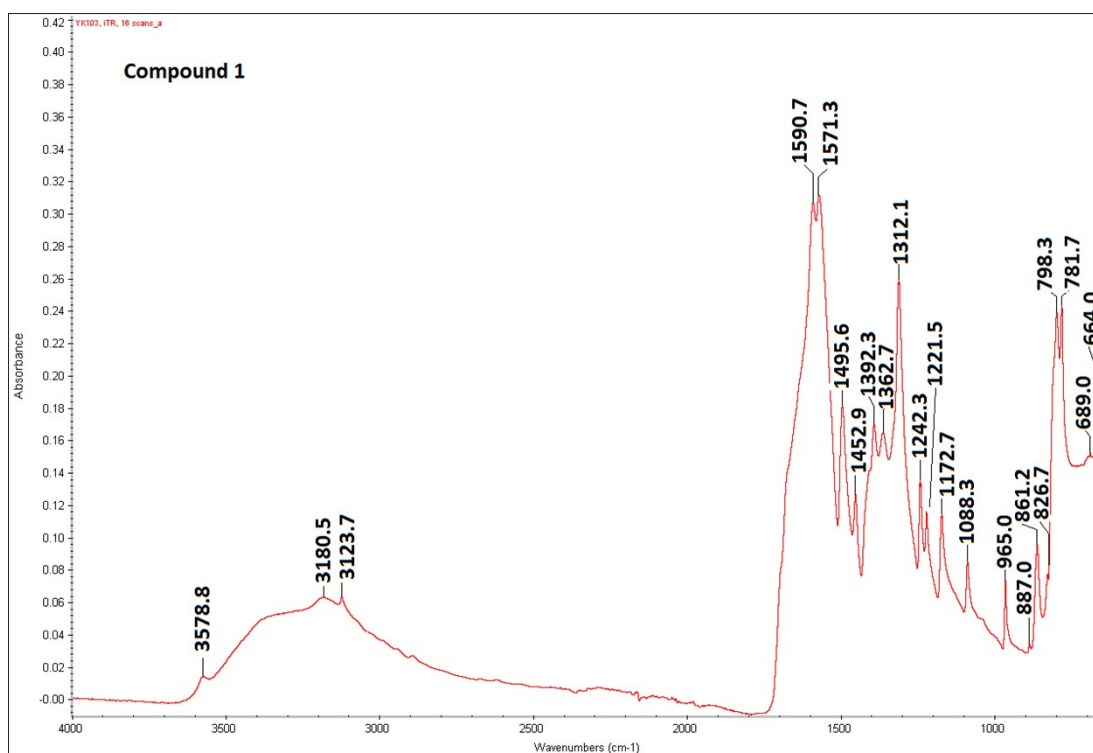
**Fig. S4.** SEM-EDS element mapping for sample 2.



**Fig. S5.** SEM-EDS element mapping for sample 3.



**Fig. S6.** SEM-EDS element mapping for sample 4.



**Fig. S7.** Infrared spectra of samples **1** (top) and **2** (bottom).

**Table S1.** Calculated d-spacing from XRD patterns for UOH phases 1-4.

| <b>H</b> | <b>K</b> | <b>L</b> | <b>d-spacing</b> |          |          |          |
|----------|----------|----------|------------------|----------|----------|----------|
|          |          |          | <b>1</b>         | <b>2</b> | <b>3</b> | <b>4</b> |
| 0        | 0        | 1        | 8.279552         | 8.257188 | 8.269512 | 8.202184 |
| 0        | 0        | 2        | 4.139795         | 4.128571 | 4.134841 | 4.101059 |
| 0        | 1        | 0        | 3.408896         | 3.405309 | 3.398158 | 3.395611 |
| 0        | 1        | 1        | 3.152243         | 3.148101 | 3.143101 | 3.13736  |
| 0        | 0        | 3        | 2.75978          | 2.752343 | 2.756552 | 2.734015 |
| 0        | 1        | 2        | 2.631501         | 2.627007 | 2.625289 | 2.615474 |
| 0        | 1        | 3        | 2.145001         | 2.140584 | 2.140729 | 2.129553 |
| 0        | 0        | 4        | 2.069857         | 2.064287 | 2.067383 | 2.050546 |
| 1        | 1        | 0        | 1.968161         | 1.966063 | 1.961923 | 1.96048  |
| 1        | 1        | 1        | 1.914783         | 1.91258  | 1.908946 | 1.906758 |
| 1        | 1        | 2        | 1.777497         | 1.775081 | 1.772512 | 1.76877  |
| 0        | 1        | 4        | 1.769249         | 1.765268 | 1.76619  | 1.755325 |
| 0        | 2        | 0        | 1.70446          | 1.702671 | 1.699077 | 1.697824 |
| 0        | 2        | 1        | 1.669469         | 1.667567 | 1.664305 | 1.662582 |
| 0        | 0        | 5        | 1.655869         | 1.651427 | 1.653919 | 1.640442 |
| 1        | 1        | 3        | 1.602418         | 1.599821 | 1.598399 | 1.593219 |
| 0        | 2        | 2        | 1.576114         | 1.574054 | 1.571562 | 1.568714 |
| 0        | 1        | 5        | 1.489455         | 1.485916 | 1.487115 | 1.477101 |
| 0        | 2        | 3        | 1.450192         | 1.447995 | 1.446388 | 1.44235  |
| 1        | 1        | 4        | 1.426287         | 1.423674 | 1.423114 | 1.417029 |
| 0        | 0        | 6        | 1.379905         | 1.376194 | 1.37826  | 1.367023 |
| 0        | 2        | 4        | 1.315767         | 1.313498 | 1.312644 | 1.307735 |
| 1        | 2        | 0        | 1.288467         | 1.287082 | 1.284383 | 1.283426 |
| 0        | 1        | 6        | 1.279086         | 1.27593  | 1.277196 | 1.268125 |
| 1        | 2        | 1        | 1.273144         | 1.271727 | 1.269168 | 1.268009 |
| 1        | 1        | 5        | 1.267084         | 1.26452  | 1.264534 | 1.258097 |
| 1        | 2        | 2        | 1.230255         | 1.22876  | 1.226566 | 1.224858 |