



# Full wwPDB X-ray Structure Validation Report

Feb 27, 2014 – 11:33 PM GMT

PDB ID : 2H2Q  
Title : Crystal structure of Trypanosoma cruzi Dihydrofolate Reductase-Thymidylate synthase  
Authors : Senkovich, O.; Schormann, N.; Chattopadhyay, D.  
Deposited on : 2006-05-19  
Resolution : 2.40 Å(reported)

This is a full wwPDB validation report for a publicly released PDB entry.  
We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)  
A user guide is available at <http://wwpdb.org/ValidationPDFNotes.html>

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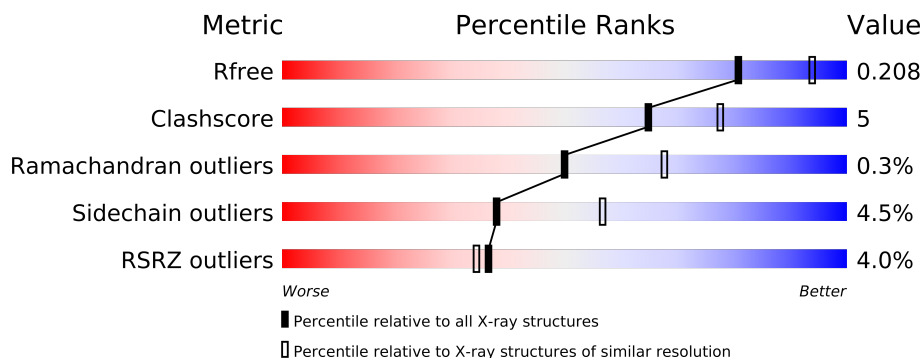
The following versions of software and data (see [references](#)) were used in the production of this report:

MolProbity : 4.02b-467  
Mogul : 1.15 2013  
Xtriage (Phenix) : dev-1323  
EDS : stable22639  
Percentile statistics : 21963  
Refmac : 5.8.0049  
CCP4 : 6.3.0 (Settle)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et. al. (1996)  
Validation Pipeline (wwPDB-VP) : stable22683

# 1 Overall quality at a glance

The reported resolution of this entry is 2.40 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))
$R_{free}$	66092	2207 (2.40-2.40)
Clashscore	79885	2789 (2.40-2.40)
Ramachandran outliers	78287	2736 (2.40-2.40)
Sidechain outliers	78261	2737 (2.40-2.40)
RSRZ outliers	66119	2210 (2.40-2.40)

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 on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density.

Mol	Chain	Length	Quality of chain
1	A	521	
1	B	521	

## 2 Entry composition i

There are 4 unique types of molecules in this entry. The entry contains 8471 atoms, of which 0 are hydrogen and 0 are deuterium.

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.

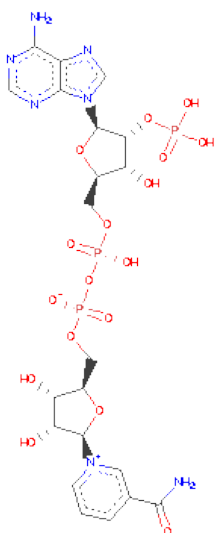
- Molecule 1 is a protein called Bifunctional dihydrofolate reductase-thymidylatesynthase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	514	Total	C	N	O	S	0	0	0
			4091	2595	723	755	18			
1	B	492	Total	C	N	O	S	0	0	0
			3937	2507	695	717	18			

There are 6 discrepancies between the modelled and reference sequences:

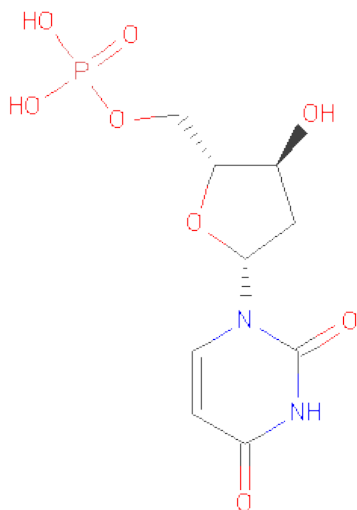
Chain	Residue	Modelled	Actual	Comment	Reference
A	32	ARG	HIS	SEE REMARK 999	UNP Q27793
A	55	VAL	LEU	SEE REMARK 999	UNP Q27793
A	137	GLN	ARG	SEE REMARK 999	UNP Q27793
B	32	ARG	HIS	SEE REMARK 999	UNP Q27793
B	55	VAL	LEU	SEE REMARK 999	UNP Q27793
B	137	GLN	ARG	SEE REMARK 999	UNP Q27793

- Molecule 2 is NADP NICOTINAMIDE-ADENINE-DINUCLEOTIDEPHOSPHATE (three-letter code: NAP) (formula: C<sub>21</sub>H<sub>28</sub>N<sub>7</sub>O<sub>17</sub>P<sub>3</sub>).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			48	21	7	17	3		
2	B	1	Total	C	N	O	P	0	0
			48	21	7	17	3		

- Molecule 3 is 2'-DEOXYURIDINE-5'-MONOPHOSPHATE (three-letter code: DU) (formula: C<sub>9</sub>H<sub>13</sub>N<sub>2</sub>O<sub>8</sub>P).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	N	O	P	0	0
			20	9	2	8	1		
3	B	1	Total	C	N	O	P	0	0
			20	9	2	8	1		

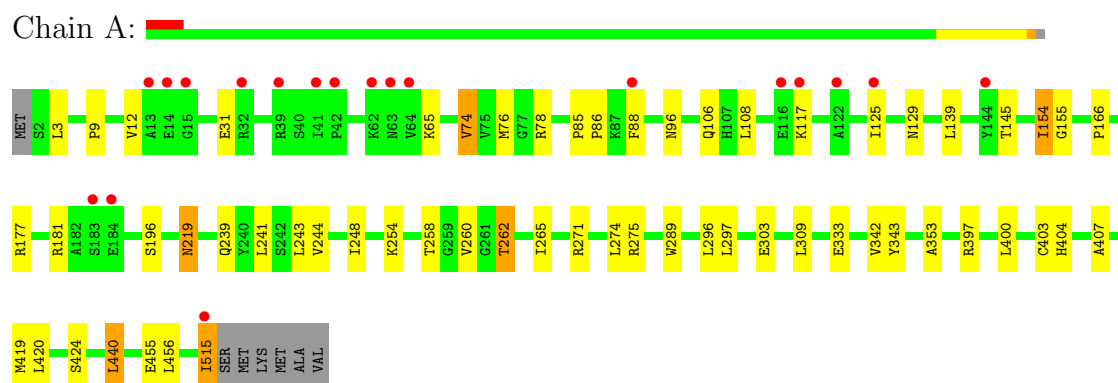
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	155	Total	O	0	0
			155	155		
4	B	152	Total	O	0	0
			152	152		

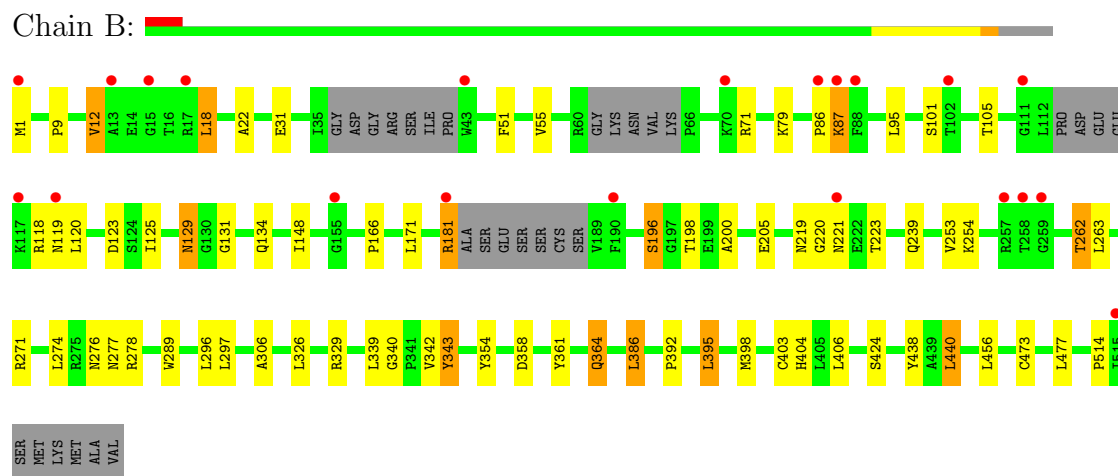
### 3 Residue-property plots

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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: Bifunctional dihydrofolate reductase-thymidylatesynthase



- Molecule 1: Bifunctional dihydrofolate reductase-thymidylatesynthase



## 4 Data and refinement statistics

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	88.68Å 137.25Å 189.27Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	43.15 – 2.40 43.17 – 2.40	Depositor EDS
% Data completeness (in resolution range)	95.2 (43.15-2.40) 99.9 (43.17-2.40)	Depositor EDS
$R_{merge}$	0.06	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.98 (at 2.39Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, $R_{free}$	0.206 , 0.241 0.211 , 0.208	Depositor DCC
$R_{free}$ test set	4588 reflections (11.24%)	DCC
Wilson B-factor (Å <sup>2</sup> )	40.5	Xtriage
Anisotropy	0.432	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.33 , 45.4	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning	$\langle  L  \rangle = 0.51$ , $\langle L^2 \rangle = 0.35$	Xtriage
Outliers	0 of 45396 reflections	Xtriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	8471	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	37.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.66% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

## 5 Model quality ⓘ

### 5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: NAP

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	0.39	1/4190 (0.0%)	0.55	0/5686
1	B	0.38	0/4030	0.55	0/5463
All	All	0.38	1/8220 (0.0%)	0.55	0/11149

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	106	GLN	CD-NE2	5.12	1.45	1.32

There are no bond angle outliers.

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	154	ILE	Peptide

### 5.2 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 hydrogens added by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit,

and the number in parentheses is this value normalized per 1000 atoms of the molecule in the chain. The Symm-Clashes column gives symmetry related clashes, in the same way as for the Clashes column.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	4091	0	4045	41	0
1	B	3937	0	3905	45	0
2	A	48	0	25	1	0
2	B	48	0	25	1	0
3	A	20	0	11	1	0
3	B	20	0	11	0	0
4	A	155	0	0	5	0
4	B	152	0	0	1	0
All	All	8471	0	8022	85	0

Clashscore is defined as the number of clashes calculated for the entry per 1000 atoms (including hydrogens) of the entry. The overall clashscore for this entry is 5.

All (85) close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:A:74:VAL:HG13	1:A:154:ILE:CD1	1.73	1.18
1:B:31:GLU:HB2	1:B:181:ARG:HD3	1.26	1.16
1:B:18:LEU:HD23	1:B:277:ASN:HD22	0.93	1.08
1:B:18:LEU:HD23	1:B:277:ASN:ND2	1.73	1.03
1:A:74:VAL:HG13	1:A:154:ILE:HD11	1.42	0.98
1:A:74:VAL:HG13	1:A:154:ILE:HD13	1.43	0.98
1:A:74:VAL:CG1	1:A:154:ILE:CD1	2.43	0.96
1:A:74:VAL:CG1	1:A:154:ILE:HD11	1.96	0.94
1:B:79:LYS:HB2	2:B:524:NAP:O2A	1.76	0.86
1:B:86:PRO:O	1:B:87:LYS:HB2	1.80	0.82
1:B:18:LEU:CD2	1:B:277:ASN:HD22	1.84	0.82
1:B:386:LEU:HD12	1:B:406:LEU:HD11	1.61	0.81
1:A:74:VAL:CG1	1:A:154:ILE:HD13	2.10	0.77
1:B:196:SER:HB2	1:B:205:GLU:HG3	1.71	0.72
1:B:18:LEU:HA	1:B:277:ASN:HD21	1.55	0.71
1:A:196:SER:O	4:A:701:HOH:O	2.11	0.68
1:A:243:LEU:HD11	1:A:265:ILE:HD11	1.76	0.68
1:B:31:GLU:HB2	1:B:181:ARG:CD	2.16	0.65
1:B:239:GLN:HE22	1:B:271:ARG:H	1.45	0.64
1:A:108:LEU:HD13	1:A:125:ILE:HD11	1.79	0.64
1:B:18:LEU:HA	1:B:277:ASN:ND2	2.12	0.64
1:B:86:PRO:O	1:B:87:LYS:CB	2.45	0.63
1:B:118:ARG:O	1:B:119:ASN:HB2	1.98	0.62
1:B:31:GLU:CB	1:B:181:ARG:HD3	2.18	0.61

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Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:A:254:LYS:HB2	1:A:262:THR:HG22	1.83	0.61
1:A:219:ASN:HD22	1:A:219:ASN:H	1.48	0.59
1:B:198:THR:HG21	4:B:698:HOH:O	2.03	0.58
1:B:198:THR:HG22	1:B:200:ALA:H	1.70	0.57
1:A:403:CYS:SG	1:A:424:SER:O	2.63	0.56
1:B:254:LYS:HB2	1:B:262:THR:HG22	1.88	0.56
1:A:258:THR:HB	1:A:260:VAL:HG23	1.88	0.55
1:B:9:PRO:O	1:B:12:VAL:HG22	2.07	0.54
1:B:296:LEU:HD22	1:B:440:LEU:HB3	1.87	0.54
1:A:404:HIS:HB2	1:A:420:LEU:HD11	1.88	0.54
1:B:131:GLY:H	1:B:134:GLN:HE21	1.53	0.54
1:B:342:VAL:O	1:B:343:TYR:C	2.46	0.53
1:B:51:PHE:O	1:B:55:VAL:HG23	2.08	0.53
1:A:239:GLN:HE22	1:A:271:ARG:H	1.57	0.53
1:B:403:CYS:SG	1:B:424:SER:O	2.67	0.52
1:A:139:LEU:O	1:A:145:THR:OG1	2.27	0.52
1:B:219:ASN:OD1	1:B:220:GLY:O	2.28	0.52
1:A:262:THR:HG21	4:A:623:HOH:O	2.12	0.50
1:A:166:PRO:HG2	1:B:166:PRO:HG2	1.93	0.50
1:A:515:ILE:HD13	1:A:515:ILE:H	1.76	0.50
1:B:289:TRP:HH2	1:B:440:LEU:HG	1.77	0.50
1:A:74:VAL:HG11	1:A:154:ILE:CD1	2.37	0.50
1:B:131:GLY:H	1:B:134:GLN:NE2	2.11	0.49
1:B:220:GLY:O	1:B:221:ASN:HB2	2.11	0.49
1:A:31:GLU:OE2	1:A:181:ARG:HD2	2.13	0.49
1:B:253:VAL:HG22	1:B:263:LEU:CD2	2.43	0.48
1:A:76:MET:HA	1:A:155:GLY:HA2	1.95	0.48
1:A:342:VAL:O	1:A:343:TYR:C	2.52	0.47
1:A:78:ARG:HD3	2:A:523:NAP:O1X	2.15	0.46
1:B:22:ALA:HA	1:B:171:LEU:HB3	1.98	0.46
1:A:296:LEU:HG	1:A:296:LEU:O	2.16	0.46
1:A:244:VAL:O	1:A:248:ILE:HG12	2.15	0.46
1:B:31:GLU:H	1:B:181:ARG:HH11	1.62	0.45
1:A:219:ASN:N	1:A:219:ASN:HD22	2.09	0.45
1:B:253:VAL:HG22	1:B:263:LEU:HD23	1.98	0.45
1:B:361:TYR:O	1:B:364:GLN:HB2	2.17	0.45
1:B:404:HIS:HD2	1:B:438:TYR:OH	2.00	0.45
1:A:303:GLU:HG3	4:A:625:HOH:O	2.15	0.45
1:B:340:GLY:HA2	1:B:354:TYR:CE2	2.52	0.44
1:B:101:SER:HA	1:B:129:ASN:ND2	2.33	0.44
1:B:276:ASN:O	1:B:277:ASN:HB2	2.18	0.44
1:B:95:LEU:HD22	1:B:148:ILE:HD11	2.00	0.44

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Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:A:96:ASN:N	1:A:96:ASN:HD22	2.15	0.44
1:A:9:PRO:O	1:A:12:VAL:CG2	2.66	0.43
1:B:306:ALA:HB2	1:B:339:LEU:HD11	2.01	0.43
1:B:296:LEU:CD2	1:B:440:LEU:HD13	2.49	0.43
1:A:353:ALA:HA	1:A:397:ARG:HH22	1.82	0.43
1:A:289:TRP:HH2	1:A:440:LEU:HG	1.84	0.42
1:A:177:ARG:CD	4:A:615:HOH:O	2.68	0.42
1:A:219:ASN:H	1:A:219:ASN:ND2	2.16	0.42
1:A:9:PRO:O	1:A:12:VAL:HG22	2.19	0.42
1:A:85:PRO:HA	1:A:86:PRO:HD3	1.92	0.42
1:B:131:GLY:N	1:B:134:GLN:HE21	2.18	0.41
1:A:85:PRO:HG2	1:A:88:PHE:HB2	2.02	0.41
1:A:177:ARG:HD2	4:A:615:HOH:O	2.19	0.41
1:A:407:ALA:HA	1:A:419:MET:O	2.20	0.41
1:A:275:ARG:HH12	1:A:455:GLU:HG3	1.85	0.41
1:A:424:SER:OG	3:A:611:DU:H3'	2.20	0.41
1:B:392:PRO:HA	1:B:395:LEU:HD22	2.02	0.41
1:B:329:ARG:NH2	1:B:398:MET:O	2.54	0.40
1:B:473:CYS:O	1:B:477:LEU:HG	2.22	0.40

There are no symmetry-related clashes.

## 5.3 Torsion angles

### 5.3.1 Protein backbone ⓘ

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	512/521 (98%)	491 (96%)	21 (4%)	0	100	100
1	B	482/521 (92%)	462 (96%)	17 (4%)	3 (1%)	33	47
All	All	994/1042 (95%)	953 (96%)	38 (4%)	3 (0%)	50	68

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	87	LYS

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Mol	Chain	Res	Type
1	B	343	TYR
1	B	514	PRO

### 5.3.2 Protein sidechains ⓘ

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	440/446 (99%)	424 (96%)	16 (4%)	47	68
1	B	422/446 (95%)	399 (94%)	23 (6%)	30	46
All	All	862/892 (97%)	823 (96%)	39 (4%)	38	57

All (39) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	3	LEU
1	A	65	LYS
1	A	74	VAL
1	A	117	LYS
1	A	129	ASN
1	A	219	ASN
1	A	241	LEU
1	A	262	THR
1	A	274	LEU
1	A	297	LEU
1	A	309	LEU
1	A	333	GLU
1	A	400	LEU
1	A	440	LEU
1	A	456	LEU
1	A	515	ILE
1	B	1	MET
1	B	12	VAL
1	B	18	LEU
1	B	71	ARG
1	B	105	THR
1	B	120	LEU
1	B	123	ASP

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Mol	Chain	Res	Type
1	B	125	ILE
1	B	129	ASN
1	B	181	ARG
1	B	196	SER
1	B	223	THR
1	B	262	THR
1	B	274	LEU
1	B	278	ARG
1	B	297	LEU
1	B	326	LEU
1	B	358	ASP
1	B	364	GLN
1	B	386	LEU
1	B	395	LEU
1	B	440	LEU
1	B	456	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (15) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	129	ASN
1	A	219	ASN
1	A	239	GLN
1	A	277	ASN
1	A	404	HIS
1	A	469	HIS
1	B	129	ASN
1	B	134	GLN
1	B	207	GLN
1	B	239	GLN
1	B	277	ASN
1	B	356	HIS
1	B	379	ASN
1	B	404	HIS
1	B	469	HIS

### 5.3.3 RNA ⓘ

There are no RNA chains 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 carbohydrates in this entry.

## 5.6 Ligand geometry ⓘ

4 ligands are modelled in this entry.

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$
2	NAP	A	523	-	52,52,52	1.81	5 (9%)	80,80,80	1.77	11 (13%)
3	DU	A	611	-	21,21,21	0.94	1 (4%)	26,31,31	1.14	1 (3%)
2	NAP	B	524	-	52,52,52	1.85	6 (11%)	80,80,80	1.81	9 (11%)
3	DU	B	612	-	21,21,21	0.98	1 (4%)	26,31,31	1.14	1 (3%)

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
2	NAP	A	523	-	-	0/35/67/67	0/3/5/5
3	DU	A	611	-	-	0/7/22/22	0/2/2/2
2	NAP	B	524	-	-	0/35/67/67	0/3/5/5
3	DU	B	612	-	-	0/7/22/22	0/2/2/2

All (13) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	524	NAP	O7N-C7N	7.47	1.41	1.24
2	B	524	NAP	C4N-C3N	7.43	1.52	1.39

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	523	NAP	O7N-C7N	7.32	1.41	1.24
2	A	523	NAP	C4N-C3N	7.15	1.51	1.39
2	A	523	NAP	C5N-C4N	5.08	1.50	1.39
2	B	524	NAP	C5N-C4N	5.03	1.50	1.39
2	A	523	NAP	C2A-N3A	3.33	1.38	1.32
2	B	524	NAP	C2A-N3A	3.25	1.38	1.32
2	A	523	NAP	C2A-N1A	2.63	1.39	1.33
2	B	524	NAP	C2A-N1A	2.45	1.38	1.33
3	B	612	DU	C6-C5	2.27	1.39	1.36
3	A	611	DU	C6-C5	2.25	1.39	1.36
2	B	524	NAP	C2N-N1N	2.07	1.37	1.35

All (22) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	523	NAP	N3A-C2A-N1A	-10.42	120.00	128.71
2	B	524	NAP	N3A-C2A-N1A	-10.27	120.12	128.71
2	B	524	NAP	C5N-C4N-C3N	-6.21	112.25	120.32
2	A	523	NAP	C5N-C4N-C3N	-6.03	112.49	120.32
3	A	611	DU	N3-C2-N1	4.45	119.69	115.97
3	B	612	DU	N3-C2-N1	4.24	119.51	115.97
2	A	523	NAP	O4D-C1D-N1N	4.17	112.22	107.95
2	B	524	NAP	N3A-C4A-N9A	3.91	132.50	125.43
2	A	523	NAP	N3A-C4A-N9A	3.85	132.38	125.43
2	B	524	NAP	C3D-C2D-C1D	3.13	105.81	100.91
2	B	524	NAP	O4B-C1B-N9A	2.88	111.12	108.44
2	B	524	NAP	C5A-C4A-N3A	-2.53	120.20	125.70
2	B	524	NAP	O4D-C1D-N1N	2.52	110.53	107.95
2	A	523	NAP	PN-O3-PA	-2.47	122.34	132.95
2	A	523	NAP	C5A-C4A-N3A	-2.42	120.44	125.70
2	B	524	NAP	C2N-C3N-C4N	2.38	121.01	118.31
2	A	523	NAP	C3N-C7N-N7N	2.24	120.32	117.77
2	B	524	NAP	C2A-N3A-C4A	2.23	120.36	114.01
2	A	523	NAP	C2A-N3A-C4A	2.22	120.33	114.01
2	A	523	NAP	O4B-C1B-N9A	2.20	110.48	108.44
2	A	523	NAP	O4D-C1D-C2D	-2.04	103.65	106.77
2	A	523	NAP	N7A-C8A-N9A	-2.00	108.70	114.36

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

## 5.7 Other polymers ⓘ

There are no such residues in this entry.

## 5.8 Polymer linkage issues

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<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	514/521 (98%)	-0.01	19 (3%)	39 38	22, 35, 56, 60	0
1	B	492/521 (94%)	0.02	21 (4%)	34 32	24, 34, 53, 60	0
All	All	1006/1042 (96%)	0.00	40 (3%)	36 34	22, 35, 54, 60	0

All (40) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	43	TRP	6.8
1	B	13	ALA	5.5
1	A	183	SER	5.2
1	A	144	TYR	4.9
1	A	14	GLU	4.5
1	B	257	ARG	4.0
1	A	42	PRO	3.8
1	B	87	LYS	3.4
1	A	515	ILE	3.4
1	A	13	ALA	3.4
1	B	86	PRO	3.3
1	A	15	GLY	3.1
1	A	116	GLU	3.0
1	B	155	GLY	3.0
1	B	17	ARG	2.9
1	B	117	LYS	2.9
1	A	125	ILE	2.8
1	B	190	PHE	2.8
1	B	1	MET	2.7
1	B	102	THR	2.6
1	A	41	ILE	2.6
1	B	221	ASN	2.6
1	A	62	LYS	2.6
1	B	70	LYS	2.6

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Mol	Chain	Res	Type	RSRZ
1	B	15	GLY	2.5
1	A	63	ASN	2.5
1	A	32	ARG	2.4
1	A	64	VAL	2.4
1	B	259	GLY	2.3
1	A	184	GLU	2.3
1	A	88	PHE	2.3
1	B	88	PHE	2.3
1	B	515	ILE	2.3
1	A	122	ALA	2.2
1	B	258	THR	2.2
1	B	111	GLY	2.2
1	A	117	LYS	2.2
1	A	39	ARG	2.1
1	B	181	ARG	2.1
1	B	119	ASN	2.0

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

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

## 6.3 Carbohydrates ⓘ

There are no carbohydrates in this entry.

## 6.4 Ligands ⓘ

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q < 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSR	LLDF	B-factors(Å <sup>2</sup> )	Q<0.9
3	DU	A	611	20/20	0.20	0.66	58,59,60,60	0
2	NAP	B	524	48/48	0.19	0.64	49,57,67,67	0
3	DU	B	612	20/20	0.14	-0.55	50,52,53,53	0
2	NAP	A	523	48/48	0.11	-0.80	41,55,62,62	0

## 6.5 Other polymers ⓘ

There are no such residues in this entry.