



# wwPDB X-ray Structure Validation Summary Report ⓘ

Dec 11, 2022 – 01:48 AM EST

PDB ID : 1IBL  
Title : STRUCTURE OF THE THERMUS THERMOPHILUS 30S RIBOSOMAL SUBUNIT IN COMPLEX WITH A MESSENGER RNA FRAGMENT AND COGNATE TRANSFER RNA ANTICODON STEM-LOOP BOUND AT THE A SITE AND WITH THE ANTIBIOTIC PAROMOMYCIN  
Authors : Ogle, J.M.; Brodersen, D.E.; Clemons Jr., W.M.; Tarry, M.J.; Carter, A.P.; Ramakrishnan, V.  
Deposited on : 2001-03-28  
Resolution : 3.11 Å(reported)

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

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<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>.

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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 : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.31.2  
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)

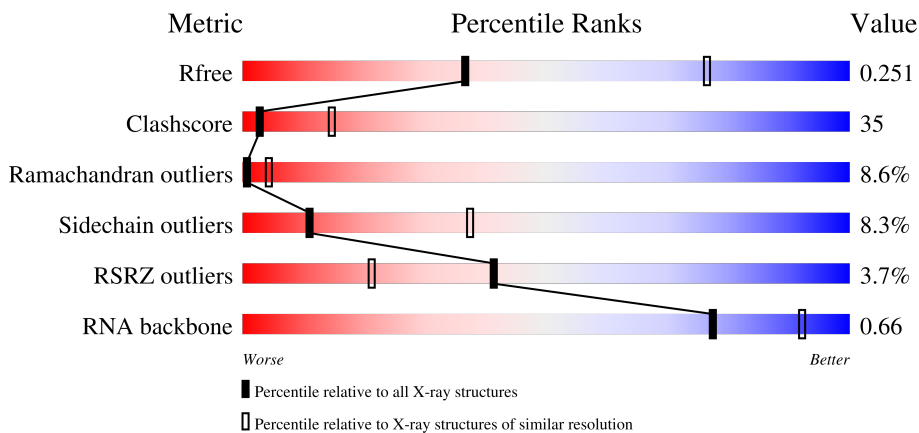
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

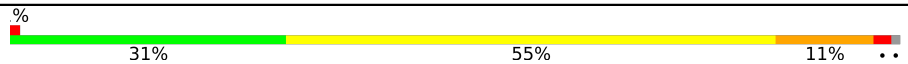
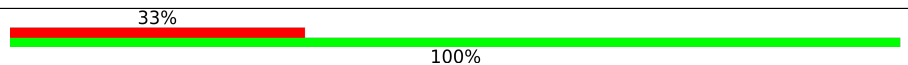
The reported resolution of this entry is 3.11 Å.

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	1292 (3.14-3.10)
Clashscore	141614	1389 (3.14-3.10)
Ramachandran outliers	138981	1337 (3.14-3.10)
Sidechain outliers	138945	1337 (3.14-3.10)
RSRZ outliers	127900	1260 (3.14-3.10)
RNA backbone	3102	1134 (3.44-2.80)

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  $\geq 3$ , 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  $\leq 5\%$ . 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	1522	 31% 55% 11%
2	X	6	 33% 100%

*Continued on next page...*

Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
 Validation Pipeline (wwPDB-VP) : 2.31.2

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Mol	Chain	Length	Quality of chain
3	Y	15	
4	Z	4	
5	B	256	
6	C	239	
7	D	209	
8	E	162	
9	F	101	
10	G	156	
11	H	138	
12	I	128	
13	J	105	
14	K	129	
15	L	135	
16	M	126	
17	N	61	
18	O	89	
19	P	88	
20	Q	105	
21	R	88	
22	S	93	
23	T	106	
24	V	26	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
26	MG	A	1633	-	-	-	X
26	MG	A	1645	-	-	-	X

## 2 Entry composition [i](#)

There are 27 unique types of molecules in this entry. The entry contains 52270 atoms, of which 0 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 RNA chain called 16S RIBOSOMAL RNA.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
1	A	1507	32391	14418	6002	10465	1506	0	0	0

- Molecule 2 is a RNA chain called P-SITE MESSENGER RNA FRAGMENT.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
2	X	6	117	54	14	44	5	0	0	0

- Molecule 3 is a RNA chain called ANTICODON STEM-LOOP OF PHENYLALANINE TRANSFER RNA.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
3	Y	15	319	144	60	101	14	0	0	0

- Molecule 4 is a RNA chain called A-SITE MESSENGER RNA FRAGMENT.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
4	Z	4	77	36	8	30	3	0	0	0

- Molecule 5 is a protein called 30S RIBOSOMAL PROTEIN S2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
5	B	234	1900	1213	341	341	5	0	0	0

- Molecule 6 is a protein called 30S RIBOSOMAL PROTEIN S3.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
6	C	206	1612	1016	314	281	1	0	0	0

- Molecule 7 is a protein called 30S RIBOSOMAL PROTEIN S4.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
7	D	208	1703	1066	339	291	7	0	0	0

- Molecule 8 is a protein called 30S RIBOSOMAL PROTEIN S5.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
8	E	150	1146	724	217	201	4	0	0	0

- Molecule 9 is a protein called 30S RIBOSOMAL PROTEIN S6.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
9	F	101	843	531	155	154	3	0	0	0

- Molecule 10 is a protein called 30S RIBOSOMAL PROTEIN S7.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
10	G	155	1257	781	252	218	6	0	0	0

- Molecule 11 is a protein called 30S RIBOSOMAL PROTEIN S8.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
11	H	138	1116	705	215	193	3	0	0	0

- Molecule 12 is a protein called 30S RIBOSOMAL PROTEIN S9.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
12	I	127	1011	639	198	174	0	0	0

- Molecule 13 is a protein called 30S RIBOSOMAL PROTEIN S10.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
13	J	98	792	498	156	137	1	0	0	0

- Molecule 14 is a protein called 30S RIBOSOMAL PROTEIN S11.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
14	K	119	885	549	168	165	3	0	0	0

- Molecule 15 is a protein called 30S RIBOSOMAL PROTEIN S12.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
15	L	124	970	611	195	163	1	0	0	0

- Molecule 16 is a protein called 30S RIBOSOMAL PROTEIN S13.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
16	M	118	937	579	193	163	2	0	0	0

- Molecule 17 is a protein called 30S RIBOSOMAL PROTEIN S14.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
17	N	60	492	312	104	72	4	0	0	0

- Molecule 18 is a protein called 30S RIBOSOMAL PROTEIN S15.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
18	O	88	734	459	147	126	2	0	0	0

- Molecule 19 is a protein called 30S RIBOSOMAL PROTEIN S16.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
19	P	83	700	443	139	117	1	0	0	0

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
P	?	-	PHE	conflict	GB 12056104
P	?	-	HIS	conflict	GB 12056104
P	?	-	TYR	conflict	GB 12056104

- Molecule 20 is a protein called 30S RIBOSOMAL PROTEIN S17.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
20	Q	104	857	547	161	147	2	0	0	0

- Molecule 21 is a protein called 30S RIBOSOMAL PROTEIN S18.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
21	R	73	597	380	118	99		0	0	0

- Molecule 22 is a protein called 30S RIBOSOMAL PROTEIN S19.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
22	S	84	674	430	126	116	2	0	0	0

- Molecule 23 is a protein called 30S RIBOSOMAL PROTEIN S20.

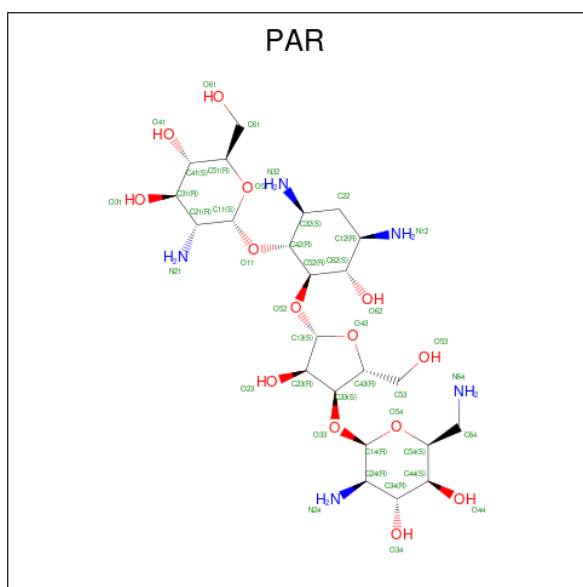
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
23	T	99	763	470	162	129	2	0	0	0

- Molecule 24 is a protein called 30S RIBOSOMAL PROTEIN THX.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
24	V	24	208	128	50	30	0	0	0

- Molecule 25 is PAROMOMYCIN (three-letter code: PAR) (formula: C<sub>23</sub>H<sub>45</sub>N<sub>5</sub>O<sub>14</sub>).





Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
25	A	1	42	23	5	14	0	0

- Molecule 26 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Mg		
26	A	120	120	120	0	0
26	Y	1	1	1	0	0
26	D	2	2	2	0	0
26	J	2	2	2	0	0

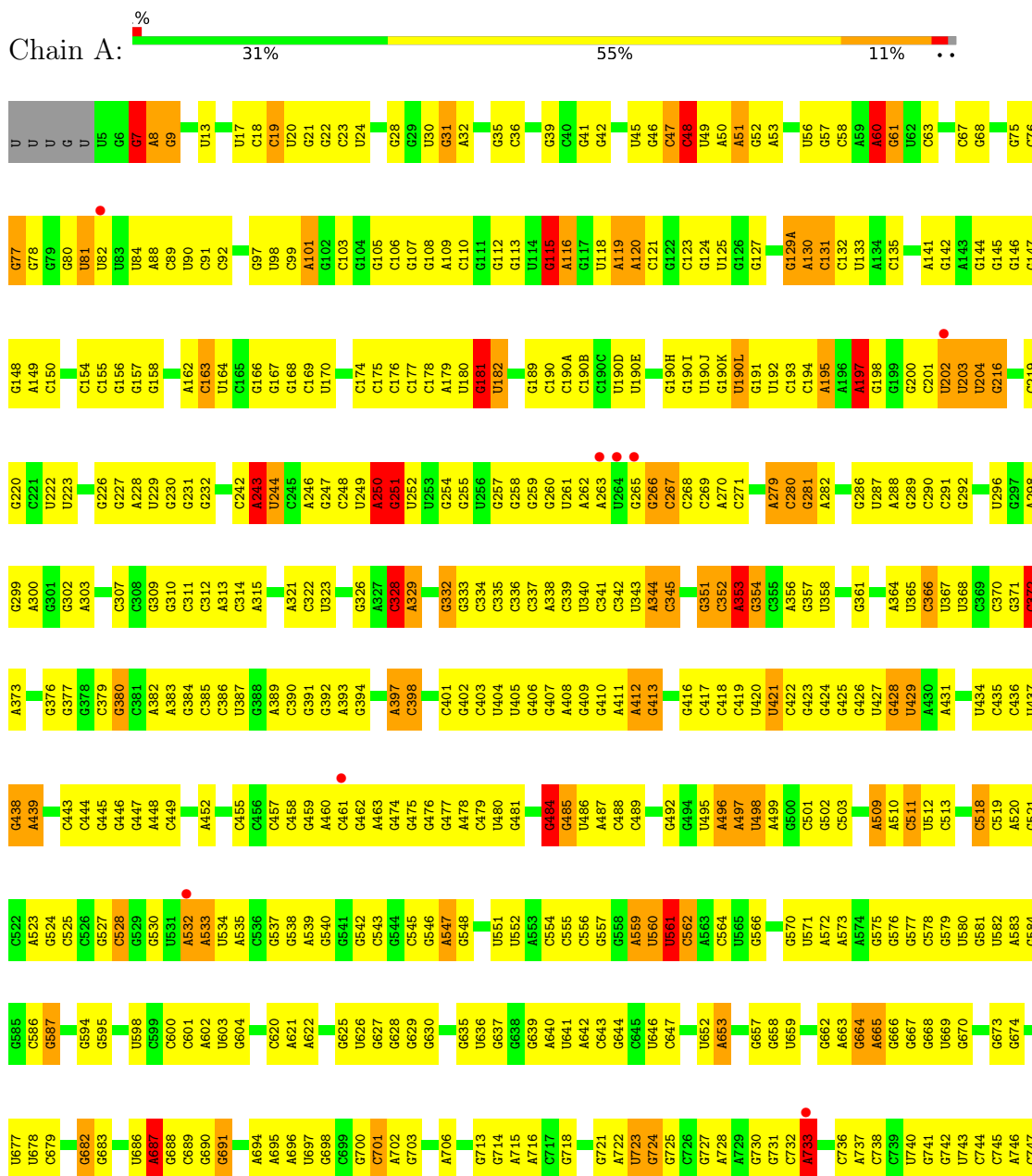
- Molecule 27 is ZINC ION (three-letter code: ZN) (formula: Zn).

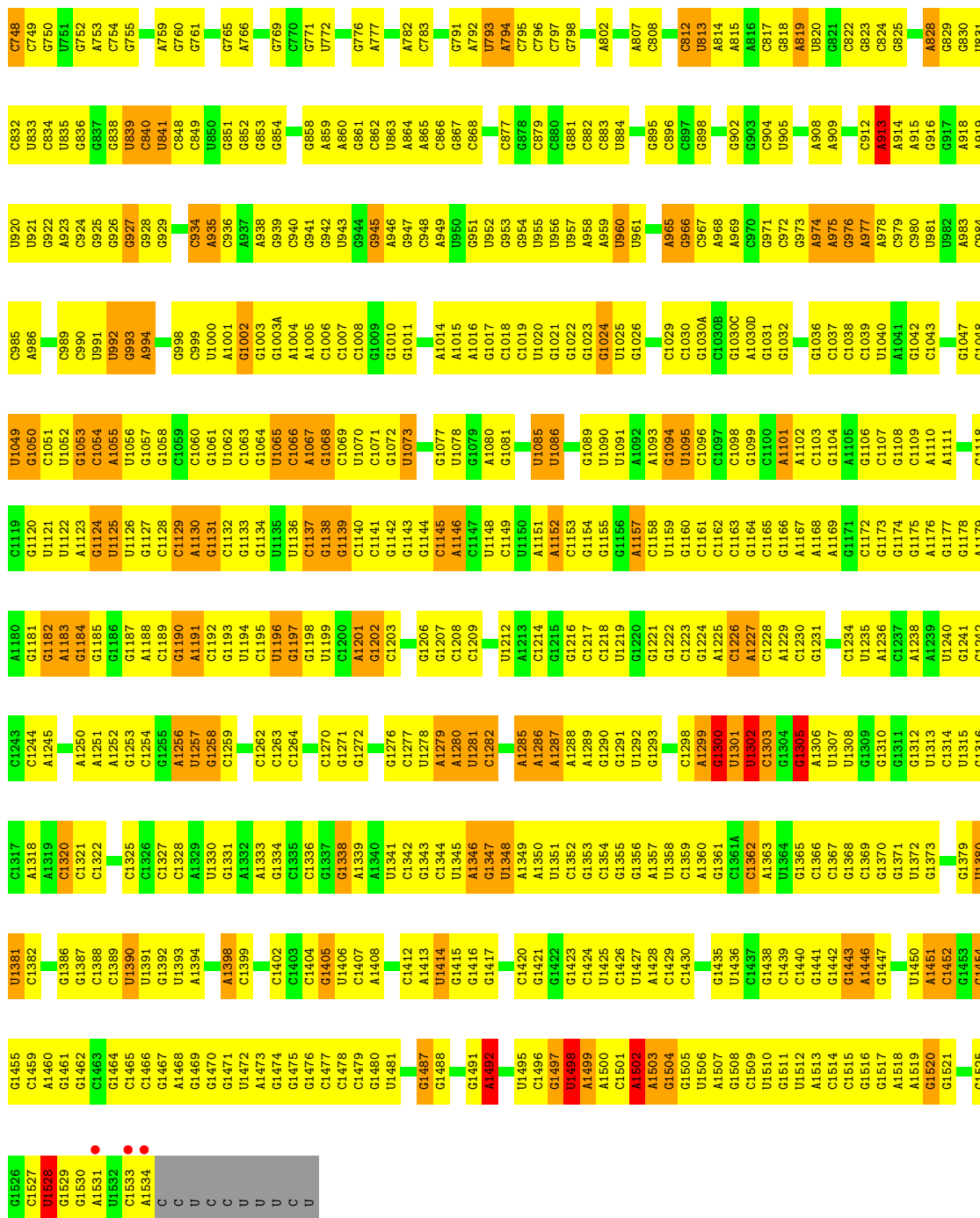
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Zn		
27	D	1	1	1	0	0
27	N	1	1	1	0	0

### 3 Residue-property plots

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: 16S RIBOSOMAL RNA





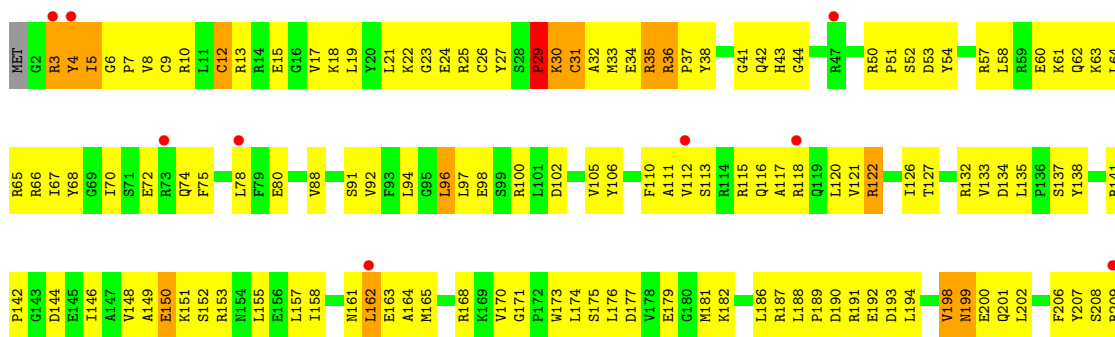
● Molecule 2: P-SITE MESSENGER RNA FRAGMENT



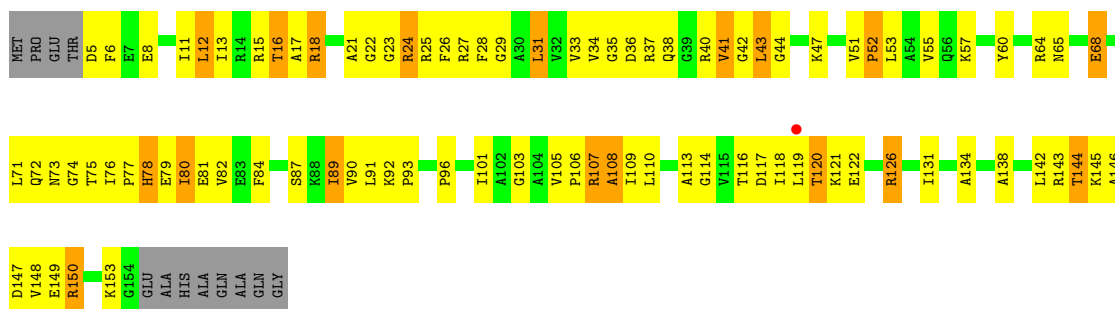
● Molecule 3: ANTICODON STEM-LOOP OF PHENYLALANINE TRANSFER RNA



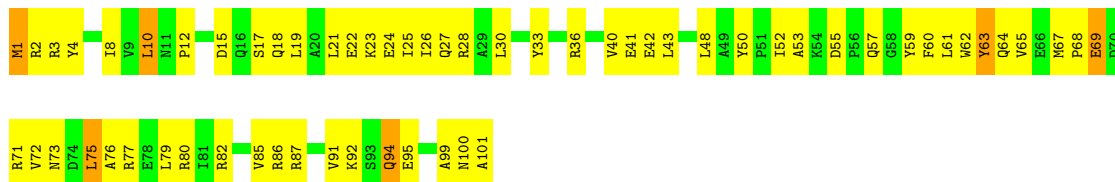




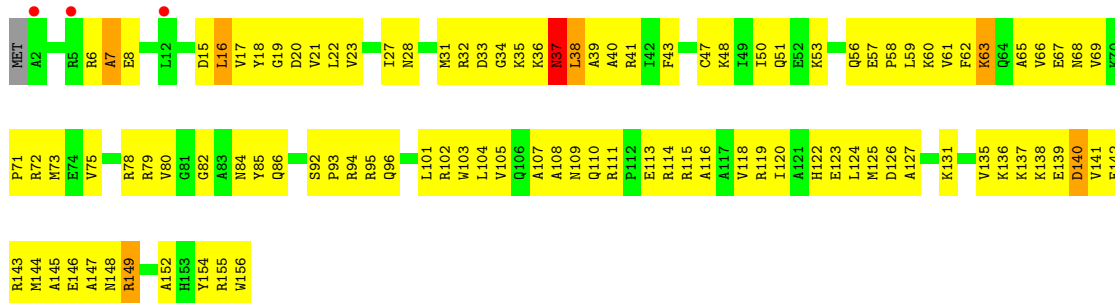
• Molecule 8: 30S RIBOSOMAL PROTEIN S5



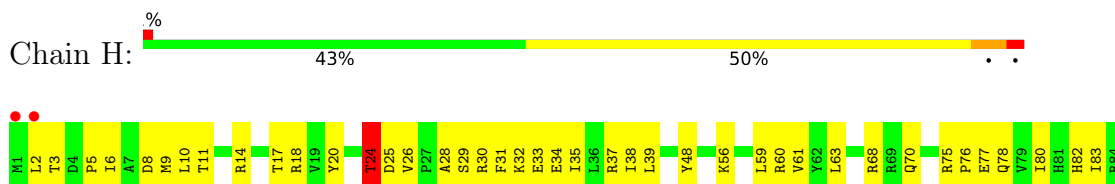
• Molecule 9: 30S RIBOSOMAL PROTEIN S6



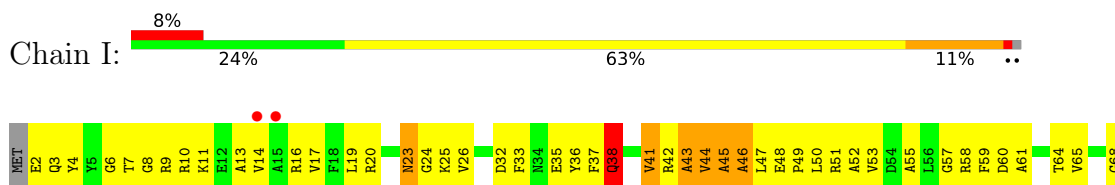
• Molecule 10: 30S RIBOSOMAL PROTEIN S7



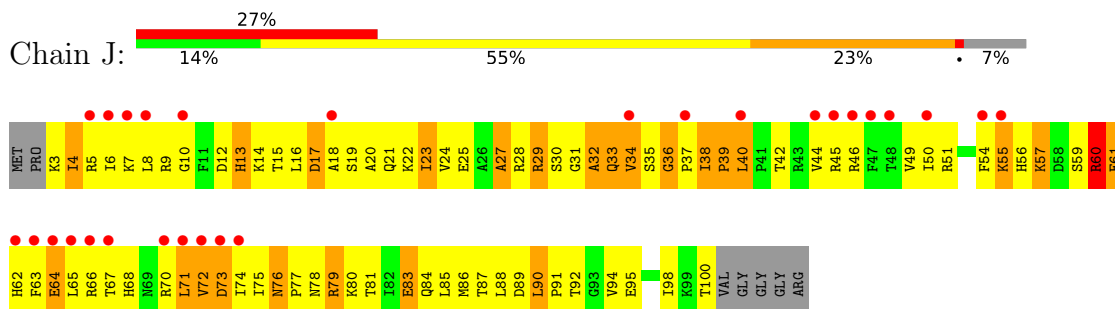
• Molecule 11: 30S RIBOSOMAL PROTEIN S8



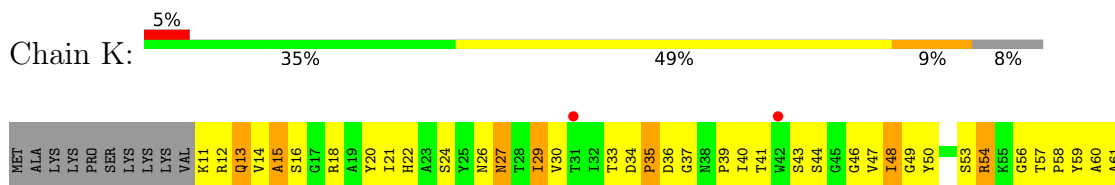
- Molecule 12: 30S RIBOSOMAL PROTEIN S9



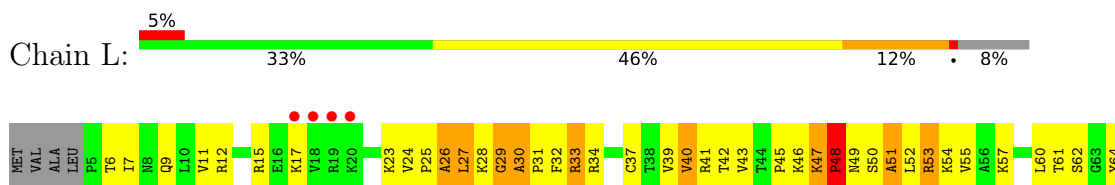
- Molecule 13: 30S RIBOSOMAL PROTEIN S10

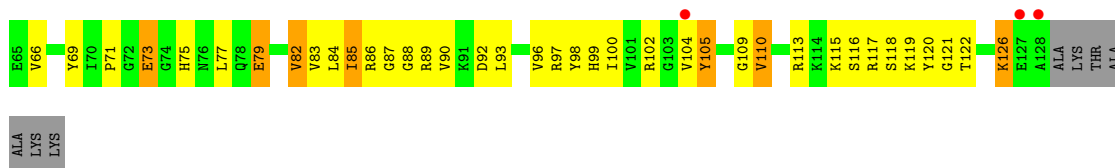


- Molecule 14: 30S RIBOSOMAL PROTEIN S11

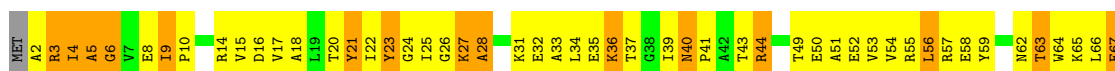


- Molecule 15: 30S RIBOSOMAL PROTEIN S12

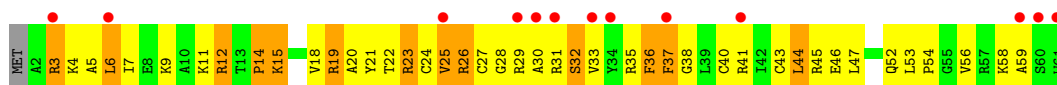




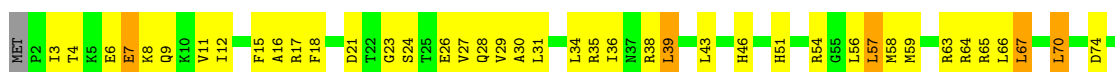
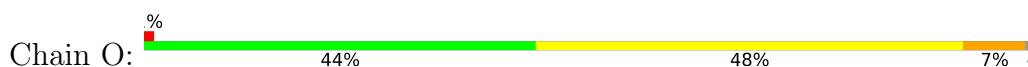
- Molecule 16: 30S RIBOSOMAL PROTEIN S13



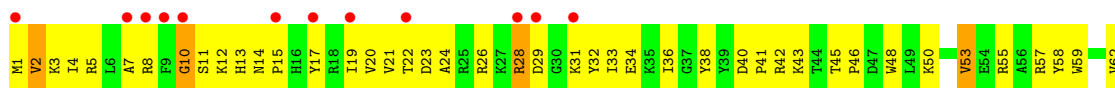
- Molecule 17: 30S RIBOSOMAL PROTEIN S14



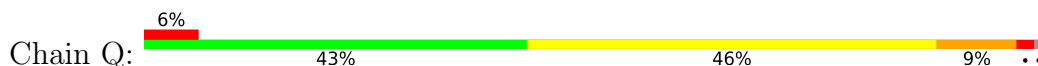
- Molecule 18: 30S RIBOSOMAL PROTEIN S15

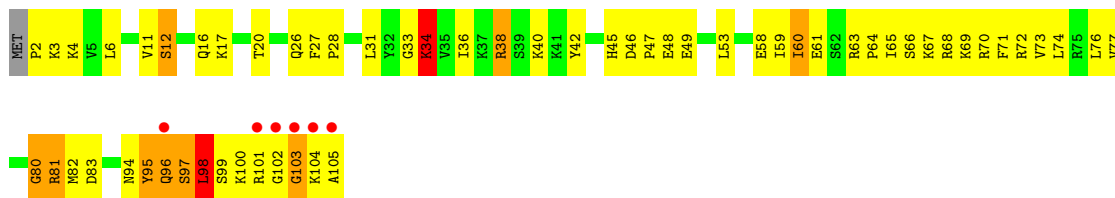


- Molecule 19: 30S RIBOSOMAL PROTEIN S16

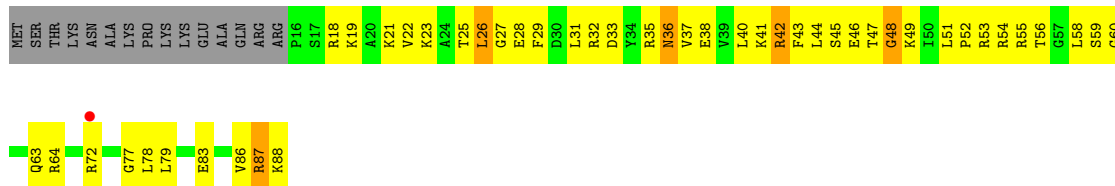
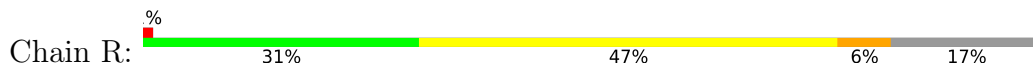


- Molecule 20: 30S RIBOSOMAL PROTEIN S17

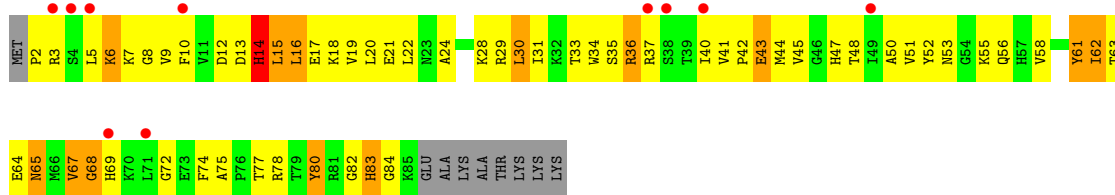




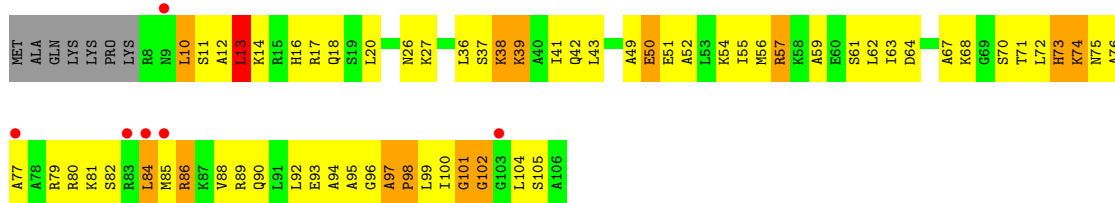
- Molecule 21: 30S RIBOSOMAL PROTEIN S18



- Molecule 22: 30S RIBOSOMAL PROTEIN S19



- Molecule 23: 30S RIBOSOMAL PROTEIN S20



- Molecule 24: 30S RIBOSOMAL PROTEIN THX





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 41 21 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	400.80Å 400.80Å 175.88Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	316.23 – 3.11 200.40 – 3.11	Depositor EDS
% Data completeness (in resolution range)	89.9 (316.23-3.11) 89.8 (200.40-3.11)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.12	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.36 (at 3.13Å)	Xtrriage
Refinement program	CNS	Depositor
R, $R_{free}$	0.232 , 0.275 0.211 , 0.251	Depositor DCC
$R_{free}$ test set	11493 reflections (5.05%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	72.7	Xtrriage
Anisotropy	0.163	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.27 , 83.1	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.84	EDS
Total number of atoms	52270	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	71.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 1.48% of the height of the origin peak. No significant pseudotranslation is detected.*

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

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

## 5 Model quality i

### 5.1 Standard geometry i

Bond lengths and bond angles in the following residue types are not validated in this section: PAR, MG, ZN

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	0.54	0/36259	0.74	34/56593 (0.1%)
2	X	0.45	0/128	0.64	0/196
3	Y	0.36	0/357	0.66	0/555
4	Z	0.42	0/84	0.81	0/128
5	B	0.33	0/1935	0.62	0/2609
6	C	0.36	0/1636	0.63	0/2205
7	D	0.47	2/1733 (0.1%)	0.65	1/2318 (0.0%)
8	E	0.47	0/1162	0.71	0/1564
9	F	0.31	0/856	0.62	0/1154
10	G	0.35	0/1276	0.59	0/1709
11	H	0.44	0/1136	0.77	0/1527
12	I	0.35	0/1029	0.64	0/1378
13	J	0.37	0/805	0.68	1/1082 (0.1%)
14	K	0.41	0/900	0.73	0/1213
15	L	0.47	0/986	0.80	2/1320 (0.2%)
16	M	0.34	0/947	0.64	0/1270
17	N	0.44	0/501	0.74	0/664
18	O	0.39	0/745	0.60	0/992
19	P	0.46	0/716	0.73	0/963
20	Q	0.48	0/870	0.74	0/1159
21	R	0.36	0/603	0.63	0/799
22	S	0.32	0/689	0.67	0/926
23	T	0.44	0/765	0.75	1/1007 (0.1%)
24	V	0.41	0/212	0.67	0/277
All	All	0.50	2/56330 (0.0%)	0.72	39/83608 (0.0%)

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	3	34

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
7	D	198	VAL	C-N	-8.29	1.15	1.34
7	D	200	GLU	C-N	5.60	1.47	1.34

The worst 5 of 39 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	1498	U	C2'-C3'-O3'	10.07	131.65	109.50
1	A	243	A	C2'-C3'-O3'	9.49	130.37	109.50
1	A	281	G	C2'-C3'-O3'	9.34	130.05	109.50
1	A	484	G	C2'-C3'-O3'	8.78	128.82	109.50
1	A	1302	U	C2'-C3'-O3'	8.65	128.53	109.50

All (3) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
1	A	243	A	C3'
1	A	281	G	C3'
1	A	1528	U	C3'

5 of 34 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	19	C	Sidechain
1	A	190(L)	U	Sidechain
1	A	197	A	Sidechain
1	A	250	A	Sidechain
1	A	77	G	Sidechain

## 5.2 Too-close contacts [\(i\)](#)

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	32391	0	16349	1145	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	X	117	0	64	0	0
3	Y	319	0	164	12	0
4	Z	77	0	42	6	0
5	B	1900	0	1951	280	0
6	C	1612	0	1677	244	0
7	D	1703	0	1763	153	0
8	E	1146	0	1207	111	0
9	F	843	0	857	85	0
10	G	1257	0	1296	101	0
11	H	1116	0	1177	105	0
12	I	1011	0	1043	133	0
13	J	792	0	835	149	1
14	K	885	0	904	86	0
15	L	970	0	1057	126	0
16	M	937	0	995	130	0
17	N	492	0	529	79	0
18	O	734	0	771	53	0
19	P	700	0	720	57	0
20	Q	857	0	930	93	0
21	R	597	0	668	77	0
22	S	674	0	699	88	0
23	T	763	0	861	90	0
24	V	208	0	221	20	0
25	A	42	0	45	2	0
26	A	120	0	0	0	0
26	D	2	0	0	0	0
26	J	2	0	0	0	0
26	Y	1	0	0	0	0
27	D	1	0	0	0	0
27	N	1	0	0	0	0
All	All	52270	0	36825	3136	1

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 35.

The worst 5 of 3136 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)
5:B:132:LYS:HA	5:B:135:GLN:HB3	1.20	1.14
7:D:36:ARG:H	7:D:37:PRO:HD3	1.09	1.13
1:A:975:A:H4'	1:A:976:G:H5''	1.25	1.12

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1286:A:H3'	1:A:1287:A:H5''	1.28	1.12
8:E:80:ILE:HD11	8:E:91:LEU:HB2	1.31	1.11

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
13:J:79:ARG:CD	13:J:79:ARG:CD[8_665]	2.14	0.06

## 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	
5	B	232/256 (91%)	145 (62%)	59 (25%)	28 (12%)	0	1
6	C	204/239 (85%)	126 (62%)	51 (25%)	27 (13%)	0	1
7	D	206/209 (99%)	160 (78%)	32 (16%)	14 (7%)	1	7
8	E	148/162 (91%)	132 (89%)	13 (9%)	3 (2%)	7	30
9	F	99/101 (98%)	82 (83%)	17 (17%)	0	100	100
10	G	153/156 (98%)	118 (77%)	28 (18%)	7 (5%)	2	14
11	H	136/138 (99%)	112 (82%)	20 (15%)	4 (3%)	4	23
12	I	125/128 (98%)	94 (75%)	18 (14%)	13 (10%)	0	3
13	J	96/105 (91%)	59 (62%)	17 (18%)	20 (21%)	0	0
14	K	117/129 (91%)	88 (75%)	20 (17%)	9 (8%)	1	5
15	L	122/135 (90%)	96 (79%)	13 (11%)	13 (11%)	0	2
16	M	116/126 (92%)	77 (66%)	23 (20%)	16 (14%)	0	1
17	N	58/61 (95%)	37 (64%)	11 (19%)	10 (17%)	0	0
18	O	86/89 (97%)	67 (78%)	17 (20%)	2 (2%)	6	28

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
19	P	81/88 (92%)	71 (88%)	9 (11%)	1 (1%)	13	43
20	Q	102/105 (97%)	78 (76%)	15 (15%)	9 (9%)	1	4
21	R	71/88 (81%)	59 (83%)	8 (11%)	4 (6%)	2	10
22	S	82/93 (88%)	53 (65%)	18 (22%)	11 (13%)	0	1
23	T	97/106 (92%)	61 (63%)	26 (27%)	10 (10%)	0	3
24	V	22/26 (85%)	15 (68%)	5 (23%)	2 (9%)	1	4
All	All	2353/2540 (93%)	1730 (74%)	420 (18%)	203 (9%)	1	4

5 of 203 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
5	B	8	LYS
5	B	15	VAL
5	B	16	HIS
5	B	17	PHE
5	B	23	ARG

### 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	
5	B	202/220 (92%)	176 (87%)	26 (13%)	4	18
6	C	160/188 (85%)	146 (91%)	14 (9%)	10	35
7	D	180/181 (99%)	171 (95%)	9 (5%)	24	56
8	E	115/123 (94%)	98 (85%)	17 (15%)	3	13
9	F	90/90 (100%)	83 (92%)	7 (8%)	12	40
10	G	126/127 (99%)	119 (94%)	7 (6%)	21	51
11	H	119/119 (100%)	108 (91%)	11 (9%)	9	32
12	I	98/99 (99%)	92 (94%)	6 (6%)	18	49
13	J	87/92 (95%)	79 (91%)	8 (9%)	9	32
14	K	90/99 (91%)	84 (93%)	6 (7%)	16	45

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
15	L	104/111 (94%)	97 (93%)	7 (7%)	16	45
16	M	94/101 (93%)	85 (90%)	9 (10%)	8	30
17	N	49/50 (98%)	44 (90%)	5 (10%)	7	27
18	O	79/80 (99%)	71 (90%)	8 (10%)	7	27
19	P	72/74 (97%)	68 (94%)	4 (6%)	21	51
20	Q	96/97 (99%)	91 (95%)	5 (5%)	23	54
21	R	64/77 (83%)	62 (97%)	2 (3%)	40	69
22	S	73/80 (91%)	65 (89%)	8 (11%)	6	24
23	T	76/82 (93%)	69 (91%)	7 (9%)	9	32
24	V	19/21 (90%)	19 (100%)	0	100	100
All	All	1993/2111 (94%)	1827 (92%)	166 (8%)	11	37

5 of 166 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
15	L	82	VAL
19	P	53	VAL
16	M	44	ARG
17	N	44	LEU
21	R	42	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 56 such sidechains are listed below:

Mol	Chain	Res	Type
10	G	37	ASN
23	T	90	GLN
13	J	76	ASN
22	S	83	HIS
20	Q	16	GLN

### 5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	A	1506/1522 (98%)	200 (13%)	67 (4%)
2	X	5/6 (83%)	0	0
3	Y	14/15 (93%)	1 (7%)	0

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Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
4	Z	3/4 (75%)	1 (33%)	0
All	All	1528/1547 (98%)	202 (13%)	67 (4%)

5 of 202 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	A	8	A
1	A	9	G
1	A	31	G
1	A	32	A
1	A	39	G

5 of 67 RNA pucker outliers are listed below:

Mol	Chain	Res	Type
1	A	1285	A
1	A	1301	U
1	A	1498	U
1	A	496	A
1	A	484	G

## 5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

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

## 5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 128 ligands modelled in this entry, 127 are monoatomic - leaving 1 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
25	PAR	A	1545	-	45,45,45	1.48	7 (15%)	64,67,67	1.21	7 (10%)

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
25	PAR	A	1545	-	-	4/18/94/94	0/4/4/4

The worst 5 of 7 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
25	A	1545	PAR	C64-C54	4.58	1.58	1.52
25	A	1545	PAR	O54-C14	3.13	1.49	1.41
25	A	1545	PAR	C11-C21	2.88	1.58	1.52
25	A	1545	PAR	C52-C42	2.40	1.57	1.52
25	A	1545	PAR	C31-C21	2.34	1.56	1.53

The worst 5 of 7 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
25	A	1545	PAR	O54-C54-C64	3.74	112.96	106.01
25	A	1545	PAR	O33-C14-C24	3.01	113.39	108.22
25	A	1545	PAR	O11-C11-C21	2.92	113.24	108.22
25	A	1545	PAR	O52-C13-C23	2.91	114.00	107.96
25	A	1545	PAR	C14-O54-C54	2.88	119.35	113.69

There are no chirality outliers.

All (4) torsion outliers are listed below:

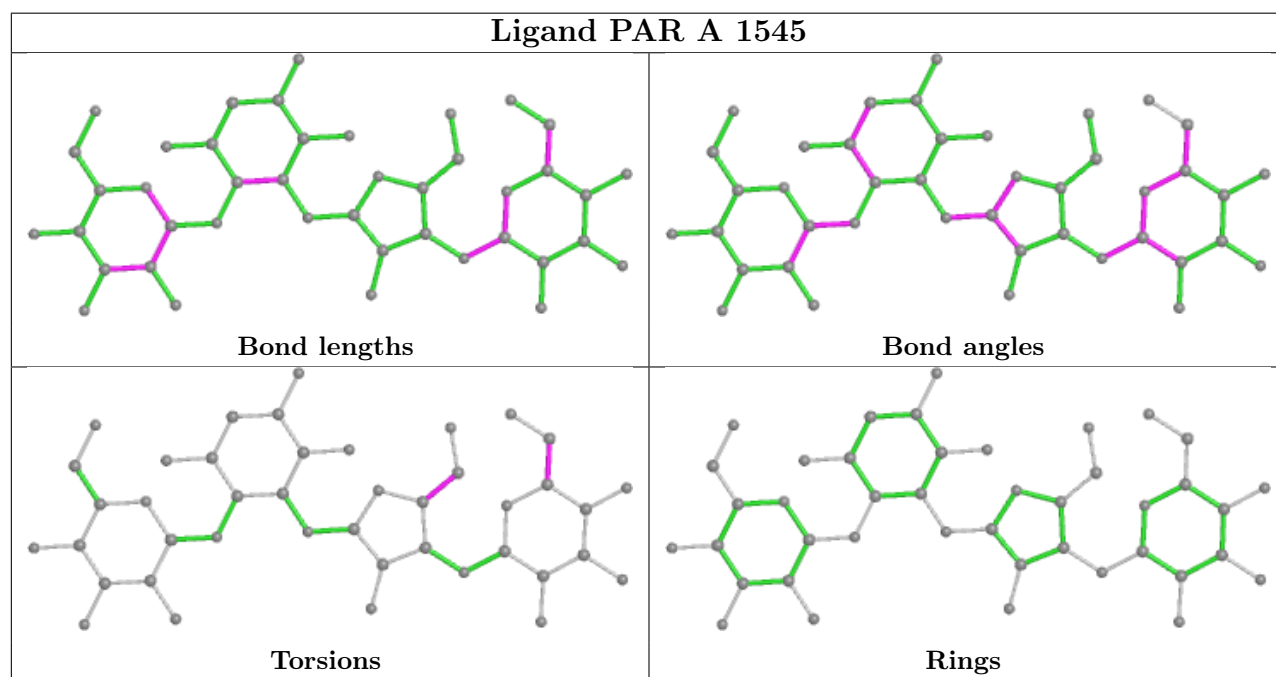
Mol	Chain	Res	Type	Atoms
25	A	1545	PAR	C44-C54-C64-N64
25	A	1545	PAR	O54-C54-C64-N64
25	A	1545	PAR	C33-C43-C53-O53
25	A	1545	PAR	O43-C43-C53-O53

There are no ring outliers.

1 monomer is involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
25	A	1545	PAR	2	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 than 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.



## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
7	D	1

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	D	198:VAL	C	199:ASN	N	1.15

## 6 Fit of model and data [i](#)

### 6.1 Protein, DNA and RNA chains [i](#)

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	1507/1522 (99%)	0.33	11 (0%) 87 77	22, 56, 140, 201	0
2	X	6/6 (100%)	1.59	2 (33%) 0 0	47, 59, 141, 164	0
3	Y	15/15 (100%)	0.56	0 100 100	58, 100, 200, 201	0
4	Z	4/4 (100%)	1.23	1 (25%) 0 0	69, 71, 82, 141	0
5	B	234/256 (91%)	0.21	6 (2%) 56 33	30, 94, 172, 201	0
6	C	206/239 (86%)	0.00	3 (1%) 73 56	38, 81, 170, 192	0
7	D	208/209 (99%)	0.36	9 (4%) 35 17	25, 62, 145, 181	0
8	E	150/162 (92%)	0.00	1 (0%) 87 77	21, 47, 109, 164	0
9	F	101/101 (100%)	-0.12	0 100 100	45, 90, 145, 176	0
10	G	155/156 (99%)	-0.15	3 (1%) 66 47	38, 73, 150, 191	0
11	H	138/138 (100%)	0.13	2 (1%) 75 58	17, 43, 103, 150	0
12	I	127/128 (99%)	0.47	10 (7%) 12 5	34, 89, 151, 180	0
13	J	98/105 (93%)	1.22	28 (28%) 0 0	36, 114, 185, 201	0
14	K	119/129 (92%)	0.54	6 (5%) 28 13	24, 60, 123, 201	0
15	L	124/135 (91%)	0.32	7 (5%) 24 11	16, 55, 125, 192	0
16	M	118/126 (93%)	0.07	5 (4%) 36 18	36, 74, 131, 165	0
17	N	60/61 (98%)	1.13	13 (21%) 0 0	44, 76, 139, 194	0
18	O	88/89 (98%)	0.01	1 (1%) 80 65	26, 56, 137, 199	0
19	P	83/88 (94%)	0.85	14 (16%) 1 1	22, 47, 77, 158	0
20	Q	104/105 (99%)	0.85	6 (5%) 23 10	13, 45, 137, 201	0
21	R	73/88 (82%)	0.38	1 (1%) 75 58	33, 71, 164, 201	0
22	S	84/93 (90%)	0.66	10 (11%) 4 2	54, 100, 165, 201	0
23	T	99/106 (93%)	0.64	6 (6%) 21 9	25, 56, 127, 198	0
24	V	24/26 (92%)	1.11	2 (8%) 11 4	42, 61, 113, 188	0

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Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
All	All	3925/4087 (96%)	0.34	147 (3%) 41 21	13, 63, 153, 201	0

The worst 5 of 147 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
14	K	129	SER	26.2
22	S	3	ARG	13.5
20	Q	103	GLY	12.2
14	K	128	ALA	11.1
20	Q	104	LYS	10.0

## 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](#)

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. 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	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
26	MG	Y	456	1/1	0.26	0.32	20,20,20,20	1
26	MG	A	441	1/1	0.41	0.21	20,20,20,20	1
26	MG	A	1633	1/1	0.49	0.41	20,20,20,20	1
26	MG	A	1622	1/1	0.62	0.24	20,20,20,20	1
26	MG	A	1643	1/1	0.63	0.38	20,20,20,20	1
26	MG	D	215	1/1	0.66	0.18	20,20,20,20	1
26	MG	A	1549	1/1	0.67	0.31	20,20,20,20	1
26	MG	A	1640	1/1	0.70	0.20	20,20,20,20	1
26	MG	A	1645	1/1	0.70	0.43	20,20,20,20	1
26	MG	A	210	1/1	0.75	0.17	20,20,20,20	1
26	MG	A	211	1/1	0.75	0.32	20,20,20,20	1
26	MG	A	1630	1/1	0.76	0.20	20,20,20,20	1
26	MG	A	1615	1/1	0.76	0.37	20,20,20,20	1

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
26	MG	A	1656	1/1	0.77	0.12	20,20,20,20	1
26	MG	A	1653	1/1	0.79	0.23	20,20,20,20	1
26	MG	A	1555	1/1	0.79	0.22	20,20,20,20	0
26	MG	A	1618	1/1	0.79	0.25	20,20,20,20	0
26	MG	A	1642	1/1	0.79	0.20	20,20,20,20	1
26	MG	A	1590	1/1	0.81	0.30	20,20,20,20	0
26	MG	A	1631	1/1	0.81	0.46	20,20,20,20	1
26	MG	A	1623	1/1	0.81	0.33	20,20,20,20	1
26	MG	A	1628	1/1	0.82	0.46	20,20,20,20	1
26	MG	A	1617	1/1	0.82	0.36	20,20,20,20	1
26	MG	A	1635	1/1	0.82	0.22	20,20,20,20	1
26	MG	A	1644	1/1	0.83	0.20	20,20,20,20	1
26	MG	A	1620	1/1	0.84	0.22	20,20,20,20	1
26	MG	A	1657	1/1	0.84	0.25	20,20,20,20	1
26	MG	A	1646	1/1	0.85	0.36	20,20,20,20	1
26	MG	A	1647	1/1	0.86	0.34	20,20,20,20	1
26	MG	A	1609	1/1	0.87	0.14	20,20,20,20	1
26	MG	A	1556	1/1	0.87	0.24	20,20,20,20	0
26	MG	A	1629	1/1	0.87	0.20	20,20,20,20	1
26	MG	A	1605	1/1	0.87	0.15	20,20,20,20	0
26	MG	A	1589	1/1	0.88	0.35	20,20,20,20	1
26	MG	A	214	1/1	0.88	0.15	20,20,20,20	1
26	MG	A	1621	1/1	0.88	0.29	20,20,20,20	1
26	MG	A	1578	1/1	0.89	0.36	20,20,20,20	1
26	MG	A	1638	1/1	0.89	0.23	20,20,20,20	1
26	MG	A	1548	1/1	0.89	0.13	20,20,20,20	0
26	MG	A	1641	1/1	0.89	0.14	20,20,20,20	1
26	MG	A	1569	1/1	0.89	0.43	20,20,20,20	1
26	MG	A	1597	1/1	0.89	0.23	20,20,20,20	1
26	MG	A	1608	1/1	0.89	0.31	20,20,20,20	1
26	MG	A	1598	1/1	0.89	0.24	20,20,20,20	1
26	MG	A	1616	1/1	0.90	0.44	20,20,20,20	1
26	MG	A	1583	1/1	0.90	0.32	20,20,20,20	1
26	MG	A	1649	1/1	0.90	0.29	20,20,20,20	1
26	MG	A	1574	1/1	0.90	0.24	20,20,20,20	0
26	MG	A	1625	1/1	0.90	0.18	20,20,20,20	1
26	MG	A	1627	1/1	0.90	0.29	20,20,20,20	1
26	MG	A	1563	1/1	0.90	0.14	20,20,20,20	1
26	MG	A	1639	1/1	0.90	0.33	20,20,20,20	1
26	MG	A	1550	1/1	0.91	0.26	20,20,20,20	1
26	MG	A	1648	1/1	0.91	0.68	20,20,20,20	1
26	MG	A	1584	1/1	0.91	0.26	20,20,20,20	1

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
26	MG	A	1636	1/1	0.91	0.27	20,20,20,20	1
26	MG	A	1637	1/1	0.91	0.10	20,20,20,20	0
26	MG	A	1610	1/1	0.91	0.40	20,20,20,20	1
26	MG	A	1606	1/1	0.91	0.19	20,20,20,20	1
26	MG	A	1626	1/1	0.91	0.25	20,20,20,20	0
26	MG	A	1619	1/1	0.92	0.39	20,20,20,20	1
26	MG	A	1604	1/1	0.92	0.16	20,20,20,20	1
26	MG	A	1567	1/1	0.92	0.28	20,20,20,20	1
26	MG	A	1655	1/1	0.92	0.15	20,20,20,20	1
25	PAR	A	1545	42/42	0.92	0.29	59,59,59,59	0
26	MG	A	1580	1/1	0.92	0.17	20,20,20,20	0
26	MG	A	1624	1/1	0.92	0.27	20,20,20,20	1
26	MG	A	1601	1/1	0.92	0.25	20,20,20,20	1
26	MG	A	71	1/1	0.93	0.28	20,20,20,20	1
26	MG	A	1591	1/1	0.93	0.39	20,20,20,20	1
26	MG	A	1634	1/1	0.93	0.11	20,20,20,20	1
26	MG	A	1651	1/1	0.93	0.43	20,20,20,20	1
26	MG	A	1565	1/1	0.93	0.10	20,20,20,20	0
26	MG	A	1599	1/1	0.94	0.18	20,20,20,20	0
26	MG	A	87	1/1	0.94	0.41	20,20,20,20	1
26	MG	A	1594	1/1	0.94	0.08	20,20,20,20	1
26	MG	A	1595	1/1	0.94	0.31	20,20,20,20	0
26	MG	A	1570	1/1	0.94	0.29	20,20,20,20	1
26	MG	A	1614	1/1	0.94	0.09	20,20,20,20	1
26	MG	A	1603	1/1	0.94	0.21	20,20,20,20	1
26	MG	A	1568	1/1	0.94	0.25	20,20,20,20	0
26	MG	A	1602	1/1	0.95	0.37	20,20,20,20	1
26	MG	A	1553	1/1	0.95	0.28	20,20,20,20	0
26	MG	A	1588	1/1	0.95	0.20	20,20,20,20	1
26	MG	A	1551	1/1	0.95	0.23	20,20,20,20	1
26	MG	A	1650	1/1	0.95	0.14	20,20,20,20	0
26	MG	A	1552	1/1	0.95	0.28	20,20,20,20	0
26	MG	A	1652	1/1	0.95	0.45	20,20,20,20	1
26	MG	A	1557	1/1	0.95	0.40	20,20,20,20	0
26	MG	A	1559	1/1	0.95	0.17	20,20,20,20	0
26	MG	A	1632	1/1	0.95	0.14	20,20,20,20	1
26	MG	A	1600	1/1	0.95	0.24	20,20,20,20	0
26	MG	A	1613	1/1	0.95	0.08	20,20,20,20	0
26	MG	A	1562	1/1	0.95	0.23	20,20,20,20	1
26	MG	A	1581	1/1	0.96	0.16	20,20,20,20	0
26	MG	A	1611	1/1	0.96	0.28	20,20,20,20	0
26	MG	A	1654	1/1	0.96	0.20	20,20,20,20	0

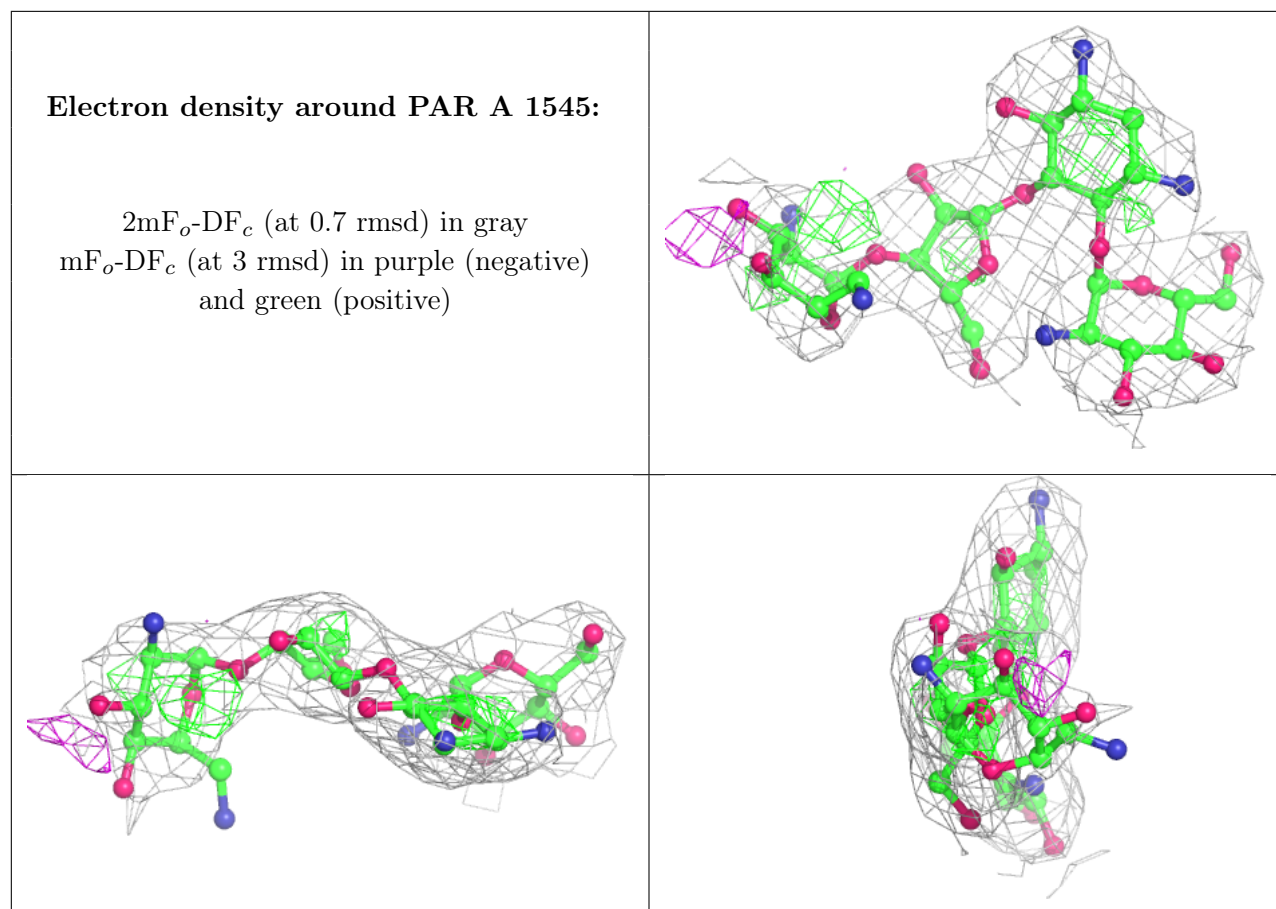
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
26	MG	A	1572	1/1	0.96	0.36	20,20,20,20	1
26	MG	A	1564	1/1	0.96	0.36	20,20,20,20	0
26	MG	A	1577	1/1	0.96	0.20	20,20,20,20	1
26	MG	A	1547	1/1	0.96	0.23	20,20,20,20	0
26	MG	D	210	1/1	0.96	0.33	20,20,20,20	1
26	MG	A	1571	1/1	0.96	0.14	20,20,20,20	1
26	MG	J	449	1/1	0.96	0.25	20,20,20,20	1
26	MG	A	1576	1/1	0.97	0.26	20,20,20,20	1
26	MG	A	1596	1/1	0.97	0.28	20,20,20,20	0
26	MG	A	1558	1/1	0.97	0.29	20,20,20,20	0
26	MG	A	1566	1/1	0.97	0.34	20,20,20,20	0
26	MG	A	86	1/1	0.97	0.27	20,20,20,20	1
26	MG	A	1560	1/1	0.97	0.36	20,20,20,20	1
26	MG	A	1575	1/1	0.97	0.20	20,20,20,20	1
26	MG	A	213	1/1	0.97	0.26	20,20,20,20	1
26	MG	A	1607	1/1	0.97	0.21	20,20,20,20	1
27	ZN	D	306	1/1	0.97	0.35	20,20,20,20	1
26	MG	A	1593	1/1	0.98	0.20	20,20,20,20	0
26	MG	A	1579	1/1	0.98	0.25	20,20,20,20	0
26	MG	A	1585	1/1	0.98	0.12	20,20,20,20	0
26	MG	A	1612	1/1	0.98	0.25	20,20,20,20	0
26	MG	A	1586	1/1	0.98	0.21	20,20,20,20	0
26	MG	A	1587	1/1	0.98	0.23	20,20,20,20	0
26	MG	A	1573	1/1	0.98	0.26	20,20,20,20	0
26	MG	A	1554	1/1	0.98	0.36	20,20,20,20	0
26	MG	A	1582	1/1	0.98	0.32	20,20,20,20	1
26	MG	J	422	1/1	0.98	0.20	20,20,20,20	0
26	MG	A	1561	1/1	0.98	0.26	20,20,20,20	0
26	MG	A	1592	1/1	0.98	0.21	20,20,20,20	0
26	MG	A	1546	1/1	0.99	0.20	20,20,20,20	0
27	ZN	N	307	1/1	0.99	0.18	20,20,20,20	1

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.





## 6.5 Other polymers [i](#)

There are no such residues in this entry.