Full wwPDB X-ray Structure Validation Report (i)

Apr 2, 2025 – 12:14 am BST

PDB ID	:	2JAX / pdb_00002jax
Title	:	Universal Stress Protein Rv2623 from Mycobaterium Tuberculosis
Authors	:	Oberschall, A.; Bourenkov, G.; Strizhov, N.; Bartunik, H.D.
Deposited on	:	2006-11-30
Resolution	:	3.22 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 (i) 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 (i)) were used in the production of this report:

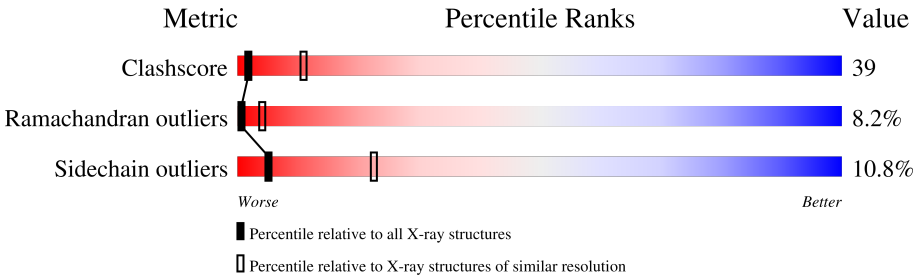
MolProbity	:	4.02b-467
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	FAILED
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.42

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 3.22 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))
Clashscore	180529	1778 (3.24-3.20)
Ramachandran outliers	177936	1751 (3.24-3.20)
Sidechain outliers	177891	1750 (3.24-3.20)

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%

Note EDS failed to run properly.

Mol	Chain	Length	Quality of chain
1	A	305	43% 31% 10% • 14%

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
2	ATP	A	1296	-	-	X	-

2 Entry composition (i)

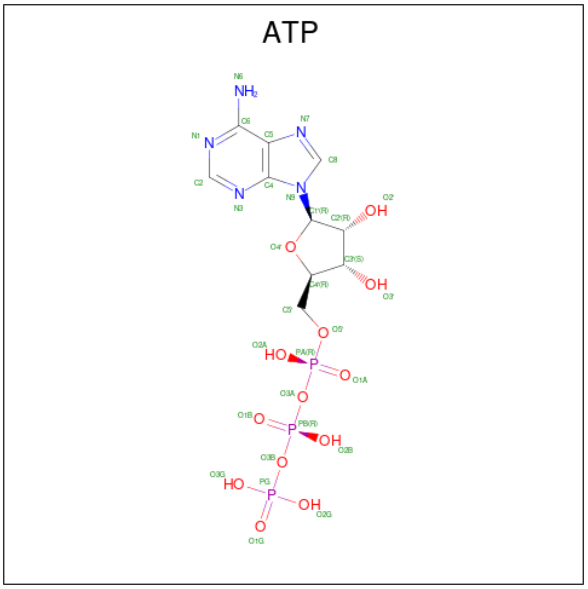
There are 3 unique types of molecules in this entry. The entry contains 2008 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 protein called HYPOTHETICAL PROTEIN TB31.7.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	261	Total	C	N	O	S	Se	0	0	0
			1944	1220	357	361	2	4			

- Molecule 2 is ADENOSINE-5'-TRIPHOSPHATE (CCD ID: ATP) (formula: $C_{10}H_{16}N_5O_{13}P_3$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	1	0
			31	10	5	13	3		
2	A	1	Total	C	N	O	P	0	0
			31	10	5	13	3		

- Molecule 3 is UNKNOWN ATOM OR ION (CCD ID: UNX) (formula: X).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	2	Total	X	0	0
			2	2		

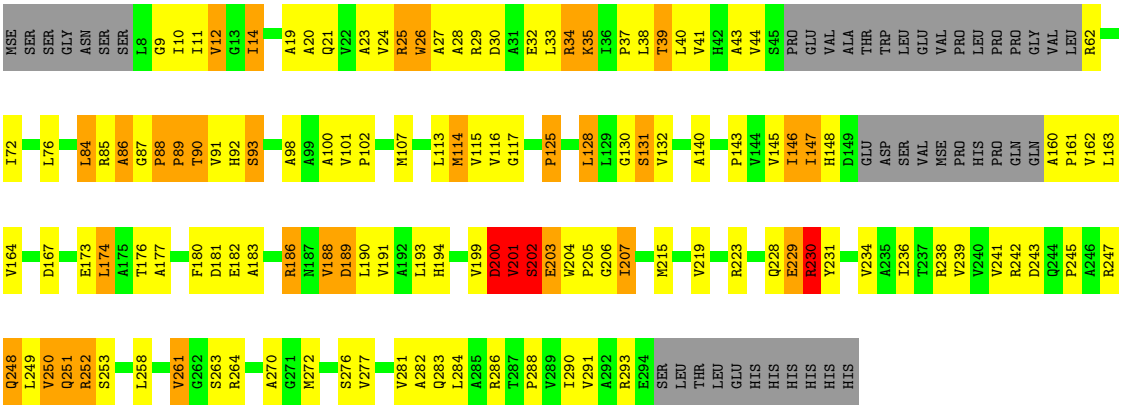
3 Residue-property plots (i)

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. 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. 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.

Note EDS failed to run properly.

- Molecule 1: HYPOTHETICAL PROTEIN TB31.7

Chain A:



4 Data and refinement statistics (i)

EDS failed to run properly - this section is therefore incomplete.

Property	Value	Source
Space group	P 64 2 2	Depositor
Cell constants a, b, c, α, β, γ	102.13Å 102.13Å 158.07Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	88.39 – 3.22	Depositor
% Data completeness (in resolution range)	99.3 (88.39-3.22)	Depositor
R_{merge}	0.13	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	4.07 (at 3.21Å)	Xtriage
Refinement program	REFMAC 5.2.0005	Depositor
R, R_{free}	0.268 , 0.324	Depositor
Wilson B-factor (Å^2)	70.0	Xtriage
Anisotropy	0.146	Xtriage
L-test for twinning[2]	$< \|L\| > = 0.48$, $< L^2 > = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	2008	wwPDB-VP
Average B, all atoms (Å^2)	63.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.38% 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: ATP, UNX

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	0.48	0/1976	0.82	3/2693 (0.1%)

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	3

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	261	VAL	CB-CA-C	-9.55	93.25	111.40
1	A	93	SER	N-CA-CB	-5.55	102.17	110.50
1	A	183	ALA	CB-CA-C	-5.02	102.57	110.10

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	200	ASP	Peptide
1	A	201	VAL	Peptide
1	A	202	SER	Peptide

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	1944	0	1949	154	7
2	A	62	0	24	12	0
3	A	2	0	0	0	0
All	All	2008	0	1973	155	7

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 39.

All (155) 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)
1:A:188:VAL:HG22	1:A:189:ASP:OD2	1.27	1.30
1:A:201:VAL:HG13	1:A:203:GLU:H	1.07	1.13
1:A:26:TRP:HE1	1:A:145:VAL:HG11	1.14	1.08
1:A:250:VAL:HG12	1:A:251:GLN:N	1.54	1.08
1:A:201:VAL:HG11	1:A:203:GLU:OE2	1.53	1.08
1:A:188:VAL:HG22	1:A:189:ASP:H	1.02	1.07
1:A:188:VAL:CG2	1:A:189:ASP:OD2	2.04	1.05
1:A:250:VAL:HG12	1:A:251:GLN:H	0.92	1.04
1:A:128:LEU:HD12	1:A:128:LEU:N	1.71	1.01
1:A:261:VAL:O	1:A:261:VAL:HG23	1.62	0.98
1:A:26:TRP:HD1	1:A:147:ILE:HG21	1.26	0.98
1:A:201:VAL:HG13	1:A:203:GLU:N	1.81	0.96
1:A:26:TRP:CD1	1:A:147:ILE:HG21	2.01	0.95
1:A:128:LEU:HD12	1:A:128:LEU:H	1.25	0.95
1:A:251:GLN:O	1:A:253:SER:N	2.02	0.92
1:A:188:VAL:CG2	1:A:189:ASP:H	1.84	0.90
1:A:188:VAL:HG22	1:A:189:ASP:N	1.86	0.90
1:A:250:VAL:CG1	1:A:251:GLN:N	2.30	0.88
1:A:248:GLN:O	1:A:252:ARG:HG2	1.74	0.88
1:A:12:VAL:HG13	1:A:40:LEU:HD23	1.57	0.86
1:A:201:VAL:HG12	1:A:201:VAL:O	1.78	0.84
1:A:261:VAL:O	1:A:261:VAL:CG2	2.26	0.83
1:A:203:GLU:O	1:A:203:GLU:HG2	1.76	0.83
1:A:229:GLU:O	1:A:231:TYR:N	2.11	0.82

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:201:VAL:CG1	1:A:203:GLU:OE2	2.26	0.82
1:A:250:VAL:CG1	1:A:251:GLN:H	1.77	0.81
1:A:264:ARG:NH1	1:A:272:MSE:HB3	1.95	0.81
1:A:91:VAL:HG12	1:A:91:VAL:O	1.80	0.79
1:A:173:GLU:OE2	1:A:223:ARG:NH2	2.17	0.77
1:A:116:VAL:CG1	2:A:1296:ATP:H4'	2.15	0.77
1:A:26:TRP:CE3	1:A:26:TRP:O	2.38	0.76
1:A:33:LEU:HD12	1:A:186:ARG:NH2	2.03	0.74
1:A:23:ALA:HA	1:A:147:ILE:HG12	1.71	0.73
1:A:26:TRP:NE1	1:A:145:VAL:HG11	1.99	0.72
1:A:33:LEU:HD12	1:A:186:ARG:CZ	2.19	0.72
1:A:203:GLU:O	1:A:203:GLU:CG	2.35	0.72
1:A:193:LEU:HD12	1:A:252:ARG:HD2	1.73	0.70
1:A:204:TRP:HB3	1:A:205:PRO:HD2	1.74	0.69
1:A:26:TRP:CD1	1:A:147:ILE:CG2	2.76	0.69
1:A:116:VAL:HG13	2:A:1296:ATP:H4'	1.72	0.69
1:A:147:ILE:C	1:A:147:ILE:HD12	2.13	0.69
1:A:21:GLN:HA	1:A:21:GLN:OE1	1.92	0.68
1:A:174:LEU:O	1:A:177:ALA:N	2.24	0.68
1:A:250:VAL:O	1:A:251:GLN:C	2.32	0.68
1:A:132:VAL:HB	2:A:1296:ATP:H5'1	1.74	0.68
1:A:163:LEU:HD22	1:A:249:LEU:HD23	1.76	0.67
1:A:12:VAL:CG1	1:A:40:LEU:HD23	2.24	0.67
1:A:113:LEU:HD23	1:A:143:PRO:HG2	1.78	0.66
1:A:116:VAL:HG13	2:A:1296:ATP:C4'	2.25	0.66
1:A:24:VAL:O	1:A:26:TRP:N	2.29	0.66
1:A:20:ALA:HB2	2:A:1296:ATP:O2'	1.95	0.65
1:A:173:GLU:HA	1:A:176:THR:HG22	1.77	0.65
1:A:189:ASP:OD2	1:A:189:ASP:N	2.30	0.65
1:A:215:MSE:O	1:A:219:VAL:HG23	1.97	0.64
1:A:190:LEU:HD23	1:A:191:VAL:N	2.14	0.63
1:A:160:ALA:N	1:A:161:PRO:CD	2.64	0.61
1:A:251:GLN:C	1:A:253:SER:H	2.04	0.61
1:A:62:ARG:NE	1:A:62:ARG:HA	2.15	0.61
1:A:231:TYR:O	1:A:234:VAL:HG22	2.01	0.61
1:A:35:LYS:HD2	1:A:35:LYS:N	2.15	0.61
1:A:26:TRP:HE1	1:A:145:VAL:CG1	2.01	0.61
1:A:146:ILE:HD12	1:A:146:ILE:C	2.21	0.60
1:A:37:PRO:HB3	1:A:90:THR:HG23	1.83	0.60
1:A:26:TRP:O	1:A:26:TRP:CD2	2.55	0.59
1:A:24:VAL:O	1:A:25:ARG:C	2.38	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:245:PRO:O	1:A:249:LEU:HD12	2.04	0.58
1:A:145:VAL:HG22	1:A:290:ILE:HG12	1.84	0.58
1:A:201:VAL:O	1:A:201:VAL:CG1	2.48	0.58
1:A:283:GLN:HG3	1:A:284:LEU:HD13	1.86	0.58
1:A:26:TRP:HD1	1:A:147:ILE:CG2	2.07	0.57
1:A:28:ALA:HA	1:A:38:LEU:HD22	1.87	0.57
1:A:163:LEU:HD11	1:A:252:ARG:HG3	1.86	0.57
1:A:33:LEU:CD1	1:A:186:ARG:CZ	2.82	0.56
1:A:10:ILE:HD11	1:A:27:ALA:O	2.06	0.56
1:A:117:GLY:CA	2:A:1296:ATP:O3'	2.54	0.56
1:A:162:VAL:HG12	1:A:258:LEU:HB3	1.86	0.55
1:A:230:ARG:HB3	1:A:231:TYR:CD1	2.42	0.55
1:A:160:ALA:N	1:A:161:PRO:HD2	2.22	0.54
1:A:160:ALA:O	1:A:188:VAL:HG21	2.07	0.54
1:A:250:VAL:O	1:A:253:SER:N	2.38	0.54
1:A:85:ARG:O	1:A:86:ALA:CB	2.55	0.54
1:A:193:LEU:C	1:A:193:LEU:HD23	2.27	0.53
1:A:91:VAL:O	1:A:91:VAL:CG1	2.52	0.53
1:A:188:VAL:HG13	1:A:189:ASP:O	2.08	0.53
1:A:11:ILE:HA	1:A:39:THR:HG23	1.90	0.53
1:A:241:VAL:HG12	1:A:242:ARG:H	1.74	0.53
1:A:205:PRO:O	1:A:207:ILE:N	2.43	0.52
1:A:263:SER:HB3	1:A:293:ARG:HG2	1.91	0.52
1:A:101:VAL:HB	1:A:102:PRO:HD3	1.91	0.52
1:A:163:LEU:HD23	1:A:164:VAL:N	2.25	0.52
1:A:130:GLY:O	1:A:132:VAL:N	2.43	0.52
1:A:229:GLU:O	1:A:230:ARG:C	2.48	0.52
1:A:11:ILE:HB	1:A:114:MSE:HE3	1.92	0.51
1:A:19:ALA:O	1:A:147:ILE:HD11	2.11	0.51
1:A:188:VAL:HG13	1:A:189:ASP:N	2.25	0.51
1:A:215:MSE:O	1:A:215:MSE:HG2	2.11	0.50
1:A:250:VAL:O	1:A:251:GLN:O	2.30	0.50
1:A:116:VAL:HG13	2:A:1296:ATP:O4'	2.11	0.50
1:A:186:ARG:O	1:A:188:VAL:HG12	2.12	0.50
1:A:41:VAL:HG21	1:A:107:MSE:SE	2.63	0.49
1:A:72:ILE:O	1:A:76:LEU:HG	2.12	0.49
1:A:201:VAL:HA	1:A:202:SER:C	2.32	0.49
1:A:146:ILE:HD12	1:A:146:ILE:O	2.12	0.49
1:A:261:VAL:O	1:A:291:VAL:HA	2.13	0.49
1:A:114:MSE:HE2	1:A:115:VAL:N	2.28	0.49
1:A:199:VAL:O	1:A:200:ASP:O	2.30	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:117:GLY:HA3	2:A:1296:ATP:O3'	2.13	0.48
1:A:193:LEU:HD23	1:A:194:HIS:N	2.28	0.48
1:A:276:SER:CB	2:A:1295:ATP:O3G	2.59	0.47
1:A:9:GLY:HA3	1:A:37:PRO:O	2.14	0.47
1:A:114:MSE:CE	1:A:114:MSE:HA	2.45	0.46
1:A:182:GLU:HG2	1:A:258:LEU:CD2	2.44	0.46
1:A:186:ARG:HH11	1:A:186:ARG:HB2	1.81	0.46
1:A:163:LEU:HD22	1:A:249:LEU:CD2	2.43	0.46
1:A:147:ILE:HG22	1:A:288:PRO:HB3	1.98	0.46
1:A:229:GLU:C	1:A:231:TYR:N	2.69	0.45
1:A:38:LEU:O	1:A:38:LEU:HG	2.16	0.45
1:A:62:ARG:HA	1:A:62:ARG:CZ	2.45	0.45
1:A:116:VAL:HG12	2:A:1296:ATP:H4'	1.97	0.45
1:A:272:MSE:HE1	2:A:1295:ATP:O1B	2.17	0.45
1:A:258:LEU:HD11	1:A:290:ILE:HG13	1.98	0.45
1:A:163:LEU:CD2	1:A:249:LEU:HD23	2.45	0.45
1:A:146:ILE:HD11	1:A:282:ALA:O	2.18	0.44
1:A:146:ILE:HD11	1:A:148:HIS:NE2	2.33	0.44
1:A:39:THR:HA	1:A:92:HIS:HB3	1.99	0.44
1:A:228:GLN:HB2	1:A:236:ILE:HD12	1.98	0.44
1:A:116:VAL:HG12	1:A:117:GLY:O	2.18	0.44
1:A:116:VAL:O	1:A:146:ILE:HA	2.17	0.44
1:A:167:ASP:HA	1:A:194:HIS:HD1	1.83	0.44
1:A:88:PRO:HA	1:A:89:PRO:HD2	1.56	0.44
1:A:11:ILE:HG22	1:A:12:VAL:N	2.33	0.44
1:A:180:PHE:O	1:A:181:ASP:C	2.55	0.43
1:A:14:ILE:H	1:A:14:ILE:HD13	1.83	0.43
1:A:30:ASP:O	1:A:34:ARG:HG3	2.18	0.43
1:A:43:ALA:HB3	1:A:100:ALA:HA	2.01	0.43
1:A:101:VAL:O	1:A:102:PRO:C	2.57	0.43
1:A:241:VAL:HG12	1:A:242:ARG:N	2.33	0.43
1:A:29:ARG:NH2	1:A:84:LEU:HD11	2.34	0.43
1:A:234:VAL:HG23	1:A:234:VAL:O	2.18	0.43
1:A:247:ARG:O	1:A:251:GLN:HB2	2.19	0.43
1:A:201:VAL:CA	1:A:202:SER:C	2.88	0.42
1:A:40:LEU:O	1:A:93:SER:HA	2.19	0.42
1:A:43:ALA:CB	1:A:100:ALA:HA	2.50	0.42
1:A:239:VAL:HG11	1:A:252:ARG:NH1	2.35	0.42
1:A:277:VAL:O	1:A:281:VAL:HG23	2.20	0.42
1:A:229:GLU:C	1:A:231:TYR:H	2.23	0.41
1:A:20:ALA:O	1:A:21:GLN:C	2.55	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:43:ALA:HB1	1:A:98:ALA:O	2.20	0.41
1:A:182:GLU:HG2	1:A:258:LEU:HD23	2.01	0.41
1:A:193:LEU:C	1:A:193:LEU:CD2	2.89	0.41
2:A:1296:ATP:O2G	2:A:1296:ATP:O2B	2.38	0.41
1:A:32:GLU:OE2	1:A:84:LEU:O	2.39	0.41
1:A:130:GLY:O	1:A:131:SER:C	2.58	0.41
1:A:140:ALA:O	1:A:293:ARG:NH1	2.54	0.41
1:A:249:LEU:O	1:A:250:VAL:O	2.38	0.40

All (7) 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)
1:A:92:HIS:NE2	1:A:92:HIS:NE2[7_555]	0.31	1.89
1:A:92:HIS:CE1	1:A:92:HIS:NE2[7_555]	1.15	1.05
1:A:92:HIS:CD2	1:A:92:HIS:NE2[7_555]	1.38	0.82
1:A:92:HIS:CE1	1:A:92:HIS:CE1[7_555]	1.38	0.82
1:A:92:HIS:ND1	1:A:92:HIS:NE2[7_555]	1.94	0.26
1:A:92:HIS:CG	1:A:92:HIS:NE2[7_555]	2.06	0.14
1:A:92:HIS:CD2	1:A:92:HIS:CD2[7_555]	2.10	0.10

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	255/305 (84%)	198 (78%)	36 (14%)	21 (8%)	1 4

All (21) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	86	ALA
1	A	89	PRO

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Mol	Chain	Res	Type
1	A	125	PRO
1	A	200	ASP
1	A	201	VAL
1	A	202	SER
1	A	230	ARG
1	A	250	VAL
1	A	251	GLN
1	A	252	ARG
1	A	270	ALA
1	A	25	ARG
1	A	131	SER
1	A	174	LEU
1	A	206	GLY
1	A	229	GLU
1	A	88	PRO
1	A	44	VAL
1	A	87	GLY
1	A	188	VAL
1	A	12	VAL

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	203/241 (84%)	181 (89%)	22 (11%)	5 22

All (22) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	14	ILE
1	A	26	TRP
1	A	34	ARG
1	A	35	LYS
1	A	39	THR
1	A	84	LEU
1	A	90	THR

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Mol	Chain	Res	Type
1	A	114	MSE
1	A	125	PRO
1	A	128	LEU
1	A	146	ILE
1	A	147	ILE
1	A	186	ARG
1	A	189	ASP
1	A	202	SER
1	A	203	GLU
1	A	207	ILE
1	A	230	ARG
1	A	238	ARG
1	A	243	ASP
1	A	248	GLN
1	A	286	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	65	GLN
1	A	92	HIS
1	A	213	GLN
1	A	283	GLN

5.3.3 RNA (i)

There are no RNA molecules in this entry.

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 oligosaccharides in this entry.

5.6 Ligand geometry (i)

Of 4 ligands modelled in this entry, 2 are unknown - leaving 2 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	$\#\|Z\| > 2$
2	ATP	A	1296	-	26,33,33	0.93	1 (3%)	31,52,52	1.62	5 (16%)
2	ATP	A	1295	3,1	26,33,33	0.93	0	31,52,52	1.71	6 (19%)

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	ATP	A	1296	-	-	4/18/38/38	0/3/3/3
2	ATP	A	1295	3,1	-	8/18/38/38	0/3/3/3

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	1296	ATP	C5-C4	2.50	1.47	1.40

All (11) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	1295	ATP	PA-O3A-PB	-4.95	115.86	132.83
2	A	1295	ATP	C3'-C2'-C1'	3.60	106.40	100.98
2	A	1296	ATP	PB-O3B-PG	-3.60	120.48	132.83
2	A	1296	ATP	PA-O3A-PB	-3.58	120.53	132.83
2	A	1296	ATP	C3'-C2'-C1'	3.47	106.20	100.98
2	A	1296	ATP	N3-C2-N1	-3.16	123.74	128.68
2	A	1295	ATP	PB-O3B-PG	-3.05	122.36	132.83
2	A	1295	ATP	N3-C2-N1	-2.99	124.01	128.68
2	A	1295	ATP	C4-C5-N7	-2.80	106.48	109.40
2	A	1296	ATP	C4-C5-N7	-2.73	106.56	109.40
2	A	1295	ATP	O2A-PA-O1A	2.11	122.66	112.24

There are no chirality outliers.

All (12) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	1295	ATP	C5'-O5'-PA-O3A
2	A	1295	ATP	O4'-C4'-C5'-O5'
2	A	1296	ATP	C5'-O5'-PA-O2A
2	A	1295	ATP	C3'-C4'-C5'-O5'
2	A	1295	ATP	PG-O3B-PB-O1B
2	A	1295	ATP	PB-O3B-PG-O2G
2	A	1296	ATP	C5'-O5'-PA-O3A
2	A	1296	ATP	PG-O3B-PB-O2B
2	A	1295	ATP	C5'-O5'-PA-O1A
2	A	1296	ATP	C5'-O5'-PA-O1A
2	A	1295	ATP	PG-O3B-PB-O2B
2	A	1295	ATP	PB-O3B-PG-O3G

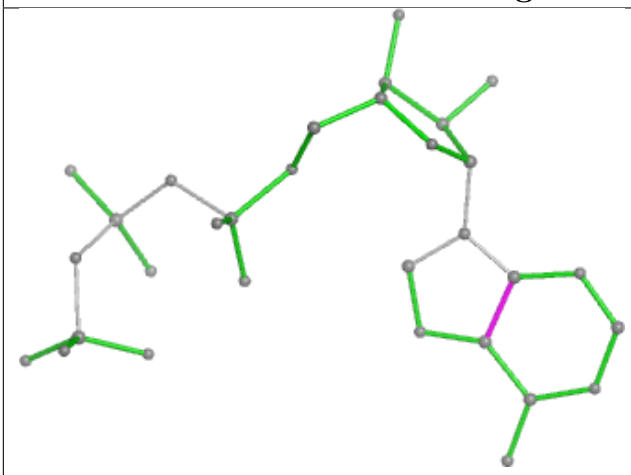
There are no ring outliers.

2 monomers are involved in 12 short contacts:

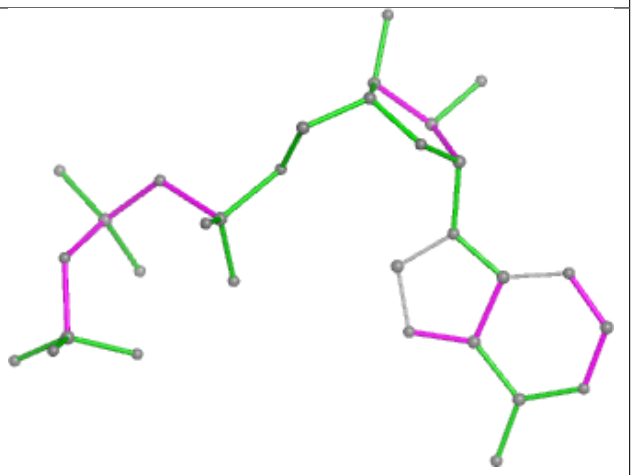
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	1296	ATP	10	0
2	A	1295	ATP	2	0

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 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.

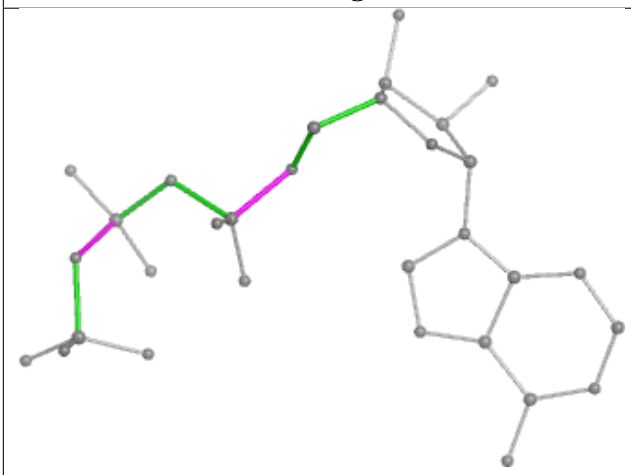
Ligand ATP A 1296



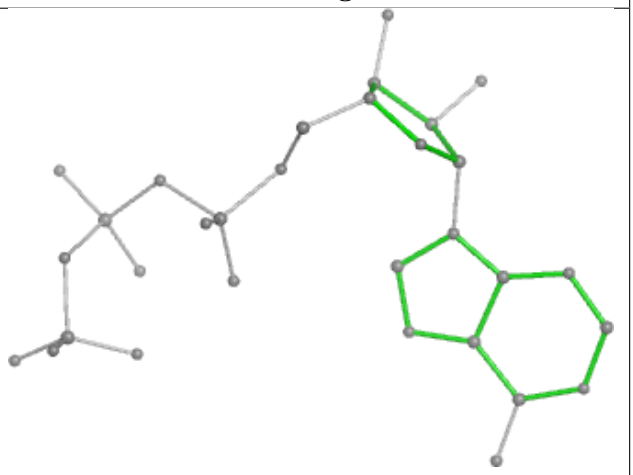
Bond lengths



Bond angles

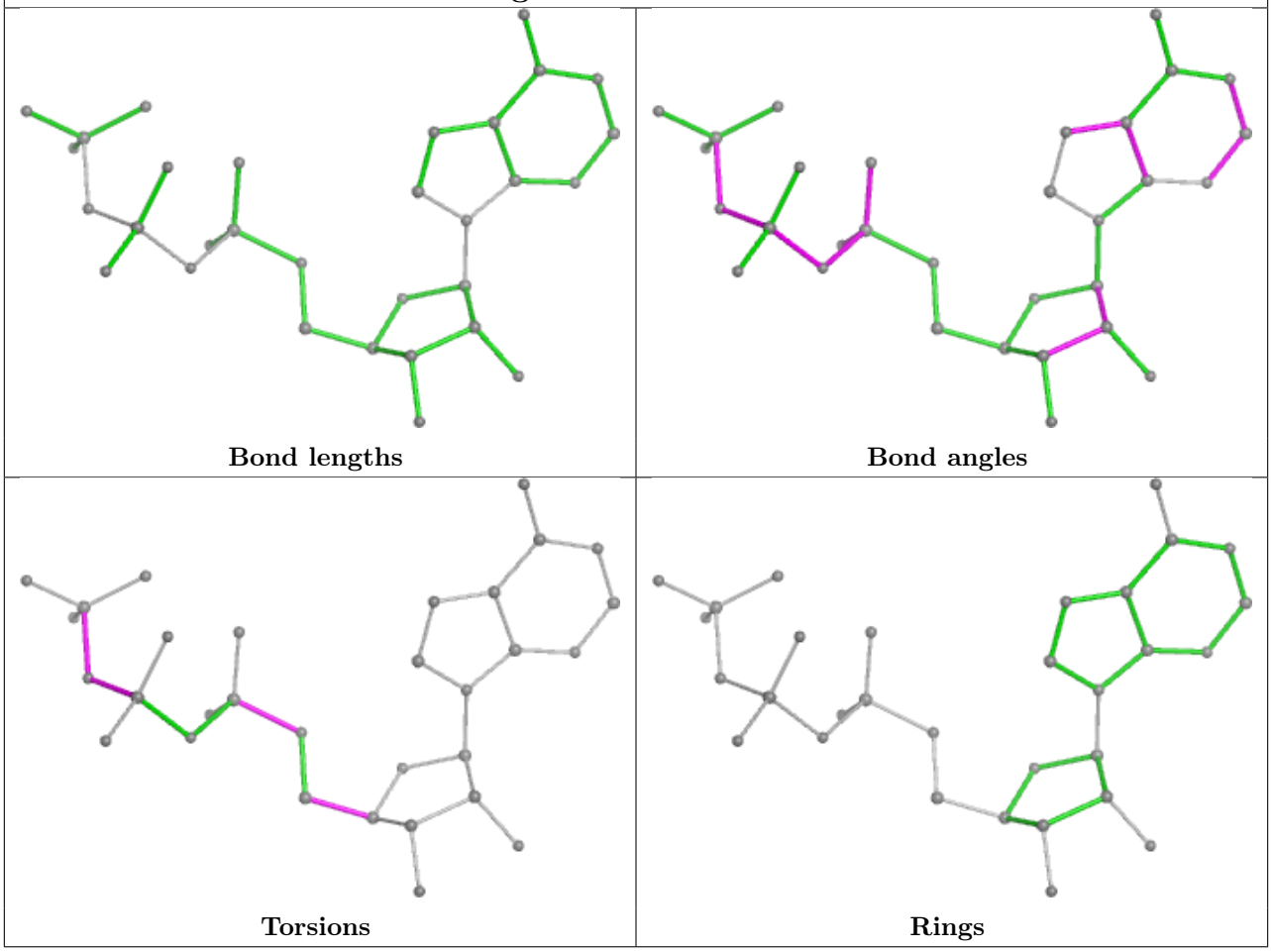


Torsions



Rings

Ligand ATP A 1295



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

EDS failed to run properly - this section is therefore empty.

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

EDS failed to run properly - this section is therefore empty.

6.3 Carbohydrates

EDS failed to run properly - this section is therefore empty.

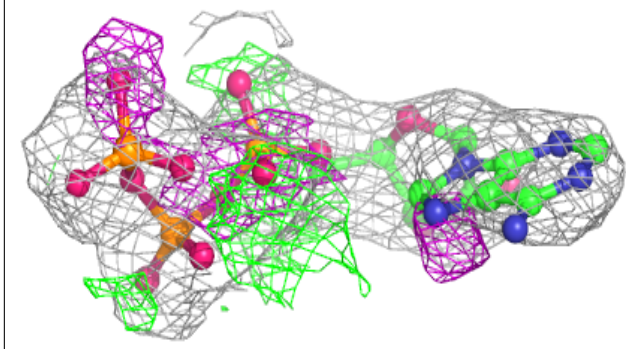
6.4 Ligands

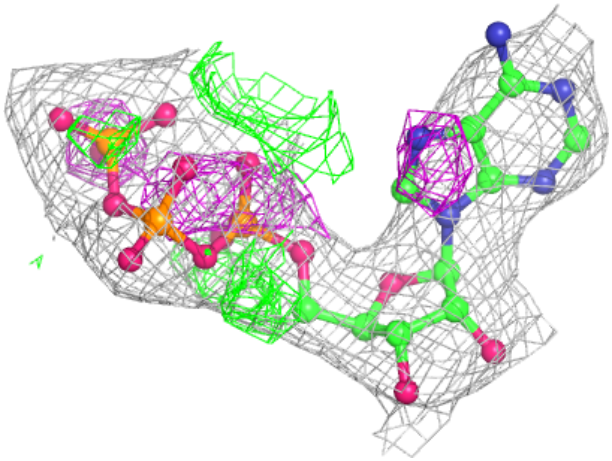
EDS failed to run properly - this section is therefore empty.

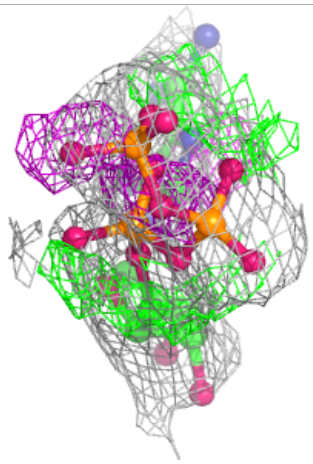
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around ATP A 1295:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

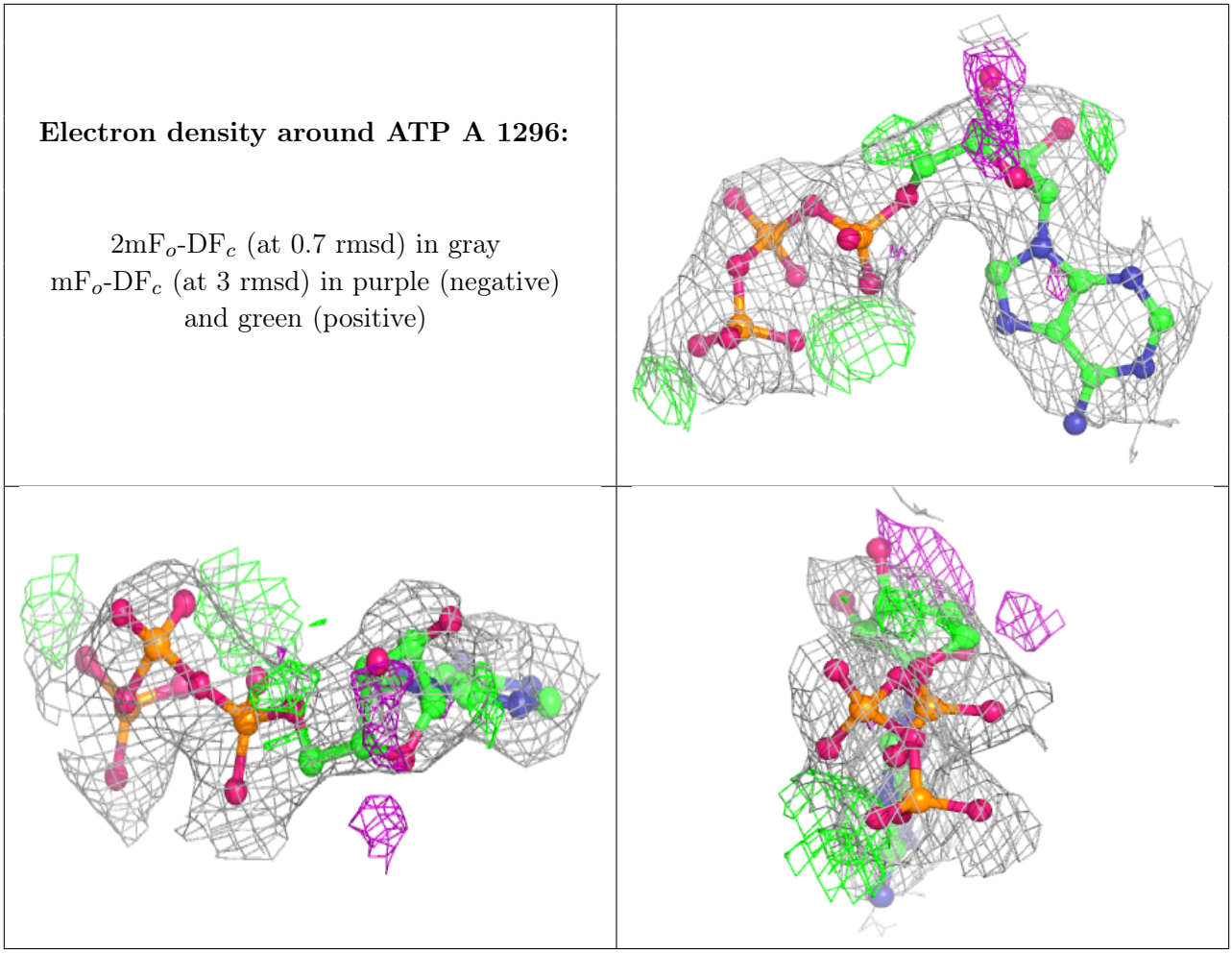






Electron density around ATP A 1296:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)



6.5 Other polymers

EDS failed to run properly - this section is therefore empty.