Full wwPDB X-ray Structure Validation Report ⓘ

Mar 20, 2024 – 06:49 PM JST

PDB ID	:	8JJB
Title	:	Crystal structure of T2R-TTL-Y61 complex
Authors	:	Yang, J.
Deposited on	:	2023-05-30
Resolution	:	2.68 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at *validation@mail.wwpdb.org*
A user guide is available at
https://www.wwpdb.org/validation/2017/XrayValidationReportHelp
with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

The following versions of software and data (see references ⓘ) were used in the production of this report:

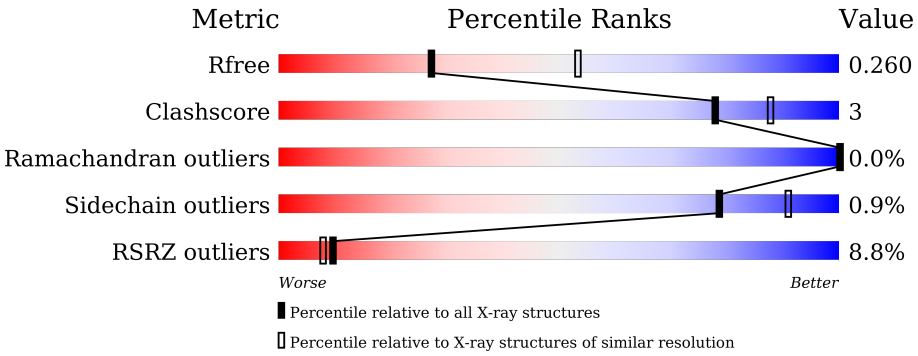
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.68 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	3863 (2.70-2.66)
Clashscore	141614	4210 (2.70-2.66)
Ramachandran outliers	138981	4141 (2.70-2.66)
Sidechain outliers	138945	4141 (2.70-2.66)
RSRZ outliers	127900	3780 (2.70-2.66)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=5% The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	451	5% 92% 5% ·
1	C	451	% 91% 6% ·
2	B	431	5% 90% 8% ·
2	D	431	8% 89% 9% ·
3	E	189	5% 61% · 35%
4	F	380	26% 83% 8% 8%

2 Entry composition (i)

There are 13 unique types of molecules in this entry. The entry contains 34306 atoms, of which 16750 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called Tubulin alpha-1B chain.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	438	Total	C	H	N	O	S	0	2	0
			6760	2171	3330	583	653	23			
1	C	440	Total	C	H	N	O	S	0	5	0
			6749	2178	3314	578	656	23			

- Molecule 2 is a protein called Tubulin beta chain.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
2	B	425	Total	C	H	N	O	S	0	1	0
			6490	2095	3157	569	644	25			
2	D	423	Total	C	H	N	O	S	0	1	0
			6386	2063	3108	551	637	27			

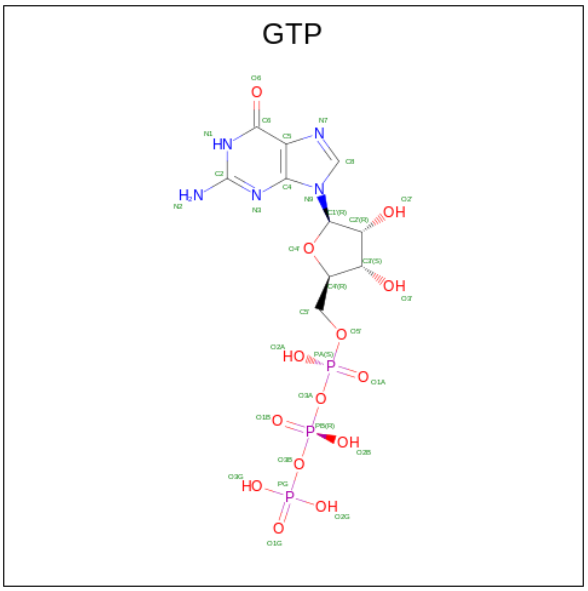
- Molecule 3 is a protein called Stathmin-4.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
3	E	123	Total	C	H	N	O	S	0	2	0
			2045	627	1028	185	200	5			

- Molecule 4 is a protein called TTL.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
4	F	349	Total	C	H	N	O	S	0	0	0
			5506	1795	2709	477	511	14			

- Molecule 5 is GUANOSINE-5'-TRIPHOSPHATE (three-letter code: GTP) (formula: $C_{10}H_{16}N_5O_{14}P_3$).



Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
5	A	1	Total	C	H	N	O	P	42	0
			42	10	10	5	14	3		
5	C	1	Total	C	H	N	O	P	42	0
			42	10	10	5	14	3		
5	D	1	Total	C	H	N	O	P	42	0
			42	10	10	5	14	3		

- Molecule 6 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	1	Total	Mg	1	0
			1	1		
6	B	1	Total	Mg	1	0
			1	1		
6	C	1	Total	Mg	1	0
			1	1		
6	D	1	Total	Mg	1	0
			1	1		
6	F	1	Total	Mg	1	0
			1	1		

- Molecule 7 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	1	Total	Ca	1	0
			1	1		

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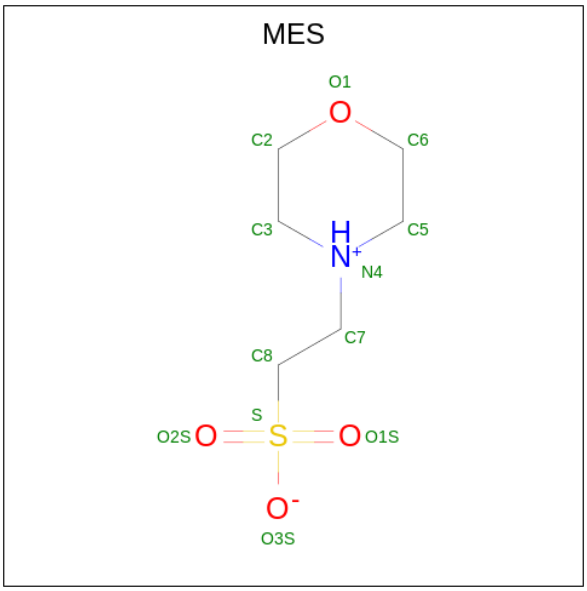
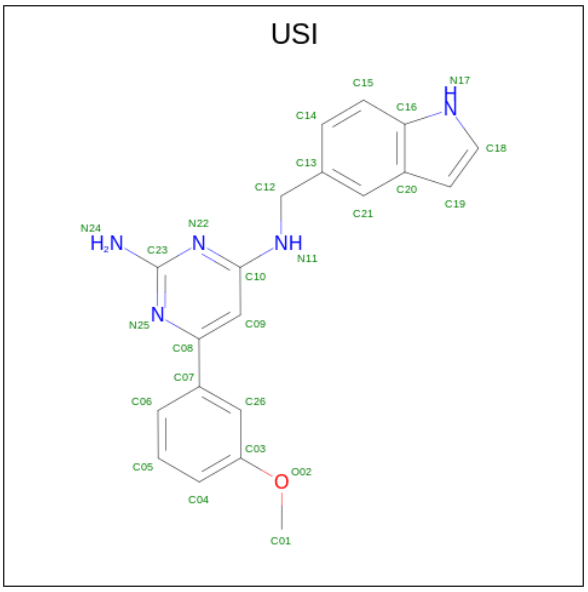
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	B	2	Total Ca 2 2	2	0
7	C	1	Total Ca 1 1	1	0
7	D	1	Total Ca 1 1	1	0
7	E	1	Total Ca 1 1	1	0

- Molecule 8 is 2-(N-MORPHOLINO)-ETHANESULFONIC ACID (three-letter code: MES) (formula: $C_6H_{13}NO_4S$).



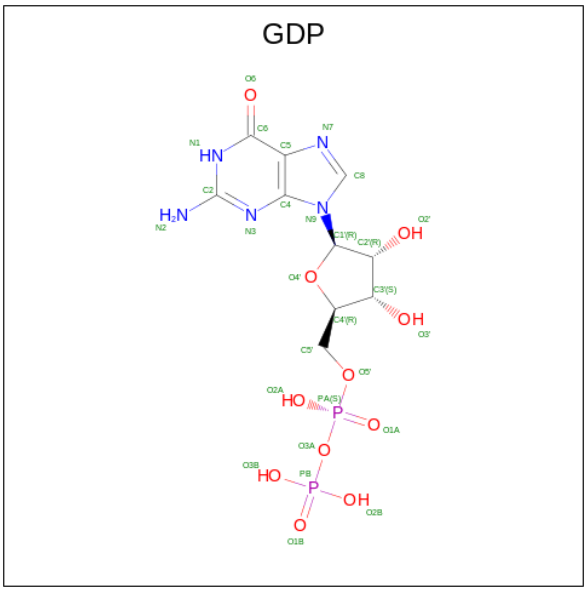
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	B	1	Total C H N O S 24 6 12 1 4 1	24	0

- Molecule 9 is {N}4-(1 {H}-indol-5-ylmethyl)-6-(3-methoxyphenyl)pyrimidine-2,4-diamine (three-letter code: USI) (formula: $C_{20}H_{19}N_5O$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
9	B	1	Total	C	H	N	O	0	0
			45	20	19	5	1		
9	D	1	Total	C	H	N	O	0	0
			45	20	19	5	1		

- Molecule 10 is GUANOSINE-5'-DIPHOSPHATE (three-letter code: GDP) (formula: $C_{10}H_{15}N_5O_{11}P_2$).

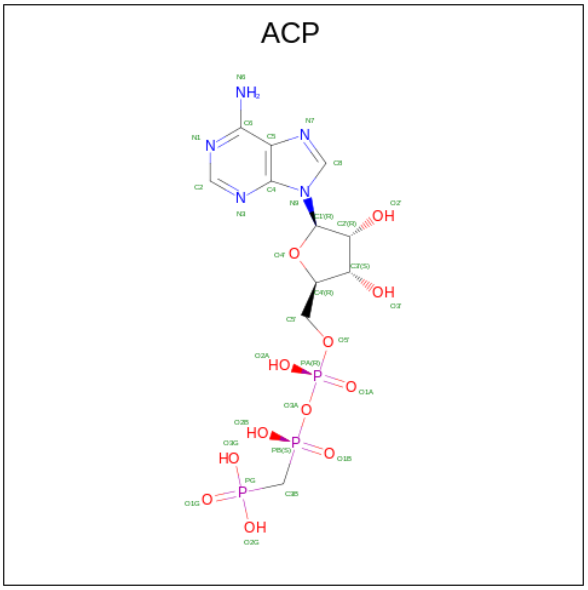


Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
10	B	1	Total	C	H	N	O	P	38	0
			38	10	10	5	11	2		

- Molecule 11 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
11	D	1	Total Cl 1 1	1	0

- Molecule 12 is PHOSPHOMETHYLPHOSPHONIC ACID ADENYLATE ESTER (three-letter code: ACP) (formula: $C_{11}H_{18}N_5O_{12}P_3$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
12	F	1	Total C H N O P 45 11 14 5 12 3	45	0

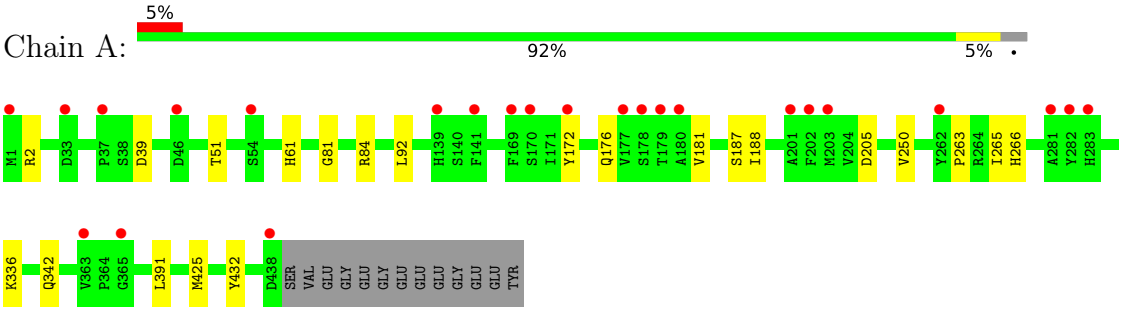
- Molecule 13 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
13	A	4	Total O 4 4	0	0
13	B	9	Total O 9 9	0	0
13	C	9	Total O 9 9	0	0
13	D	3	Total O 3 3	0	0
13	E	3	Total O 3 3	0	0
13	F	7	Total O 7 7	0	0

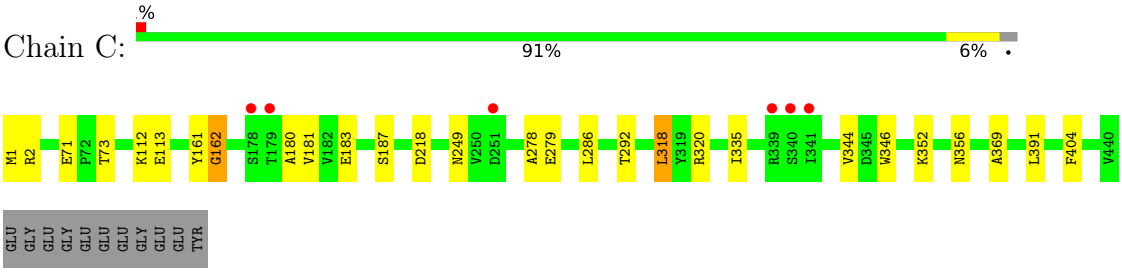
3 Residue-property plots (i)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density (RSRZ > 2). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

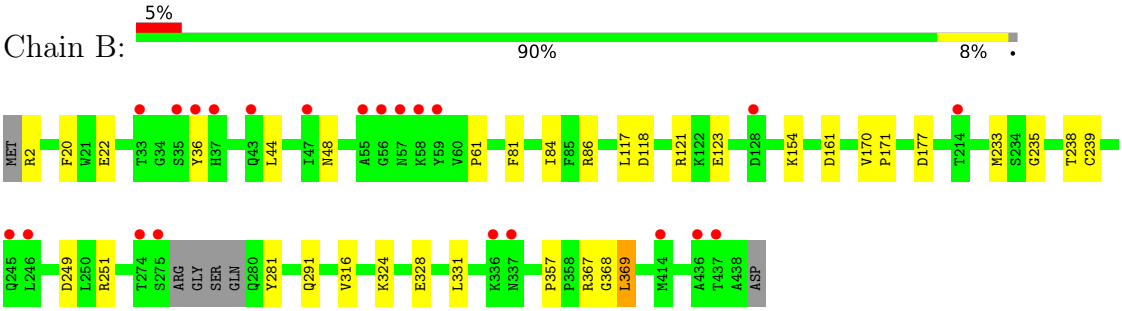
• Molecule 1: Tubulin alpha-1B chain



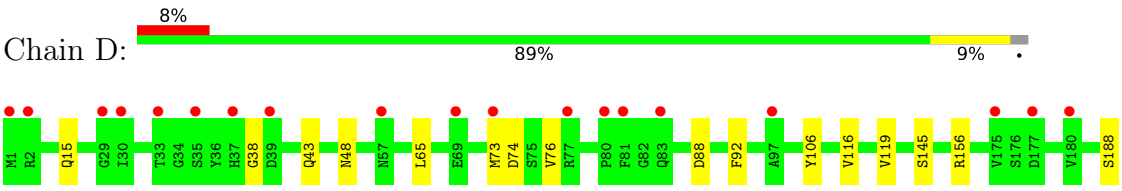
• Molecule 1: Tubulin alpha-1B chain

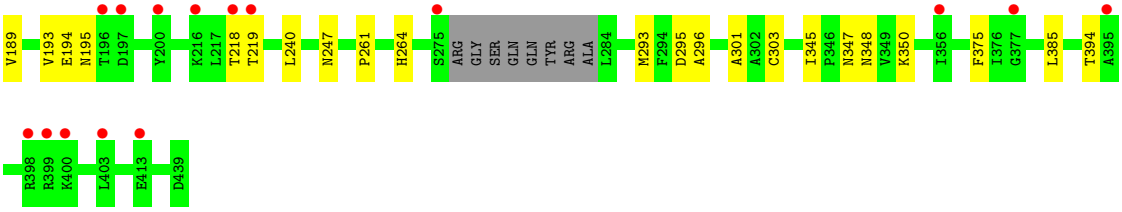


• Molecule 2: Tubulin beta chain

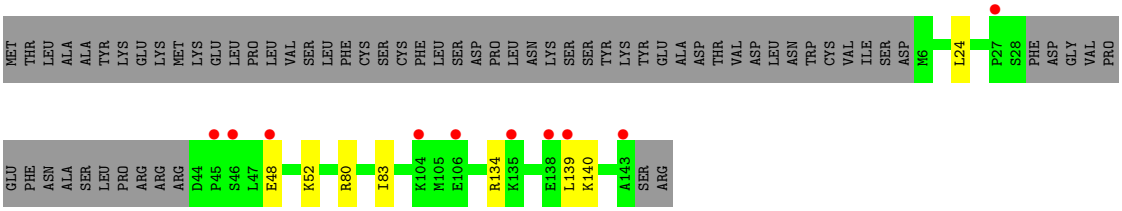


• Molecule 2: Tubulin beta chain

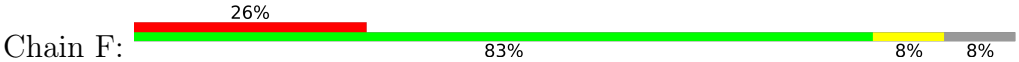


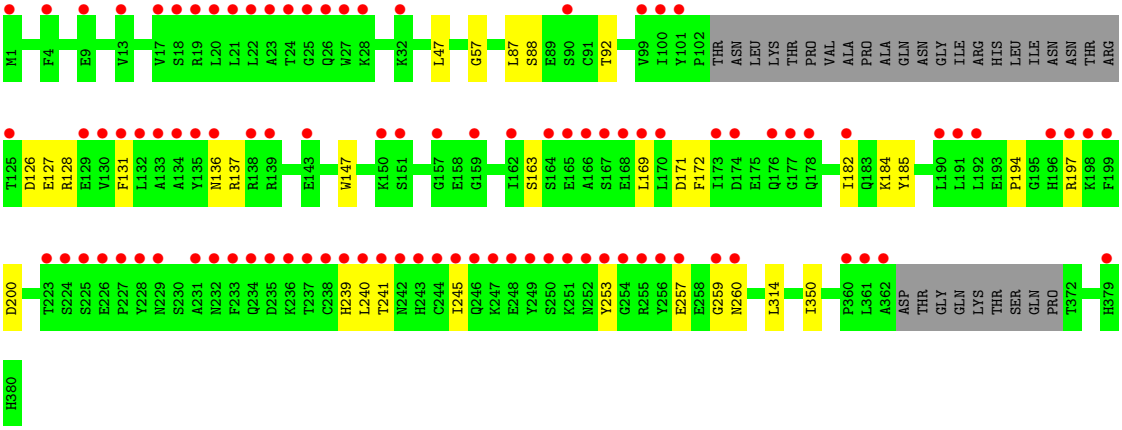


• Molecule 3: Stathmin-4



• Molecule 4: TTL





4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	105.29Å 157.91Å 181.75Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	48.06 – 2.68 48.16 – 2.68	Depositor EDS
% Data completeness (in resolution range)	99.7 (48.06-2.68) 99.8 (48.16-2.68)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.17 (at 2.69Å)	Xtriage
Refinement program	PHENIX 1.18.2_3874, PHENIX 1.18.2_3874	Depositor
R, R_{free}	0.227 , 0.260 0.227 , 0.260	Depositor DCC
R_{free} test set	1280 reflections (1.50%)	wwPDB-VP
Wilson B-factor (Å^2)	64.6	Xtriage
Anisotropy	0.238	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.39 , 59.5	EDS
L-test for twinning[2]	$< \|L\| > = 0.50$, $< L^2 > = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.93	EDS
Total number of atoms	34306	wwPDB-VP
Average B, all atoms (Å^2)	77.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.75% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: MG, ACP, GDP, MES, USI, CL, CA, GTP

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\#\|Z\| > 5$	RMSZ	$\#\|Z\| > 5$
1	A	0.25	0/3511	0.45	0/4767
1	C	0.25	0/3526	0.44	0/4795
2	B	0.25	0/3410	0.46	0/4623
2	D	0.25	0/3352	0.43	0/4548
3	E	0.24	0/1028	0.38	0/1365
4	F	0.25	0/2862	0.42	0/3873
All	All	0.25	0/17689	0.44	0/23971

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3430	3330	3341	14	0
1	C	3435	3314	3327	21	0
2	B	3333	3157	3198	20	0
2	D	3278	3108	3138	26	0
3	E	1017	1028	1031	6	0
4	F	2797	2709	2724	21	0
5	A	32	10	12	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	C	32	10	12	0	0
5	D	32	10	12	0	0
6	A	1	0	0	0	0
6	B	1	0	0	0	0
6	C	1	0	0	0	0
6	D	1	0	0	0	0
6	F	1	0	0	0	0
7	A	1	0	0	0	0
7	B	2	0	0	0	0
7	C	1	0	0	0	0
7	D	1	0	0	0	0
7	E	1	0	0	0	0
8	B	12	12	12	0	0
9	B	26	19	0	0	0
9	D	26	19	0	1	0
10	B	28	10	12	0	0
11	D	1	0	0	0	0
12	F	31	14	14	0	0
13	A	4	0	0	0	0
13	B	9	0	0	2	0
13	C	9	0	0	0	0
13	D	3	0	0	0	0
13	E	3	0	0	0	0
13	F	7	0	0	0	0
All	All	17556	16750	16833	100	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 3.

All (100) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:F:200:ASP:OD1	4:F:241:THR:OG1	2.02	0.77
1:C:249:ASN:OD1	1:C:356:ASN:ND2	2.23	0.71
1:A:263:PRO:O	1:A:266:HIS:ND1	2.20	0.67
2:D:73:MET:SD	2:D:92:PHE:CB	2.82	0.67
2:D:145:SER:HG	2:D:188:SER:HG	1.41	0.66
2:D:156:ARG:NH1	2:D:195:ASN:OD1	2.30	0.63
4:F:126:ASP:OD1	4:F:128:ARG:N	2.34	0.60
2:B:36:TYR:CZ	2:B:44:LEU:HD11	2.37	0.59
2:B:2:ARG:N	13:B:601:HOH:O	2.35	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:187:SER:HB3	1:A:391:LEU:HD21	1.86	0.58
2:D:189:VAL:O	2:D:193:VAL:HG23	2.04	0.56
2:D:156:ARG:NH1	2:D:194:GLU:O	2.39	0.56
1:A:265:ILE:HG23	1:A:432:TYR:CZ	2.40	0.55
1:C:112:LYS:NZ	1:C:113:GLU:OE2	2.36	0.55
2:D:218:THR:O	2:D:219:THR:OG1	2.24	0.55
2:B:235:GLY:O	2:B:238:THR:HG22	2.08	0.54
1:C:180:ALA:HB3	1:C:183:GLU:HG3	1.89	0.54
2:D:48:ASN:N	2:D:48:ASN:OD1	2.42	0.53
4:F:126:ASP:OD1	4:F:127:GLU:N	2.42	0.53
2:B:324:LYS:NZ	2:B:328:GLU:OE1	2.41	0.53
2:D:347:ASN:O	2:D:350:LYS:NZ	2.42	0.53
4:F:194:PRO:O	4:F:197:ARG:NH1	2.42	0.52
2:B:48:ASN:OD1	2:B:48:ASN:N	2.42	0.52
4:F:163:SER:CB	4:F:169:LEU:HD21	2.40	0.51
4:F:185:TYR:HH	4:F:239:HIS:CG	2.28	0.51
1:C:279:GLU:N	1:C:279:GLU:OE1	2.43	0.51
4:F:163:SER:HB3	4:F:169:LEU:HD21	1.93	0.51
4:F:131:PHE:CE1	4:F:182:ILE:HG21	2.45	0.51
1:A:81:GLY:O	1:A:84:ARG:HD3	2.12	0.50
2:B:118:ASP:OD1	2:B:121:ARG:NH2	2.44	0.50
2:D:88:ASP:OD1	2:D:88:ASP:N	2.43	0.50
3:E:80:ARG:HA	3:E:83:ILE:HG22	1.94	0.50
4:F:136:ASN:OD1	4:F:137:ARG:N	2.45	0.49
1:C:71:GLU:OE1	1:C:73:THR:OG1	2.23	0.49
1:A:187:SER:CB	1:A:391:LEU:HD21	2.42	0.49
1:A:188:ILE:HD12	1:A:425:MET:HG3	1.96	0.48
1:C:344:VAL:HG21	1:C:346:TRP:CE2	2.49	0.47
4:F:240:LEU:HD12	4:F:240:LEU:N	2.28	0.47
2:B:368:GLY:O	2:B:369:LEU:HD13	2.14	0.47
3:E:48:GLU:O	3:E:52:LYS:N	2.46	0.47
1:A:250:VAL:HG12	1:A:250:VAL:O	2.14	0.47
2:D:65:LEU:CD2	2:D:76:VAL:HG11	2.44	0.47
4:F:171:ASP:OD1	4:F:172:PHE:N	2.47	0.47
2:D:106:TYR:O	3:E:134:ARG:NH1	2.48	0.47
1:C:187:SER:HB3	1:C:391:LEU:HD21	1.97	0.46
4:F:184:LYS:NZ	4:F:185:TYR:O	2.48	0.46
3:E:139:LEU:C	3:E:139:LEU:HD12	2.36	0.46
4:F:182:ILE:HG22	4:F:182:ILE:O	2.15	0.46
1:C:181[B]:VAL:HG13	2:D:350:LYS:HZ3	1.80	0.46
2:D:65:LEU:HD12	2:D:65:LEU:N	2.32	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:320:ARG:HA	1:C:356:ASN:O	2.17	0.45
4:F:87:LEU:O	4:F:88:SER:OG	2.23	0.45
1:A:181:VAL:HG22	1:A:181:VAL:O	2.17	0.44
2:B:161:ASP:O	2:B:251:ARG:NH2	2.50	0.44
1:C:71:GLU:OE2	2:D:247:ASN:ND2	2.47	0.44
4:F:314:LEU:HD13	4:F:350:ILE:HD11	1.99	0.44
1:C:318:LEU:HD12	1:C:318:LEU:N	2.32	0.44
1:C:181[A]:VAL:HG13	2:D:350:LYS:HZ3	1.82	0.44
2:B:331:LEU:HD13	4:F:57:GLY:HA3	1.99	0.44
2:D:38:GLY:HA3	2:D:43:GLN:OE1	2.18	0.43
1:C:181[B]:VAL:HG21	1:C:404:PHE:CZ	2.53	0.43
2:D:65:LEU:HD23	2:D:76:VAL:HG11	2.00	0.43
4:F:47:LEU:C	4:F:47:LEU:HD23	2.39	0.43
4:F:163:SER:HB3	4:F:169:LEU:HD11	2.00	0.43
1:C:1:MET:O	1:C:2:ARG:HB2	2.18	0.43
2:B:22:GLU:HG2	2:B:81:PHE:CD1	2.54	0.43
2:B:170:VAL:HG13	2:B:171:PRO:HD2	2.00	0.43
2:B:81:PHE:O	2:B:84:ILE:HG22	2.19	0.43
2:D:301:ALA:O	2:D:303:CYS:N	2.52	0.43
1:C:181[A]:VAL:HG21	1:C:404:PHE:CZ	2.54	0.42
1:A:92:LEU:HD12	1:A:92:LEU:N	2.35	0.42
1:A:336:LYS:HD2	3:E:24:LEU:HD13	2.00	0.42
1:C:161:TYR:O	1:C:162:GLY:C	2.58	0.42
2:D:345:ILE:HG22	2:D:348:ASN:HB3	2.01	0.42
4:F:147:TRP:CE3	4:F:184:LYS:HA	2.54	0.42
1:C:292:THR:HG22	1:C:335:ILE:CD1	2.50	0.42
1:A:172:TYR:HB3	1:A:205:ASP:HA	2.02	0.42
2:B:117:LEU:HD11	2:B:154:LYS:HB3	2.01	0.42
2:D:240:LEU:HD12	9:D:504:USI:C05	2.50	0.42
2:B:61:PRO:CD	2:B:84:ILE:HG12	2.50	0.42
2:D:261:PRO:O	2:D:264:HIS:ND1	2.46	0.42
2:B:2:ARG:N	13:B:604:HOH:O	2.53	0.41
2:D:385:LEU:C	2:D:385:LEU:HD23	2.40	0.41
1:A:2:ARG:O	1:A:51[B]:THR:HG23	2.20	0.41
1:A:342:GLN:N	1:A:342:GLN:OE1	2.52	0.41
2:B:20:PHE:HB2	2:B:233:MET:HE3	2.02	0.41
2:B:357:PRO:HB2	2:B:369:LEU:O	2.21	0.41
2:B:177:ASP:O	1:C:352:LYS:NZ	2.47	0.41
1:C:181[B]:VAL:HG13	2:D:350:LYS:NZ	2.36	0.41
1:C:278:ALA:HA	1:C:369:ALA:HB2	2.02	0.41
4:F:253:TYR:CZ	4:F:259:GLY:HA2	2.55	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:86:ARG:NH1	2:B:123:GLU:OE2	2.54	0.41
2:D:116:VAL:O	2:D:119:VAL:HG12	2.21	0.41
2:B:238:THR:CG2	2:B:316:VAL:HG11	2.51	0.41
1:C:187:SER:CB	1:C:391:LEU:HD21	2.51	0.41
2:D:293:MET:CG	2:D:375:PHE:HB2	2.51	0.41
1:A:39:ASP:OD2	1:A:61:HIS:NE2	2.40	0.40
3:E:139:LEU:HD12	3:E:140:LYS:N	2.36	0.40
4:F:245:ILE:HG22	4:F:245:ILE:O	2.21	0.40
2:D:295:ASP:OD1	2:D:296:ALA:N	2.53	0.40

There are no symmetry-related clashes.

5.3 Torsion angles (i)

5.3.1 Protein backbone (i)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	438/451 (97%)	428 (98%)	10 (2%)	0	100	100
1	C	443/451 (98%)	429 (97%)	13 (3%)	1 (0%)	47	71
2	B	422/431 (98%)	409 (97%)	13 (3%)	0	100	100
2	D	420/431 (97%)	407 (97%)	13 (3%)	0	100	100
3	E	121/189 (64%)	118 (98%)	3 (2%)	0	100	100
4	F	343/380 (90%)	333 (97%)	10 (3%)	0	100	100
All	All	2187/2333 (94%)	2124 (97%)	62 (3%)	1 (0%)	100	100

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	162	GLY

5.3.2 Protein sidechains (i)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	A	370/379 (98%)	369 (100%)	1 (0%)	92 97
1	C	370/379 (98%)	367 (99%)	3 (1%)	81 92
2	B	363/370 (98%)	357 (98%)	6 (2%)	60 82
2	D	356/370 (96%)	353 (99%)	3 (1%)	81 92
3	E	110/171 (64%)	110 (100%)	0	100 100
4	F	298/338 (88%)	295 (99%)	3 (1%)	76 90
All	All	1867/2007 (93%)	1851 (99%)	16 (1%)	78 91

All (16) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	176	GLN
2	B	239	CYS
2	B	249	ASP
2	B	281	TYR
2	B	291	GLN
2	B	367	ARG
2	B	369	LEU
1	C	218	ASP
1	C	286	LEU
1	C	318	LEU
2	D	15	GLN
2	D	74	ASP
2	D	394	THR
4	F	92	THR
4	F	257	GLU
4	F	260	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
2	D	337	ASN

5.3.3 RNA

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates

There are no monosaccharides in this entry.

5.6 Ligand geometry

Of 20 ligands modelled in this entry, 12 are monoatomic - leaving 8 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
9	USI	B	505	-	27,29,29	1.42	4 (14%)	35,40,40	1.19	4 (11%)
5	GTP	C	501	6	26,34,34	1.12	2 (7%)	32,54,54	1.51	7 (21%)
5	GTP	D	503	6	26,34,34	1.12	2 (7%)	32,54,54	1.54	7 (21%)
8	MES	B	502	-	12,12,12	2.27	1 (8%)	14,16,16	1.79	5 (35%)
9	USI	D	504	-	27,29,29	1.55	4 (14%)	35,40,40	1.47	7 (20%)
5	GTP	A	501	6	26,34,34	1.12	2 (7%)	32,54,54	1.68	8 (25%)
12	ACP	F	402	6	27,33,33	1.33	5 (18%)	32,52,52	1.47	4 (12%)
10	GDP	B	506	6	24,30,30	0.93	1 (4%)	30,47,47	1.34	4 (13%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
9	USI	B	505	-	-	4/11/11/11	0/4/4/4
5	GTP	C	501	6	-	1/18/38/38	0/3/3/3
5	GTP	D	503	6	-	8/18/38/38	0/3/3/3
8	MES	B	502	-	-	1/6/14/14	0/1/1/1
9	USI	D	504	-	-	3/11/11/11	0/4/4/4
5	GTP	A	501	6	-	3/18/38/38	0/3/3/3
12	ACP	F	402	6	-	8/15/38/38	0/3/3/3
10	GDP	B	506	6	-	0/12/32/32	0/3/3/3

All (21) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
8	B	502	MES	C8-S	-7.59	1.66	1.77
9	D	504	USI	C10-N11	4.72	1.43	1.36
9	B	505	USI	C10-N11	4.12	1.42	1.36
5	D	503	GTP	C5-C6	-4.01	1.39	1.47
5	C	501	GTP	C5-C6	-3.96	1.39	1.47
5	A	501	GTP	C5-C6	-3.94	1.39	1.47
9	D	504	USI	C23-N24	3.33	1.40	1.33
9	B	505	USI	C23-N24	3.00	1.39	1.33
12	F	402	ACP	PG-O3G	2.87	1.61	1.54
12	F	402	ACP	PG-O2G	2.83	1.61	1.54
9	D	504	USI	C23-N22	2.81	1.40	1.35
9	B	505	USI	C23-N22	2.70	1.40	1.35
9	D	504	USI	C23-N25	2.61	1.40	1.35
10	B	506	GDP	C6-N1	-2.37	1.34	1.37
12	F	402	ACP	C5-C4	2.37	1.47	1.40
12	F	402	ACP	PB-O3A	2.31	1.60	1.58
5	D	503	GTP	C2-N3	2.26	1.38	1.33
5	C	501	GTP	C2-N3	2.23	1.38	1.33
9	B	505	USI	C23-N25	2.19	1.39	1.35
5	A	501	GTP	C2-N3	2.17	1.38	1.33
12	F	402	ACP	PB-O2B	2.15	1.61	1.56

All (46) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
12	F	402	ACP	PB-O3A-PA	-4.12	119.48	132.56
5	A	501	GTP	PB-O3B-PG	-4.09	118.79	132.83
8	B	502	MES	C5-N4-C3	4.01	117.85	108.83
12	F	402	ACP	N3-C2-N1	-3.65	122.97	128.68
5	A	501	GTP	PA-O3A-PB	-3.60	120.47	132.83

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
9	D	504	USI	C08-N25-C23	-3.58	114.30	116.34
9	D	504	USI	N11-C10-N22	3.42	122.19	116.43
10	B	506	GDP	C3'-C2'-C1'	3.36	106.04	100.98
5	D	503	GTP	C5-C6-N1	3.26	119.71	113.95
12	F	402	ACP	C3'-C2'-C1'	3.24	105.86	100.98
5	A	501	GTP	C5-C6-N1	3.21	119.62	113.95
5	C	501	GTP	C5-C6-N1	3.20	119.61	113.95
10	B	506	GDP	PA-O3A-PB	-3.20	121.83	132.83
5	D	503	GTP	PA-O3A-PB	-3.15	122.03	132.83
5	A	501	GTP	C8-N7-C5	3.05	108.79	102.99
5	D	503	GTP	C8-N7-C5	3.02	108.75	102.99
5	C	501	GTP	C8-N7-C5	3.02	108.74	102.99
5	D	503	GTP	PB-O3B-PG	-3.00	122.53	132.83
5	C	501	GTP	PB-O3B-PG	-3.00	122.54	132.83
5	D	503	GTP	C2-N1-C6	-2.91	119.74	125.10
5	C	501	GTP	C2-N1-C6	-2.87	119.81	125.10
5	C	501	GTP	PA-O3A-PB	-2.87	122.99	132.83
5	A	501	GTP	C2-N1-C6	-2.82	119.91	125.10
9	B	505	USI	C08-N25-C23	-2.81	114.73	116.34
9	B	505	USI	C14-C15-C16	-2.79	117.33	120.84
9	D	504	USI	C14-C15-C16	-2.77	117.36	120.84
12	F	402	ACP	C4-C5-N7	-2.56	106.73	109.40
9	D	504	USI	C09-C10-N11	-2.55	116.70	120.86
10	B	506	GDP	C8-N7-C5	2.43	107.62	102.99
9	D	504	USI	C06-C07-C08	-2.43	117.45	121.28
10	B	506	GDP	C5-C6-N1	2.37	118.13	113.95
9	D	504	USI	C26-C07-C08	2.33	123.96	120.59
9	D	504	USI	C12-N11-C10	2.31	127.95	123.40
8	B	502	MES	O3S-S-C8	2.29	109.46	105.77
5	C	501	GTP	O3G-PG-O3B	2.24	112.14	104.64
8	B	502	MES	C7-N4-C5	2.22	116.92	111.23
5	A	501	GTP	O3G-PG-O3B	2.18	111.96	104.64
9	B	505	USI	N11-C10-N22	2.18	120.10	116.43
5	D	503	GTP	O6-C6-C5	-2.15	120.18	124.37
8	B	502	MES	O2S-S-C8	2.14	109.49	106.92
5	A	501	GTP	O2G-PG-O3B	2.13	111.79	104.64
5	D	503	GTP	C3'-C2'-C1'	2.11	104.16	100.98
8	B	502	MES	O1S-S-C8	2.09	109.44	106.92
9	B	505	USI	C06-C07-C08	-2.09	117.99	121.28
5	C	501	GTP	O6-C6-C5	-2.08	120.30	124.37
5	A	501	GTP	O6-C6-C5	-2.06	120.34	124.37

There are no chirality outliers.

All (28) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	501	GTP	PB-O3B-PG-O3G
5	D	503	GTP	PB-O3B-PG-O3G
5	D	503	GTP	C5'-O5'-PA-O3A
9	B	505	USI	C09-C10-N11-C12
9	B	505	USI	N22-C10-N11-C12
12	F	402	ACP	PG-C3B-PB-O1B
12	F	402	ACP	PG-C3B-PB-O2B
12	F	402	ACP	PG-C3B-PB-O3A
12	F	402	ACP	C5'-O5'-PA-O1A
12	F	402	ACP	C5'-O5'-PA-O2A
9	B	505	USI	C04-C03-O02-C01
9	B	505	USI	C26-C03-O02-C01
9	D	504	USI	C04-C03-O02-C01
9	D	504	USI	C13-C12-N11-C10
9	D	504	USI	C26-C03-O02-C01
5	D	503	GTP	PG-O3B-PB-O1B
12	F	402	ACP	C3'-C4'-C5'-O5'
8	B	502	MES	C8-C7-N4-C3
12	F	402	ACP	O4'-C4'-C5'-O5'
5	A	501	GTP	PB-O3B-PG-O2G
5	C	501	GTP	C4'-C5'-O5'-PA
5	D	503	GTP	C5'-O5'-PA-O2A
5	A	501	GTP	C4'-C5'-O5'-PA
5	D	503	GTP	C4'-C5'-O5'-PA
5	D	503	GTP	PB-O3B-PG-O2G
12	F	402	ACP	C5'-O5'-PA-O3A
5	D	503	GTP	PG-O3B-PB-O2B
5	D	503	GTP	PB-O3B-PG-O1G

There are no ring outliers.

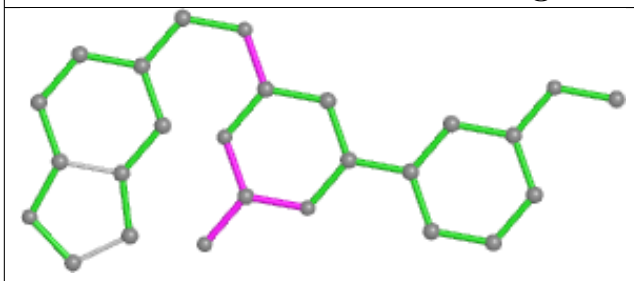
1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
9	D	504	USI	1	0

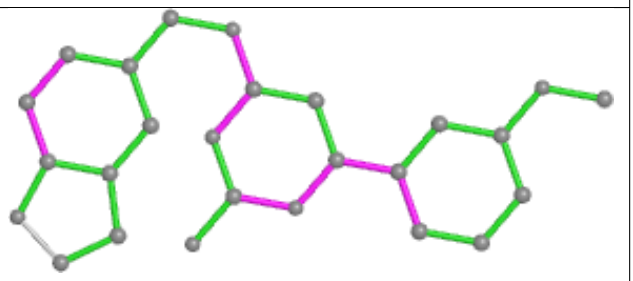
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be

highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

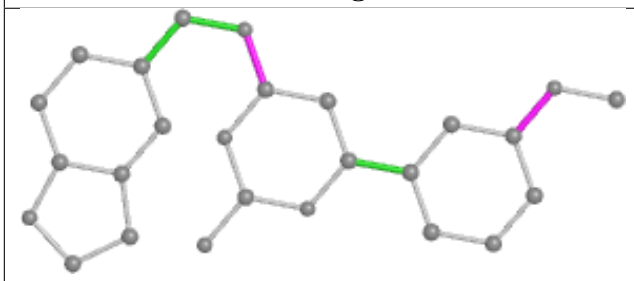
Ligand USI B 505



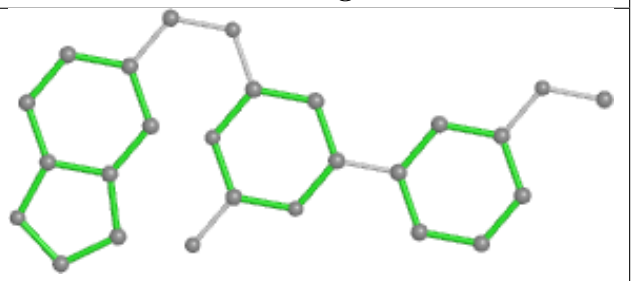
Bond lengths



Bond angles

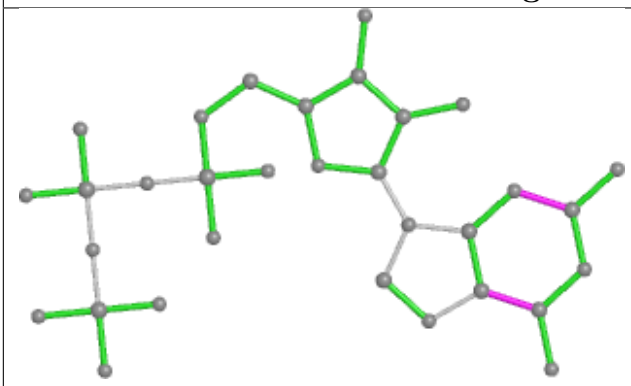


Torsions

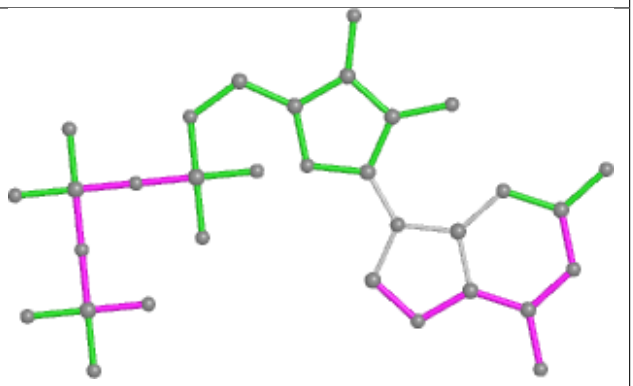


Rings

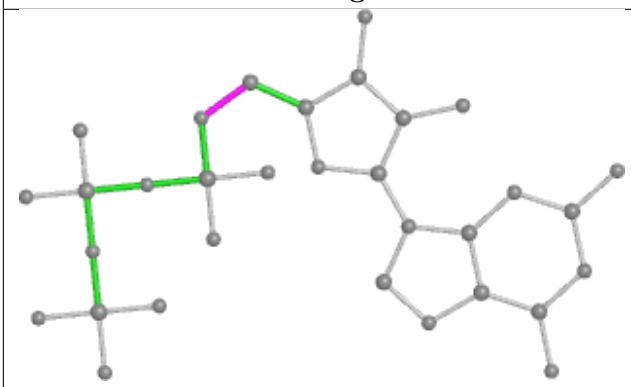
Ligand GTP C 501



Bond lengths



Bond angles



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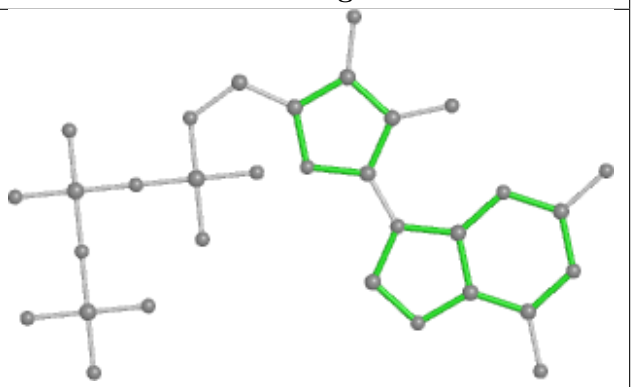
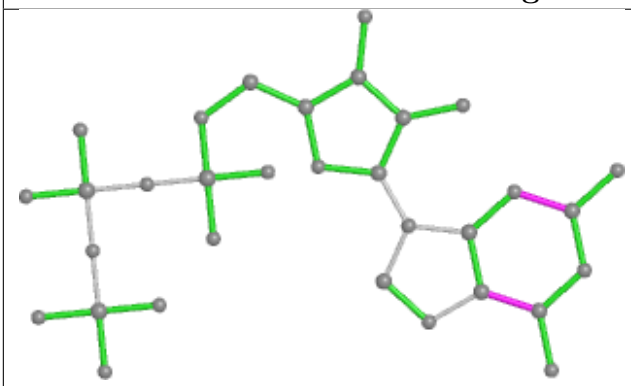
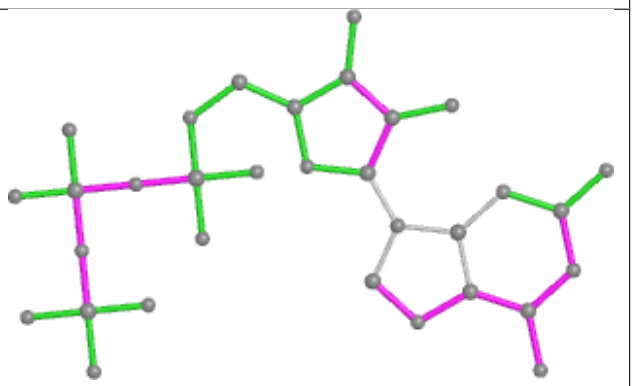


Rings

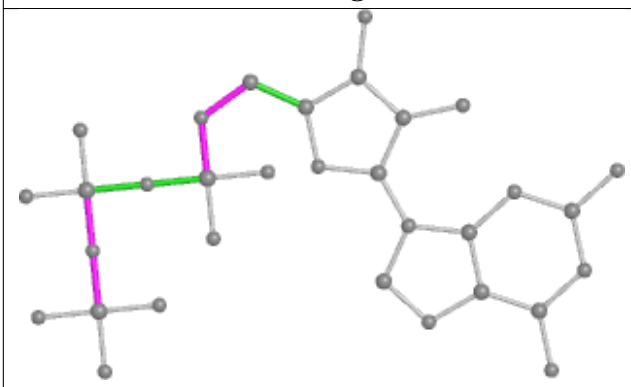
Ligand GTP D 503



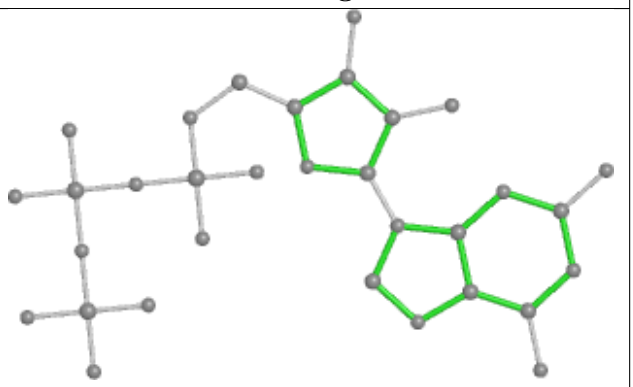
Bond lengths



Bond angles

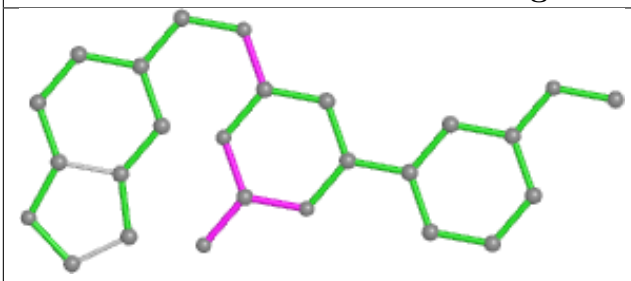


Torsions

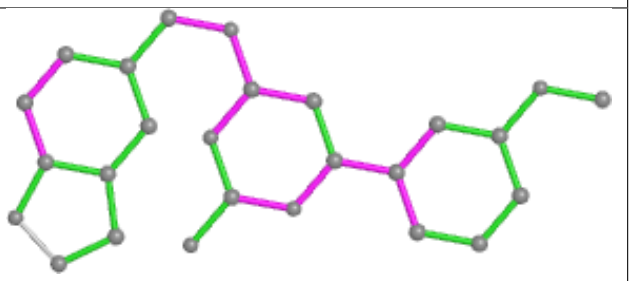


Rings

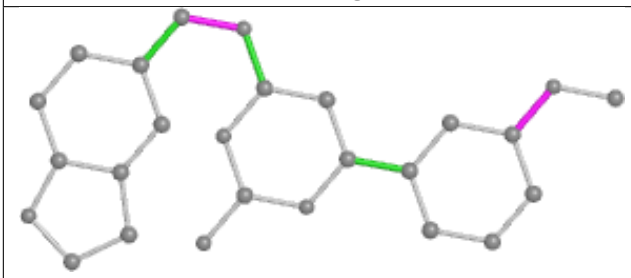
Ligand USI D 504



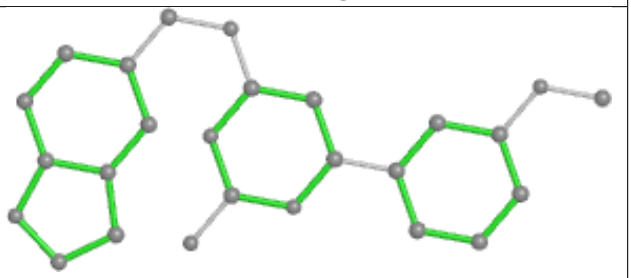
Bond lengths



Bond angles

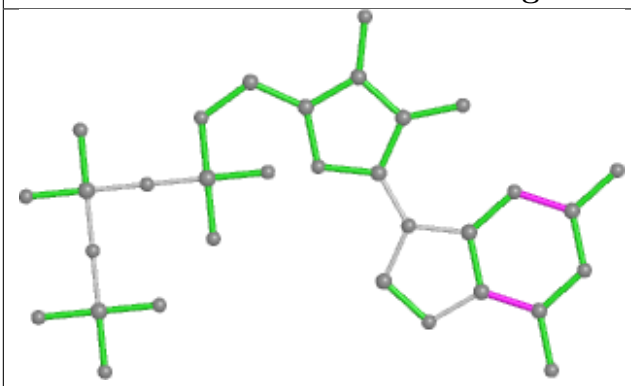


Torsions

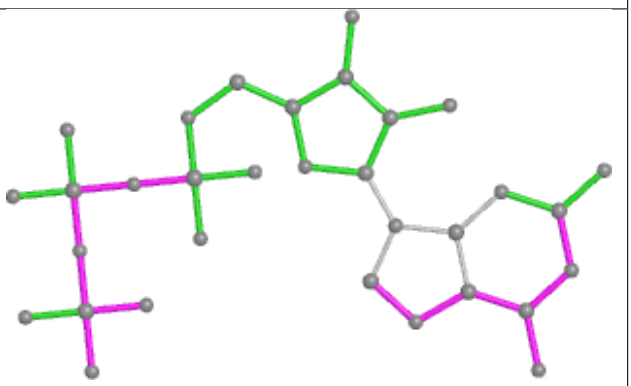


Rings

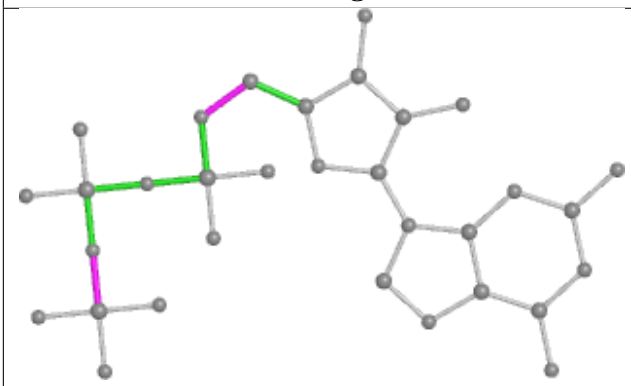
Ligand GTP A 501



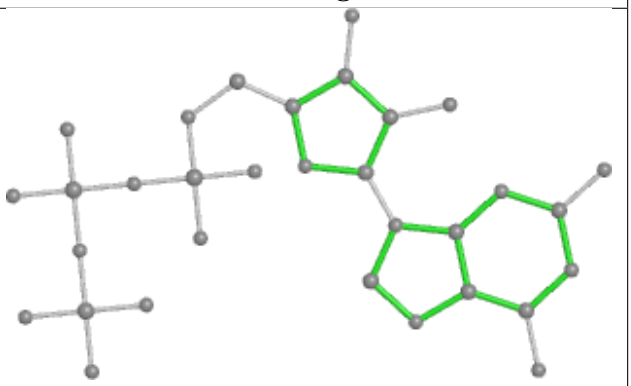
Bond lengths



Bond angles

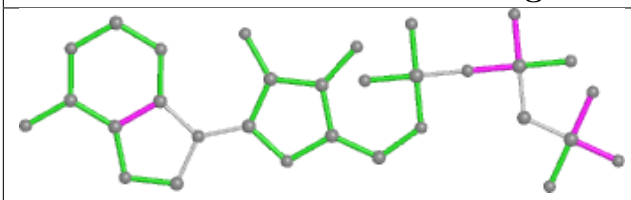


Torsions

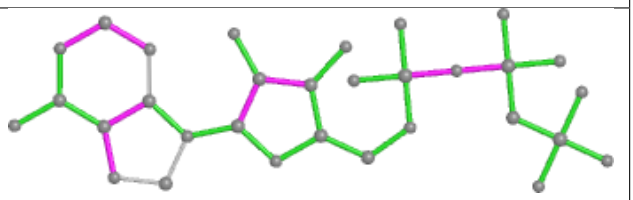


Rings

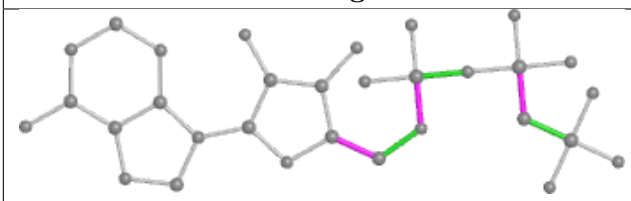
Ligand ACP F 402



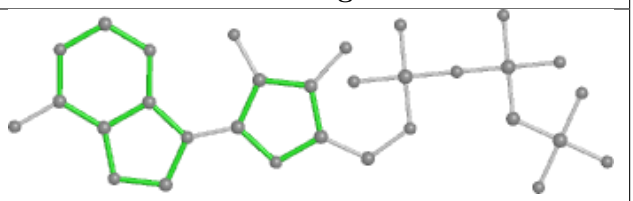
Bond lengths



Bond angles

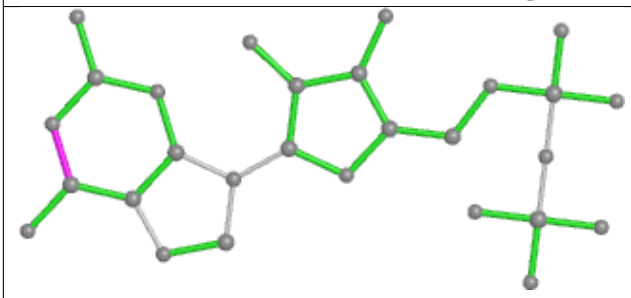


Torsions

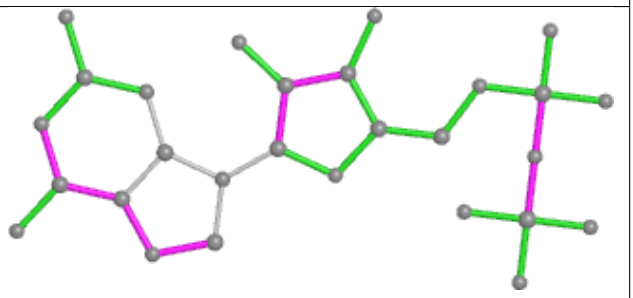


Rings

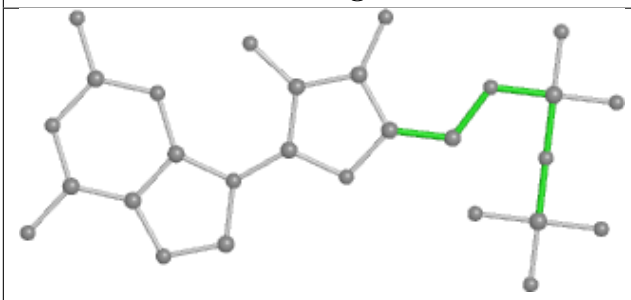
Ligand GDP B 506



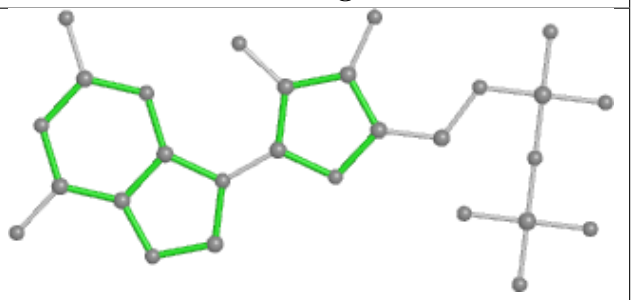
Bond lengths



Bond angles



Torsions



Rings

5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

In the following table, the column labelled '#RSRZ> 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95^{th} percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled 'Q< 0.9' lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å^2)	Q<0.9
1	A	438/451 (97%)	0.59	24 (5%) 25 23	41, 60, 90, 137	0
1	C	440/451 (97%)	0.17	6 (1%) 75 76	30, 50, 79, 112	0
2	B	425/431 (98%)	0.43	22 (5%) 27 25	37, 61, 102, 140	0
2	D	423/431 (98%)	0.66	34 (8%) 12 10	42, 74, 108, 155	0
3	E	123/189 (65%)	0.64	10 (8%) 12 10	46, 76, 116, 131	0
4	F	349/380 (91%)	1.31	98 (28%) 0 0	54, 89, 149, 180	0
All	All	2198/2333 (94%)	0.61	194 (8%) 10 8	30, 66, 117, 180	0

All (194) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
4	F	233	PHE	8.7
4	F	173	ILE	7.9
1	A	179	THR	6.9
4	F	362	ALA	6.7
1	A	282	TYR	6.5
1	A	281	ALA	6.2
4	F	253	TYR	5.9
4	F	250	SER	5.9
4	F	255	ARG	5.9
4	F	234	GLN	5.8
4	F	251	LYS	5.8
4	F	249	TYR	5.7
2	B	57	ASN	5.4
2	D	275	SER	5.0
2	D	37	HIS	4.8
4	F	170	LEU	4.8
4	F	150	LYS	4.7
4	F	17	VAL	4.7
4	F	130	VAL	4.7

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Mol	Chain	Res	Type	RSRZ
2	D	73	MET	4.7
4	F	125	THR	4.6
4	F	226	GLU	4.6
1	A	438	ASP	4.5
4	F	259	GLY	4.5
4	F	132	LEU	4.4
4	F	246	GLN	4.3
4	F	254	GLY	4.3
4	F	228	TYR	4.3
4	F	252	ASN	4.2
4	F	256	TYR	4.2
1	C	340	SER	4.1
2	B	437	THR	4.1
4	F	168	GLU	4.1
4	F	21	LEU	4.0
4	F	18	SER	4.0
4	F	248	GLU	4.0
2	D	398	ARG	4.0
2	B	37	HIS	4.0
4	F	22	LEU	4.0
2	D	39	ASP	3.9
4	F	177	GLY	3.9
2	B	36	TYR	3.9
4	F	247	LYS	3.9
4	F	167	SER	3.9
4	F	236	LYS	3.9
4	F	257	GLU	3.9
4	F	239	HIS	3.8
4	F	134	ALA	3.8
4	F	361	LEU	3.8
2	D	80	PRO	3.8
4	F	242	ASN	3.8
1	C	179	THR	3.7
4	F	244	CYS	3.7
2	D	1	MET	3.7
4	F	235	ASP	3.7
4	F	224	SER	3.6
4	F	25	GLY	3.6
2	D	403	LEU	3.6
3	E	46	SER	3.5
1	A	180	ALA	3.5
4	F	100	ILE	3.5

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Mol	Chain	Res	Type	RSRZ
4	F	165	GLU	3.5
1	C	178	SER	3.5
4	F	13	VAL	3.5
2	B	274	THR	3.5
4	F	241	THR	3.5
4	F	243	HIS	3.4
4	F	231	ALA	3.4
4	F	223	THR	3.4
4	F	157	GLY	3.4
4	F	164	SER	3.3
4	F	162	ILE	3.3
2	B	436	ALA	3.3
2	D	177	ASP	3.3
4	F	28	LYS	3.3
4	F	129	GLU	3.3
2	D	83	GLN	3.3
4	F	245	ILE	3.3
2	D	97	ALA	3.3
2	D	77	ARG	3.3
4	F	225	SER	3.2
4	F	26	GLN	3.2
2	D	57	ASN	3.1
3	E	27	PRO	3.1
2	D	219	THR	3.1
2	D	399	ARG	3.1
1	A	177	VAL	3.1
4	F	4	PHE	3.1
4	F	174	ASP	3.1
1	A	178	SER	3.1
1	A	262	TYR	3.0
4	F	229	ASN	3.0
1	A	54	SER	3.0
4	F	169	LEU	3.0
4	F	197	ARG	3.0
4	F	99	VAL	3.0
4	F	240	LEU	3.0
4	F	1	MET	2.9
4	F	24	THR	2.9
2	B	128	ASP	2.9
2	D	413	GLU	2.9
2	B	58	LYS	2.9
4	F	90	SER	2.9

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Mol	Chain	Res	Type	RSRZ
2	D	175	VAL	2.9
4	F	379	HIS	2.9
1	A	1	MET	2.9
4	F	131	PHE	2.8
1	A	46	ASP	2.8
2	B	59	TYR	2.8
3	E	45	PRO	2.8
4	F	190	LEU	2.8
1	A	363	VAL	2.8
3	E	135	LYS	2.8
4	F	136	ASN	2.8
2	B	35	SER	2.8
4	F	176	GLN	2.8
4	F	227	PRO	2.8
4	F	27	TRP	2.8
1	A	283	HIS	2.7
4	F	166	ALA	2.7
2	D	35	SER	2.7
2	D	29	GLY	2.7
2	B	337	ASN	2.7
4	F	139	ARG	2.7
1	A	201	ALA	2.7
2	B	275	SER	2.7
4	F	138	ARG	2.7
2	D	395	ALA	2.6
4	F	133	ALA	2.6
4	F	196	HIS	2.6
4	F	191	LEU	2.6
4	F	135	TYR	2.6
1	C	341	ILE	2.6
2	D	33	THR	2.6
4	F	23	ALA	2.6
4	F	101	TYR	2.6
4	F	232	ASN	2.5
4	F	237	THR	2.5
1	A	172	TYR	2.5
2	B	246	LEU	2.5
4	F	238	CYS	2.5
1	A	33	ASP	2.5
1	C	251	ASP	2.5
3	E	138	GLU	2.4
2	B	33	THR	2.4

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Mol	Chain	Res	Type	RSRZ
2	D	218	THR	2.4
4	F	192	LEU	2.4
2	B	56	GLY	2.4
2	B	55	ALA	2.4
1	A	170	SER	2.4
2	D	197	ASP	2.4
3	E	139	LEU	2.3
4	F	260	ASN	2.3
2	B	336	LYS	2.3
2	D	69	GLU	2.3
4	F	143	GLU	2.3
1	C	339	ARG	2.3
4	F	20	LEU	2.3
1	A	139	HIS	2.3
4	F	32	LYS	2.3
2	D	356	ILE	2.2
4	F	159	GLY	2.2
3	E	104	LYS	2.2
2	D	2	ARG	2.2
2	B	43	GLN	2.2
2	D	81	PHE	2.2
2	D	377	GLY	2.2
1	A	203	MET	2.2
3	E	143	ALA	2.2
1	A	141	PHE	2.2
2	D	196	THR	2.2
4	F	151	SER	2.2
4	F	182	ILE	2.2
2	B	214	THR	2.2
2	D	200	TYR	2.1
2	D	30	ILE	2.1
2	B	47	ILE	2.1
4	F	198	LYS	2.1
3	E	48	GLU	2.1
2	B	245	GLN	2.1
1	A	202	PHE	2.1
4	F	199	PHE	2.1
4	F	9	GLU	2.1
4	F	360	PRO	2.1
1	A	169	PHE	2.1
2	D	400	LYS	2.0
2	D	180	VAL	2.0

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Mol	Chain	Res	Type	RSRZ
4	F	19	ARG	2.0
2	B	414	MET	2.0
2	D	216	LYS	2.0
1	A	365	GLY	2.0
4	F	178	GLN	2.0
3	E	106	GLU	2.0
1	A	37	PRO	2.0

6.2 Non-standard residues in protein, DNA, RNA chains (i)

There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates (i)

There are no monosaccharides in this entry.

6.4 Ligands (i)

LIGAND-RSR INFOmissingINFO

6.5 Other polymers (i)

There are no such residues in this entry.