

APÉNDICE A. TABLAS DE PROPIEDADES PARA LAS TOPOLOGÍAS

Tabla A.1 Propiedades de la Topología 1-1

| | T (K) | P (ATM) | H (J/KGMOLE) | S (J/KMOLEK) | H (KJ/KGMOLE) | S (KJ/KMOLEK) |
|---|----------|---------|--------------|--------------|---------------|---------------|
| 1 | 300 | 1 | -84700000 | -135000 | -84700 | -135 |
| 2 | 300 | 1 | -84700000 | -133000 | -84700 | -133 |
| 3 | 648.5992 | 245 | -63700000 | -133000 | -63700 | -133 |
| 4 | 300 | 245 | -91400000 | -194000 | -91400 | -194 |
| 5 | 273 | 245 | -93500000 | -202000 | -93500 | -202 |
| 6 | 203.9586 | 1 | -93500000 | -170000 | -93500 | -170 |
| 7 | 203.9586 | 1 | -79300000 | -101000 | -79300 | -101 |
| 8 | 203.9586 | 1 | -158000000 | -486000 | -158000 | -486 |
| 9 | 275.2235 | 1 | -76800000 | -90441.27 | -76800 | -90.44127 |

Tabla A.2 Propiedades de la Topología 1-2

| | T (K) | P (ATM) | H (J/KGMOLE) | S (J/KMOLEK) | H (KJ/KGMOLE) | S (KJ/KMOLEK) |
|---|----------|---------|--------------|--------------|---------------|---------------|
| 1 | 300 | 1 | -84700000 | -133280 | -84700 | -133.28 |
| 2 | 335 | 245 | -88700000 | -185560 | -88700 | -185.56 |
| 3 | 300 | 245 | -91400000 | -194280 | -91400 | -194.28 |
| 4 | 220.7881 | 1 | -91400000 | -160700 | -91400 | -160.7 |
| 5 | 220.7881 | 1 | -156000000 | -478820 | -156000 | -478.82 |
| 6 | 220.7881 | 1 | -81900000 | -114160 | -81900 | -114.16 |
| 7 | 301.3248 | 1 | -78800000 | -101940 | -78800 | -101.94 |

Tabla A.3 Propiedades de la Topología 1-3

| | T (K) | P (ATM) | H (J/KGMOLE) | S (J/KMOLEK) | H (KJ/KGMOLE) | S (KJ/KMOLEK) |
|---|----------|---------|--------------|--------------|---------------|---------------|
| 1 | 300 | 1 | -84722000 | -133280 | -84722 | -133.28 |
| 2 | 263.1033 | 1 | -76988000 | -90801.34 | -76988 | -90.80134 |
| 3 | 722.9096 | 245 | -55107000 | -90801.33 | -55107 | -90.80133 |
| 4 | 300 | 245 | -79294000 | -140540 | -79294 | -140.54 |
| 5 | 230 | 245 | -83602000 | -156910 | -83602 | -156.91 |
| 6 | 113.2111 | 1 | -83602000 | -130010 | -83602 | -130.01 |

Tabla A.3 Propiedades de la Topología 1-3 (continuación)

| | | | | | | |
|-----------|----------|------|------------|-----------|---------|-----------|
| 7 | 113.2111 | 1 | -80856000 | -113620 | -80856 | -113.62 |
| 8 | 113.2111 | 1 | -104990000 | -257650 | -104990 | -257.65 |
| 9 | 256.6415 | 1 | -75995000 | -85900.32 | -75995 | -85.90032 |
| 10 | 256.6674 | 1 | -75995000 | -85896.84 | -75995 | -85.89684 |
| 11 | ---- | ---- | ---- | ---- | ---- | ---- |

Tabla A.4 Propiedades de la Topología 1-4

| | T (K) | P (ATM) | H (J/KGMOLE) | S (J/KMOLEK) | H (KJ/KGMOLE) | S (KJ/KMOLEK) |
|-----------|--------------|----------------|-------------------------|-------------------------|--------------------------|--------------------------|
| 1 | 300 | 1 | -84722000 | -133280 | -84722 | -133.28 |
| 2 | 335 | 245 | -77651000 | -135790 | -77651 | -135.79 |
| 3 | 300 | 245 | -79669000 | -142160 | -79669 | -142.16 |
| 4 | 200.7818 | 1 | -79669000 | -102700 | -79669 | -102.7 |
| 5 | 200.7818 | 1 | -158250000 | -487510 | -158250 | -487.51 |
| 6 | 200.7818 | 1 | -79131000 | -100070 | -79131 | -100.07 |
| 7 | 258.6343 | 1 | -77099000 | -91175.77 | -77099 | -91.17577 |
| 8 | 260.6023 | 1 | -77378000 | -92623.1 | -77378 | -92.6231 |
| 9 | 258.6343 | 1 | -77099000 | -91175.77 | -77099 | -91.17577 |
| 10 | 258.6343 | 1 | -77099000 | -91175.77 | -77099 | -91.17577 |

Tabla A.5 Propiedades de la Topología 2-1

| | T (K) | P (ATM) | H (J/KGMOLE) | S (J/KMOLEK) | H (KJ/KGMOLE) | S (KJ/KMOLEK) |
|-----------|--------------|----------------|-------------------------|-------------------------|--------------------------|--------------------------|
| 1 | 300 | 1 | -84700000 | -133000 | -84700 | -133 |
| 2 | 648.5992 | 245 | -63700000 | -133000 | -63700 | -133 |
| 3 | 288 | 245 | -92400000 | -197000 | -92400 | -197 |
| 4 | 280 | 245 | -93000000 | -200000 | -93000 | -200 |
| 5 | 253 | 245 | -95000000 | -207000 | -95000 | -207 |
| 6 | 183.3954 | 1 | -95000000 | -178000 | -95000 | -178 |
| 7 | 183.3954 | 1 | -160000000 | -494000 | -160000 | -494 |
| 8 | 183.3954 | 1 | -78800000 | -98624.66 | -78800 | -98.62466 |
| 9 | 257.2761 | 1 | -76200000 | -87051.47 | -76200 | -87.05147 |
| 10 | 279.2135 | 1 | -75500000 | -84178.53 | -75500 | -84.17853 |
| | | | | | | |

Tabla A.6 Propiedades de la Topología 2-2

| | T (K) | P (ATM) | H (J/KGMOLE) | S (J/KMOLEK) | H (KJ/KGMOLE) | S (KJ/KMOLEK) |
|---|----------|---------|--------------|--------------|---------------|---------------|
| 1 | 300 | 1 | -84700000 | -133000 | -84700 | -133 |
| 2 | 288.15 | 245 | -92400000 | -197000 | -92400 | -197 |
| 3 | 280 | 245 | -93000000 | -200000 | -93000 | -200 |
| 4 | 253 | 245 | -95000000 | -207000 | -95000 | -207 |
| 5 | 183.3954 | 1 | -95000000 | -178000 | -95000 | -178 |
| 6 | 183.3954 | 1 | -78800000 | -98624.66 | -78800 | -98.62466 |
| 7 | 257.2761 | 1 | -76200000 | -87051.47 | -76200 | -87.05147 |
| 8 | 279.6232 | 1 | -75500000 | -54126.56 | -75500 | -54.12656 |
| 9 | 183.3954 | 1 | -160000 | -494000 | -160 | -494 |

Tabla A.7 Propiedades de la Topología 2-3

| | T (K) | P (ATM) | H (J/KGMOLE) | S (J/KMOLEK) | H (KJ/KGMOLE) | S (KJ/KMOLEK) |
|----|----------|---------|--------------|--------------|---------------|---------------|
| 1 | 300 | 1 | -84722000 | -133280 | -84722 | -133.28 |
| 2 | 632.3065 | 245 | -60574000 | -97391.6 | -60574 | -97.3916 |
| 3 | 288 | 245 | -79347000 | -140150 | -79347 | -140.15 |
| 4 | 280 | 245 | -79820000 | -141810 | -79820 | -141.81 |
| 5 | 253 | 245 | -81462000 | -147980 | -81462 | -147.98 |
| 6 | 129.637 | 1 | -81462000 | -114850 | -81462 | -114.85 |
| 7 | 129.6368 | 1 | -151900000 | -467770 | -151900 | -467.77 |
| 8 | 129.6368 | 1 | -80298000 | -109020 | -80298 | -109.02 |
| 9 | 179.0936 | 1 | -78628000 | -98106.57 | -78628 | -98.10657 |
| 10 | 193.3574 | 1 | -78148000 | -95525.24 | -78148 | -95.52524 |
| 11 | 202.5104 | 1 | -78579000 | -97392.81 | -78579 | -97.39281 |
| 12 | 193.3574 | 1 | -78148000 | -95525.24 | -78148 | -95.52524 |
| 13 | 193.3574 | 1 | -78148000 | -95525.24 | -78148 | -95.52524 |

Tabla A.8 Propiedades de la Topología 2-4

| | T (K) | P (ATM) | H (J/KGMOLE) | S (J/KMOLEK) | H (KJ/KGMOLE) | S (KJ/KMOLEK) |
|---|----------|---------|--------------|--------------|---------------|---------------|
| 1 | 300 | 1 | -84722000 | -133280 | -84722 | -133.28 |
| 2 | 288.15 | 245 | -79338000 | -140120 | -79338 | -140.12 |
| 3 | 280 | 245 | -79820000 | -141810 | -79820 | -141.81 |
| 4 | 253 | 245 | -81462000 | -147980 | -81462 | -147.98 |
| 5 | 129.6364 | 1 | -81462000 | -114850 | -81462 | -114.85 |

Tabla A.9 Propiedades de la Topología 2-4 (continuación)

| | | | | | | |
|----|----------|---|------------|-----------|---------|-----------|
| 6 | 129.6364 | 1 | -80298000 | -109020 | -80298 | -109.02 |
| 7 | 179.0985 | 1 | -78628000 | -98105.65 | -78628 | -98.10565 |
| 8 | 193.6233 | 1 | -78139000 | -95478.92 | -78139 | -95.47892 |
| 9 | 129.6364 | 1 | -151900000 | -467760 | -151900 | -467.76 |
| 10 | 202.7536 | 1 | -78570000 | -97351.28 | -78570 | -97.35128 |
| 11 | 193.6233 | 1 | -78139000 | -95478.92 | -78139 | -95.47892 |
| 12 | 193.6233 | 1 | -78139000 | -95478.92 | -78139 | -95.47892 |

Tabla A.10 Propiedades de la Topología 1-s1

| | T (K) | P (ATM) | H (J/KGMOLE) | S (J/KMOLEK) | H (KJ/KGMOLE) | S (KJ/KMOLEK) |
|----|----------|---------|-----------------|-----------------|------------------|------------------|
| 1 | 300 | 1 | -84722000 | -133280 | -84722 | -133.28 |
| 2 | 300 | 1 | -84755000 | -133280 | -84755 | -133.28 |
| 3 | 648.5992 | 245 | -63736000 | -133280 | -63736 | -133.28 |
| 4 | 300 | 245 | -91430000 | -194280 | -91430 | -194.28 |
| 5 | 250 | 245 | -95218000 | -208080 | -95218 | -208.08 |
| 6 | 123.0798 | 1 | -98680000 | -202930 | -98680 | -202.93 |
| 7 | 123.0787 | 1 | -80520000 | -110780 | -80520 | -110.78 |
| 8 | 123.0787 | 1 | -144150000 | -433650 | -144150 | -433.65 |
| 9 | 278.9659 | 1 | -75218000 | -82996.95 | -75218 | -82.99695 |
| 10 | 200 | 245 | -98680000 | -223510 | -98680 | -223.51 |

Tabla A.11 Propiedades de la Topología 1-s2

| | T (K) | P (ATM) | H (J/KGMOLE) | S (J/KMOLEK) | H (KJ/KGMOLE) | S (KJ/KMOLEK) |
|----|----------|---------|-----------------|-----------------|------------------|------------------|
| 1 | 300 | 1 | -84722000 | -133280 | -84722 | -133.28 |
| 2 | 288.6943 | 1 | -78147000 | -97940.05 | -78147 | -97.94005 |
| 3 | 723.0022 | 245 | -55557000 | -97940.07 | -55557 | -97.94007 |
| 4 | 300 | 245 | -82001000 | -152370 | -82001 | -152.37 |
| 5 | 240 | 245 | -85928000 | -166980 | -85928 | -166.98 |
| 6 | 113.2111 | 1 | -88456000 | -158990 | -88456 | -158.99 |
| 7 | 113.2111 | 1 | -80856000 | -113620 | -80856 | -113.62 |
| 8 | 113.2111 | 1 | -104990000 | -257650 | -104990 | -257.65 |
| 9 | 281.6582 | 1 | -75124000 | -82659.02 | -75124 | -82.65902 |
| 10 | 281.6582 | 1 | -75124000 | -82659.02 | -75124 | -82.65902 |
| 11 | ----- | ----- | ----- | ----- | ----- | ----- |
| 12 | 200 | 245 | -88456000 | -178490 | -88456 | -178.49 |

Tabla A.12 Propiedades de la Topología 1-s3

| | T (K) | P (ATM) | H (J/KGMOLE) | S (J/KMOLEK) | H (KJ/KGMOLE) | S (KJ/KMOLEK) |
|---|----------|---------|--------------|--------------|---------------|---------------|
| 1 | 300 | 1 | -84722000 | -133280 | -84722 | -133.28 |
| 2 | 335 | 245 | -88663000 | -185560 | -88663 | -185.56 |
| 3 | 300 | 245 | -91430000 | -194280 | -91430 | -194.28 |
| 4 | 123.0798 | 1 | -98680000 | -202930 | -98680 | -202.93 |
| 5 | 123.0793 | 1 | -144150000 | -433660 | -144150 | -433.66 |
| 6 | 123.0793 | 1 | -80520000 | -110780 | -80520 | -110.78 |
| 7 | 237.6277 | 1 | -76648000 | -88542.45 | -76648 | -88.54245 |
| 8 | 200 | 245 | -98680000 | -223510 | -98680 | -223.51 |

Tabla A.13 Propiedades de la Topología 1-s4

| | T (K) | P (ATM) | H (J/KGMOLE) | S (J/KMOLEK) | H (KJ/KGMOLE) | S (KJ/KMOLEK) |
|----|----------|---------|--------------|--------------|---------------|---------------|
| 1 | 300 | 1 | -84722000 | -133280 | -84722 | -133.28 |
| 2 | 335 | 245 | -79813000 | -145470 | -79813 | -145.47 |
| 3 | 300 | 245 | -82000000 | -152370 | -82000 | -152.37 |
| 4 | 113.2111 | 1 | -88456000 | -158990 | -88456 | -158.99 |
| 5 | 113.2111 | 1 | -104990000 | -257650 | -104990 | -257.65 |
| 6 | 113.2111 | 1 | -80856000 | -113620 | -80856 | -113.62 |
| 7 | 207.7361 | 1 | -77663000 | -93104.69 | -77663 | -93.10469 |
| 8 | 243.3016 | 1 | -79886000 | -104490 | -79886 | -104.49 |
| 9 | ----- | ----- | ----- | ----- | ----- | ----- |
| 10 | 207.7361 | 1 | -77663000 | -93104.69 | -77663 | -93.10469 |
| 11 | 200 | 245 | -88456000 | -178490 | -88456 | -178.49 |

Tabla A.14 Propiedades de la Topología 2 –s1

| | T (K) | P (ATM) | H (J/KGMOLE) | S (J/KMOLEK) | H (KJ/KGMOLE) | S (KJ/KMOLEK) |
|---|----------|---------|--------------|--------------|---------------|---------------|
| 1 | 300 | 1 | -84722000 | -133280 | -84722 | -133.28 |
| 2 | 648.5992 | 245 | -63736000 | -133280 | -63736 | -133.28 |
| 3 | 288 | 245 | -92364000 | -197460 | -92364 | -197.46 |
| 4 | 280 | 245 | -92980000 | -199630 | -92980 | -199.63 |
| 5 | 207 | 245 | -98214000 | -221220 | -98214 | -221.22 |
| 6 | 127.7383 | 1 | -98214000 | -199210 | -98214 | -199.21 |
| 7 | 127.7374 | 1 | -150170000 | -460220 | -150170 | -460.22 |
| 8 | 127.7374 | 1 | -80362000 | -109520 | -80362 | -109.52 |

Tabla A.14 Propiedades de la Topología 2 –s1 (continuación)

| | | | | | | |
|-----------|----------|-----|-----------|-----------|--------|-----------|
| 9 | 246.7216 | 1 | -76337000 | -87257.34 | -76337 | -87.25734 |
| 10 | 270.6387 | 1 | -75510000 | -84058 | -75510 | -84.058 |
| 11 | 250 | 245 | -95218000 | -208080 | -95218 | -208.08 |

Tabla A.15 Propiedades de la topología 2-s3

| | T (K) | P (ATM) | H (J/KGMOLE) | S (J/KMOLEK) | H (KJ/KGMOLE) | S (KJ/KMOLEK) |
|-----------|--------------|----------------|---------------------|---------------------|----------------------|----------------------|
| 1 | 300 | 1 | -84722000 | -133280 | -84722 | -133.28 |
| 2 | 288.15 | 245 | -92353000 | -197420 | -92353 | -197.42 |
| 3 | 280 | 245 | -92980000 | -199630 | -92980 | -199.63 |
| 4 | 200 | 245 | -98680000 | -223510 | -98680 | -223.51 |
| 5 | 123.0798 | 1 | -98680000 | -202930 | -98680 | -202.93 |
| 6 | 123.079 | 1 | -80520000 | -110780 | -80520 | -110.78 |
| 7 | 207.5801 | 1 | -77668000 | -93130.18 | -77668 | -93.13018 |
| 8 | 233.4659 | 1 | -76790000 | -89145.16 | -76790 | -89.14516 |
| 9 | 123.079 | 1 | -144150000 | -433660 | -144150 | -433.66 |
| 10 | 230 | 245 | -96642000 | -214020 | -96642 | -214.02 |

Tabla A.16 Propiedades de la Topología 2-s2

| | T (K) | P (ATM) | H (J/KGMOLE) | S (J/KMOLEK) | H (KJ/KGMOLE) | S (KJ/KMOLEK) |
|-----------|--------------|----------------|---------------------|---------------------|----------------------|----------------------|
| 1 | 300 | 1 | -84722000 | -133280 | -84722 | -133.28 |
| 2 | 630.279 | 245 | -61601000 | -104920 | -61601 | -104.92 |
| 3 | 288 | 245 | -81945000 | -151370 | -81945 | -151.37 |
| 4 | 280 | 245 | -82456000 | -153170 | -82456 | -153.17 |
| 5 | 210 | 245 | -86945000 | -171600 | -86945 | -171.6 |
| 6 | 113.2591 | 1 | -86945000 | -149790 | -86945 | -149.79 |
| 7 | 113.259 | 1 | -105470000 | -259820 | -105470 | -259.82 |
| 8 | 113.259 | 1 | -80855000 | -113610 | -80855 | -113.61 |
| 9 | 162.5565 | 1 | -79185000 | -101370 | -79185 | -101.37 |
| 10 | 182.7173 | 1 | -78506000 | -97431.4 | -78506 | -97.4314 |
| 11 | 219.8076 | 1 | -80091000 | -104920 | -80091 | -104.92 |
| 12 | 182.7173 | 1 | -78506000 | -97431.4 | -78506 | -97.4314 |
| 13 | 182.7173 | 1 | -78506000 | -97431.4 | -78506 | -97.4314 |
| 14 | 230 | 245 | -85689000 | -165890 | -85689 | -165.89 |

Tabla A.17 Propiedades de la Topología 2-s4

| | T (K) | P (ATM) | H (J/KGMOLE) | S (J/KMOLEK) | H (KJ/KGMOLE) | S (KJ/KMOLEK) |
|----|----------|---------|-----------------|-----------------|------------------|------------------|
| 1 | 300 | 1 | -84722000 | -133280 | -84722 | -133.28 |
| 2 | 288.15 | 245 | -82852000 | -155350 | -82852 | -155.35 |
| 3 | 280 | 245 | -83385000 | -157230 | -83385 | -157.23 |
| 4 | 200 | 245 | -88550000 | -178900 | -88550 | -178.9 |
| 5 | 113.2452 | 1 | -88550000 | -159380 | -88550 | -159.38 |
| 6 | 113.2452 | 1 | -80855000 | -113610 | -80855 | -113.61 |
| 7 | 194.5084 | 1 | -78109000 | -95324.62 | -78109 | -95.32462 |
| 8 | 217.5311 | 1 | -77331000 | -91546.27 | -77331 | -91.54627 |
| 9 | 113.2452 | 1 | -105330000 | -259200 | -105330 | -259.2 |
| 10 | 230 | 245 | -86667000 | -170140 | -86667 | -170.14 |
| 11 | 249.9147 | 1 | -79706000 | -103820 | -79706 | -103.82 |
| 12 | 217.5311 | 1 | -77331000 | -91546.27 | -77331 | -91.54627 |
| 13 | 217.5311 | 1 | -77331000 | -91546.27 | -77331 | -91.54627 |

Tabla A.18 Propiedades de la Topología 3-1

| | T (K) | P (ATM) | H (J/KGMOLE) | S (J/KMOLEK) | H (KJ/KGMOLE) | S (KJ/KMOLEK) |
|----|----------|---------|-----------------|-----------------|------------------|------------------|
| 1 | 298 | 180 | -91207000 | -191840 | -91207 | -191.84 |
| 2 | 296 | 180 | -91378000 | -192420 | -91378 | -192.42 |
| 3 | 220.5989 | 1 | -91461000 | -160850 | -91461 | -160.85 |
| 4 | 300 | 1 | -84722000 | -133280 | -84722 | -133.28 |
| 5 | 625.3414 | 180 | -65419000 | -133280 | -65419 | -133.28 |
| 6 | 296 | 180 | -91378000 | -192420 | -91378 | -192.42 |
| 7 | 293.9604 | 170 | -91461000 | -192420 | -91461 | -192.42 |
| 8 | 206.5522 | 1 | -81151000 | -109950 | -81151 | -109.95 |
| 9 | 221 | 180 | -97336000 | -215520 | -97336 | -215.52 |
| 10 | 220.5989 | 1 | -81876000 | -113920 | -81876 | -113.92 |
| 11 | 140.5795 | 1 | -97336000 | -192640 | -97336 | -192.64 |
| 12 | 140.5785 | 1 | -157610000 | -491660 | -157610 | -491.66 |
| 13 | 140.5785 | 1 | -79928000 | -106280 | -79928 | -106.28 |
| 14 | 296 | 180 | -91378000 | -192420 | -91378 | -192.42 |
| 15 | 270.6521 | 1 | -78291000 | -97629.91 | -78291 | -97.62991 |
| 16 | 276.0666 | 1 | -78085000 | -96877.58 | -78085 | -96.87758 |
| 17 | 220.5989 | 1 | -156430000 | -478900 | -156430 | -478.9 |

Tabla A.19 Propiedades de la Topología 3-2

| | T (K) | P (ATM) | H (J/KGMOLE) | S (J/KMOLEK) | H (KJ/KGMOLE) | S (KJ/KMOLEK) |
|-----------|--------------|----------------|-------------------------|-------------------------|--------------------------|--------------------------|
| 1 | 298 | 180 | -79573000 | -140150 | -79573 | -140.15 |
| 2 | 236 | 180 | -83733000 | -155850 | -83733 | -155.85 |
| 3 | 118.3343 | 1 | -83797000 | -128270 | -83797 | -128.27 |
| 4 | 300 | 1 | -84722000 | -133280 | -84722 | -133.28 |
| 5 | 732.1649 | 180 | -54530000 | -88957.98 | -54530 | -88.95798 |
| 6 | 236 | 180 | -83733000 | -155850 | -83733 | -155.85 |
| 7 | 234.1804 | 170 | -83797000 | -155850 | -83797 | -155.85 |
| 8 | 116.4357 | 1 | -80746000 | -112670 | -80746 | -112.67 |
| 9 | 200 | 180 | -86192000 | -167140 | -86192 | -167.14 |
| 10 | 118.3327 | 1 | -80682000 | -112120 | -80682 | -112.12 |
| 11 | 112.4693 | 1 | -86192000 | -149350 | -86192 | -149.35 |
| 12 | 112.4693 | 1 | -97179000 | -222810 | -97179 | -222.81 |
| 13 | 112.4693 | 1 | -80882000 | -113850 | -80882 | -113.85 |
| 14 | 236 | 180 | -83733000 | -155850 | -83733 | -155.85 |
| 15 | 151.2285 | 1 | -79567000 | -103800 | -79567 | -103.8 |
| 16 | 296.977 | 1 | -74580000 | -80780.8 | -74580 | -80.7808 |
| 17 | 118.3327 | 1 | -133420000 | -385590 | -133420 | -385.59 |
| 18 | 297.6053 | 1 | -76260000 | -88957.98 | -76260 | -88.95798 |