



Full wwPDB X-ray Structure Validation Report ⓘ

May 14, 2020 – 08:08 pm BST

PDB ID : 3OAC
Title : Mint deletion mutant of heterotetrameric geranyl pyrophosphate synthase in complex with ligands
Authors : Hsieh, F.-L.; Chang, T.-H.; Ko, T.-P.; Wang, A.H.-J.
Deposited on : 2010-08-05
Resolution : 2.60 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 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 : 2.11
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) : 2.11

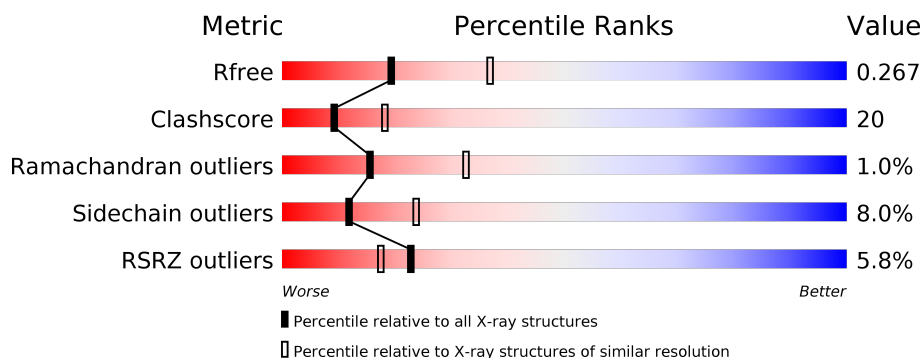
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.60 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	3163 (2.60-2.60)
Clashscore	141614	3518 (2.60-2.60)
Ramachandran outliers	138981	3455 (2.60-2.60)
Sidechain outliers	138945	3455 (2.60-2.60)
RSRZ outliers	127900	3104 (2.60-2.60)

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 ≥ 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	295	<div> <div>3%</div> <div> <div></div> <div>60%</div> <div>28%</div> <div>6%</div> <div>5%</div> </div> </div>
1	D	295	<div> <div>3%</div> <div> <div></div> <div>58%</div> <div>37%</div> <div>•</div> </div> </div>
2	B	264	<div> <div>8%</div> <div> <div></div> <div>63%</div> <div>28%</div> <div>•</div> <div>6%</div> </div> </div>
2	C	264	<div> <div>8%</div> <div> <div></div> <div>65%</div> <div>26%</div> <div>•</div> <div>6%</div> </div> </div>

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 crite-

ria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
4	DST	D	2002	-	-	X	-

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 8296 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 Geranyl diphosphate synthase large subunit.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	279	Total	C	N	O	S	0	0	0
			2120	1338	372	392	18			
1	D	295	Total	C	N	O	S	0	0	0
			2232	1406	391	417	18			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1	MET	-	EXPRESSION TAG	UNP Q9SBR3
D	1	MET	-	EXPRESSION TAG	UNP Q9SBR3

- Molecule 2 is a protein called Geranyl diphosphate synthase small subunit.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	248	Total	C	N	O	S	0	0	0
			1873	1184	324	352	13			
2	C	248	Total	C	N	O	S	0	0	0
			1873	1184	324	352	13			

There are 38 discrepancies between the modelled and reference sequences:

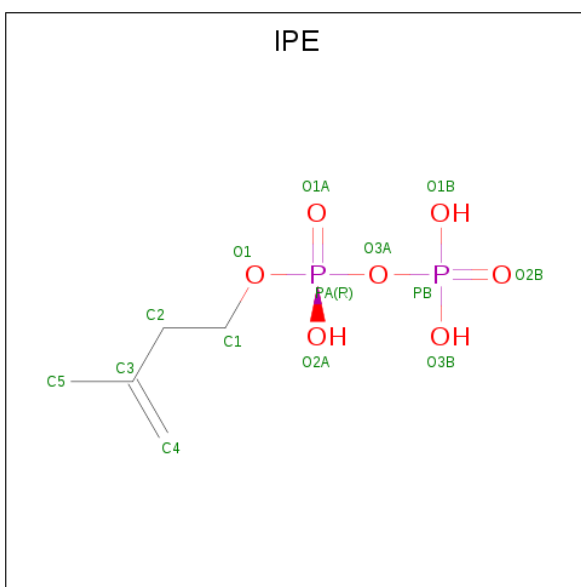
Chain	Residue	Modelled	Actual	Comment	Reference
B	1	MET	-	EXPRESSION TAG	UNP Q9SBR4
B	?	-	LEU	DELETION	UNP Q9SBR4
B	?	-	THR	DELETION	UNP Q9SBR4
B	?	-	ASP	DELETION	UNP Q9SBR4
B	?	-	GLY	DELETION	UNP Q9SBR4
B	?	-	SER	DELETION	UNP Q9SBR4
B	?	-	ARG	DELETION	UNP Q9SBR4
B	?	-	PRO	DELETION	UNP Q9SBR4
B	?	-	VAL	DELETION	UNP Q9SBR4
B	?	-	SER	DELETION	UNP Q9SBR4

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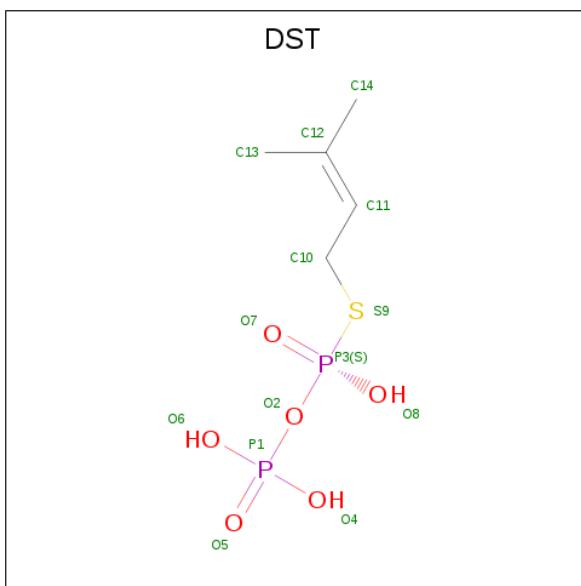
Chain	Residue	Modelled	Actual	Comment	Reference
B	?	-	LYS	DELETION	UNP Q9SBR4
B	267	HIS	-	EXPRESSION TAG	UNP Q9SBR4
B	268	HIS	-	EXPRESSION TAG	UNP Q9SBR4
B	269	HIS	-	EXPRESSION TAG	UNP Q9SBR4
B	270	HIS	-	EXPRESSION TAG	UNP Q9SBR4
B	271	HIS	-	EXPRESSION TAG	UNP Q9SBR4
B	272	HIS	-	EXPRESSION TAG	UNP Q9SBR4
B	273	HIS	-	EXPRESSION TAG	UNP Q9SBR4
B	274	HIS	-	EXPRESSION TAG	UNP Q9SBR4
C	1	MET	-	EXPRESSION TAG	UNP Q9SBR4
C	?	-	LEU	DELETION	UNP Q9SBR4
C	?	-	THR	DELETION	UNP Q9SBR4
C	?	-	ASP	DELETION	UNP Q9SBR4
C	?	-	GLY	DELETION	UNP Q9SBR4
C	?	-	SER	DELETION	UNP Q9SBR4
C	?	-	ARG	DELETION	UNP Q9SBR4
C	?	-	PRO	DELETION	UNP Q9SBR4
C	?	-	VAL	DELETION	UNP Q9SBR4
C	?	-	SER	DELETION	UNP Q9SBR4
C	?	-	LYS	DELETION	UNP Q9SBR4
C	267	HIS	-	EXPRESSION TAG	UNP Q9SBR4
C	268	HIS	-	EXPRESSION TAG	UNP Q9SBR4
C	269	HIS	-	EXPRESSION TAG	UNP Q9SBR4
C	270	HIS	-	EXPRESSION TAG	UNP Q9SBR4
C	271	HIS	-	EXPRESSION TAG	UNP Q9SBR4
C	272	HIS	-	EXPRESSION TAG	UNP Q9SBR4
C	273	HIS	-	EXPRESSION TAG	UNP Q9SBR4
C	274	HIS	-	EXPRESSION TAG	UNP Q9SBR4

- Molecule 3 is 3-METHYLBUT-3-ENYL TRIHYDROGEN DIPHOSPHATE (three-letter code: IPE) (formula: C₅H₁₂O₇P₂).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	D	1	Total	C	O	P	0	0
			14	5	7	2		

- Molecule 4 is DIMETHYLALLYL S-THIOLODIPHOSPHATE (three-letter code: DST) (formula: $C_5H_{12}O_6P_2S$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	D	1	Total	C	O	P	S	0	0
			14	5	6	2	1		

- Molecule 5 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	D	2	Total 2	Mg 2	0	0

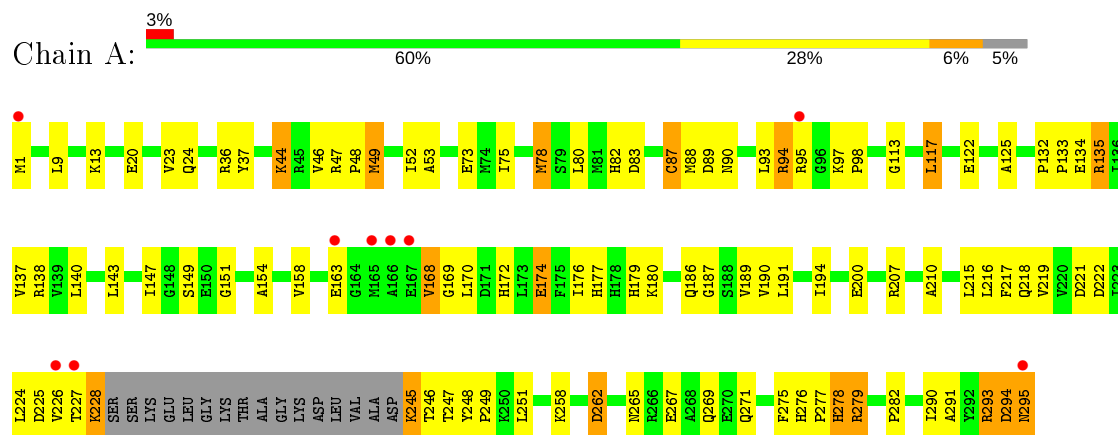
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	56	Total 56	O 56	0	0
6	B	34	Total 34	O 34	0	0
6	C	33	Total 33	O 33	0	0
6	D	45	Total 45	O 45	0	0

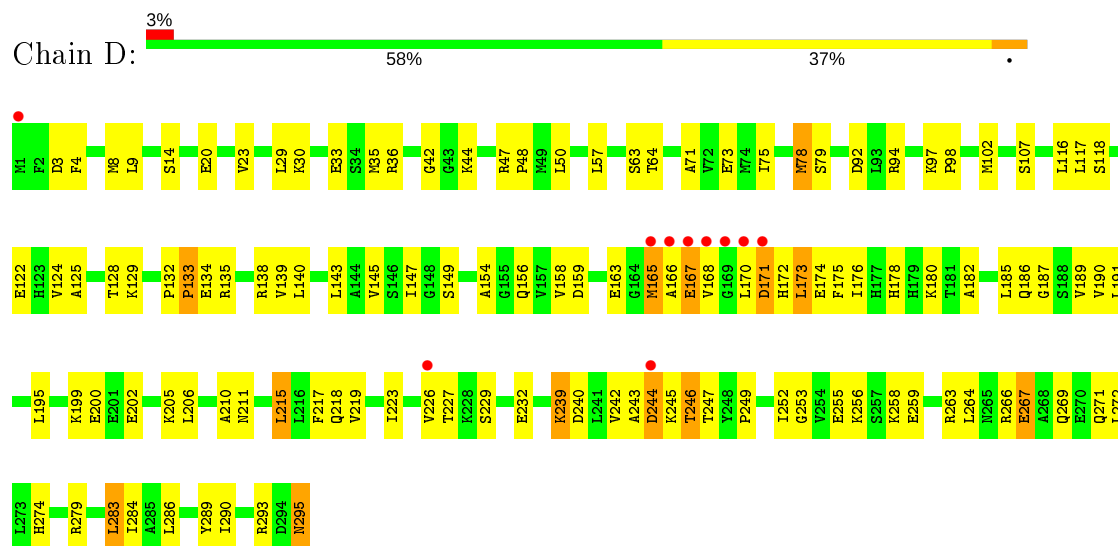
3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA 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.

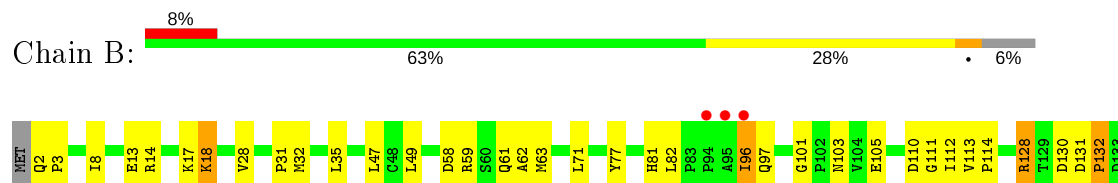
- Molecule 1: Geranyl diphosphate synthase large subunit

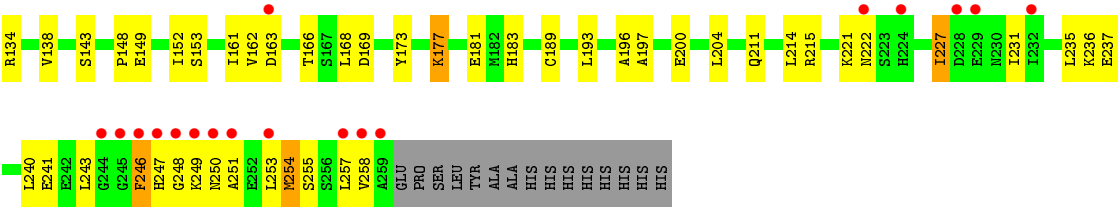


- Molecule 1: Geranyl diphosphate synthase large subunit

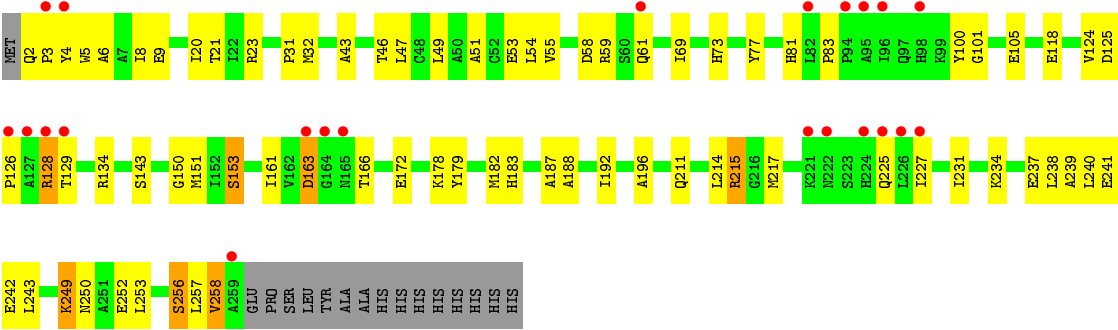


- Molecule 2: Geranyl diphosphate synthase small subunit





● Molecule 2: Geranyl diphosphate synthase small subunit



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	92.84Å 110.11Å 111.50Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	26.28 – 2.60 26.28 – 2.60	Depositor EDS
% Data completeness (in resolution range)	89.7 (26.28-2.60) 89.8 (26.28-2.60)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	4.95 (at 2.60Å)	Xtriage
Refinement program	CNS 1.1	Depositor
R, R_{free}	0.203 , 0.272 0.198 , 0.267	Depositor DCC
R_{free} test set	1596 reflections (4.97%)	wwPDB-VP
Wilson B-factor (Å ²)	38.8	Xtriage
Anisotropy	0.601	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 49.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.30$	Xtriage
Estimated twinning fraction	0.021 for -h,l,k	Xtriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	8296	wwPDB-VP
Average B, all atoms (Å ²)	42.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.12% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical 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

5.1 Standard geometry

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

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	0.91	1/2155 (0.0%)	0.93	2/2903 (0.1%)
1	D	0.87	1/2268 (0.0%)	0.93	4/3055 (0.1%)
2	B	0.85	0/1911	0.90	1/2585 (0.0%)
2	C	0.78	2/1911 (0.1%)	0.83	0/2585
All	All	0.85	4/8245 (0.0%)	0.90	7/11128 (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	D	0	1

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	134	GLU	CG-CD	6.58	1.61	1.51
1	A	87	CYS	CB-SG	-5.73	1.72	1.81
2	C	231	ILE	C-N	5.10	1.45	1.34
2	C	215	ARG	C-N	-5.07	1.24	1.33

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	172	HIS	N-CA-C	-7.62	90.44	111.00
2	B	254	MET	O-C-N	-7.20	111.18	122.70
1	D	94	ARG	O-C-N	6.66	133.35	122.70
1	D	283	LEU	CA-CB-CG	-5.71	102.18	115.30
1	A	47	ARG	NE-CZ-NH2	-5.27	117.67	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	94	ARG	CA-C-N	-5.16	105.85	117.20
1	A	47	ARG	NE-CZ-NH1	5.07	122.83	120.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	D	289	TYR	Sidechain

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	2120	0	2146	92	1
1	D	2232	0	2264	104	0
2	B	1873	0	1859	79	2
2	C	1873	0	1859	55	1
3	D	14	0	9	2	0
4	D	14	0	10	6	0
5	D	2	0	0	0	0
6	A	56	0	0	1	0
6	B	34	0	0	1	0
6	C	33	0	0	0	0
6	D	45	0	0	3	0
All	All	8296	0	8147	323	2

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 20.

All (323) 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)
2:B:168:LEU:HD13	2:B:231:ILE:CD1	1.69	1.22
2:B:168:LEU:CD1	2:B:231:ILE:HD11	1.82	1.08
2:B:168:LEU:HD13	2:B:231:ILE:HD11	1.08	1.05

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:8:ILE:HG23	2:B:49:LEU:HD12	1.33	1.05
2:B:250:ASN:O	2:B:254:MET:HB2	1.57	1.04
1:A:94:ARG:HB2	1:A:94:ARG:HH21	1.27	1.00
1:A:276:HIS:HB3	1:A:278:HIS:CD2	1.99	0.96
1:D:79:SER:HB2	4:D:2002:DST:H132	1.50	0.93
2:B:240:LEU:HD21	2:B:258:VAL:HG21	1.49	0.92
2:B:196:ALA:HB1	2:B:200:GLU:HG3	1.52	0.92
1:D:171:ASP:OD2	1:D:174:GLU:HB2	1.70	0.91
2:B:58:ASP:H	2:B:61:GLN:HE21	0.95	0.90
2:C:151:MET:HE2	2:C:182:MET:HG3	1.53	0.90
2:C:151:MET:HE2	2:C:182:MET:CG	2.05	0.87
2:B:240:LEU:HD21	2:B:258:VAL:CG2	2.04	0.86
1:D:187:GLY:O	1:D:191:LEU:HG	1.77	0.85
1:D:4:PHE:HB2	1:D:8:MET:HE2	1.59	0.82
2:C:8:ILE:HG22	2:C:46:THR:HG22	1.61	0.82
1:D:171:ASP:CG	1:D:174:GLU:HB2	2.02	0.80
1:A:80:LEU:HD22	1:A:94:ARG:HH11	1.48	0.78
2:B:249:LYS:NZ	2:B:253:LEU:HD22	1.98	0.78
1:A:276:HIS:HB3	1:A:278:HIS:HD2	1.47	0.78
1:D:252:ILE:HD12	1:D:256:LYS:HB3	1.66	0.78
1:A:133:PRO:O	1:A:137:VAL:HG23	1.84	0.78
2:B:58:ASP:N	2:B:61:GLN:HE21	1.78	0.77
1:A:277:PRO:HD2	1:A:278:HIS:CE1	2.19	0.77
2:B:240:LEU:CD2	2:B:258:VAL:HG21	2.14	0.77
1:A:97:LYS:HB2	1:A:98:PRO:HD2	1.66	0.77
1:D:199:LYS:N	1:D:202:GLU:OE1	2.17	0.76
2:C:58:ASP:O	2:C:61:GLN:HB2	1.86	0.75
1:D:180:LYS:HE3	4:D:2002:DST:S9	2.27	0.74
3:D:2001:IPE:H53	4:D:2002:DST:H101	1.71	0.73
1:D:269:GLN:OE1	1:D:284:ILE:HG23	1.88	0.73
2:B:196:ALA:HB1	2:B:200:GLU:CG	2.18	0.72
1:D:202:GLU:OE2	6:D:335:HOH:O	2.07	0.72
1:A:168:VAL:HG12	1:A:246:THR:CB	2.20	0.72
1:A:73:GLU:OE2	1:A:73:GLU:HA	1.88	0.72
2:C:249:LYS:HA	2:C:252:GLU:OE2	1.89	0.72
1:D:4:PHE:HB2	1:D:8:MET:CE	2.19	0.72
2:B:162:VAL:H	2:B:166:THR:CG2	2.02	0.71
1:A:122:GLU:HB2	2:B:143:SER:OG	1.91	0.71
1:D:293:ARG:HD2	1:D:295:ASN:O	1.90	0.71
1:D:168:VAL:HG11	1:D:246:THR:OG1	1.90	0.71
1:A:187:GLY:O	1:A:191:LEU:HG	1.91	0.71

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:293:ARG:HD2	1:A:295:ASN:O	1.91	0.70
1:A:83:ASP:HA	1:A:88:MET:HE2	1.73	0.70
1:D:79:SER:CB	4:D:2002:DST:H132	2.20	0.69
1:D:267:GLU:OE2	1:D:271:GLN:HG2	1.92	0.69
1:D:259:GLU:OE2	1:D:263:ARG:NH1	2.25	0.69
1:A:94:ARG:NH2	1:A:94:ARG:HB2	2.07	0.68
1:D:79:SER:HB2	4:D:2002:DST:C13	2.24	0.68
1:A:293:ARG:HH21	1:A:293:ARG:HG2	1.59	0.68
1:A:94:ARG:CB	1:A:94:ARG:HH21	2.03	0.67
1:A:94:ARG:HG3	1:A:95:ARG:HG3	1.76	0.67
1:A:83:ASP:OD2	1:A:89:ASP:OD2	2.13	0.67
1:A:168:VAL:HG22	1:A:169:GLY:N	2.10	0.66
1:D:252:ILE:HD12	1:D:256:LYS:CB	2.25	0.66
1:D:48:PRO:HG3	1:D:73:GLU:HB2	1.78	0.66
2:C:101:GLY:O	2:C:105:GLU:HG3	1.96	0.66
2:C:69:ILE:HG23	2:C:182:MET:HE1	1.78	0.65
1:A:93:LEU:HD23	1:A:98:PRO:HA	1.79	0.65
2:B:14:ARG:NH1	2:B:14:ARG:HB2	2.11	0.65
1:A:168:VAL:HG22	1:A:169:GLY:H	1.62	0.65
1:A:78:MET:HE1	1:A:82:HIS:CE1	2.32	0.65
1:D:64:THR:HG23	1:D:129:LYS:O	1.96	0.65
1:D:171:ASP:OD2	1:D:174:GLU:OE2	2.14	0.65
2:B:58:ASP:O	2:B:61:GLN:N	2.20	0.65
1:D:44:LYS:HE3	1:D:293:ARG:HH21	1.62	0.64
1:D:57:LEU:CD1	1:D:279:ARG:HB3	2.27	0.64
2:B:14:ARG:HB2	2:B:14:ARG:CZ	2.27	0.64
2:B:149:GLU:O	2:B:177:LYS:NZ	2.30	0.64
1:D:135:ARG:HG3	1:D:135:ARG:HH11	1.63	0.64
1:A:143:LEU:HD13	1:A:191:LEU:HD11	1.80	0.64
1:A:78:MET:HE3	1:A:113:GLY:O	1.97	0.64
1:D:57:LEU:HD12	1:D:279:ARG:HB3	1.77	0.64
2:B:58:ASP:H	2:B:61:GLN:NE2	1.80	0.64
2:C:143:SER:OG	1:D:122:GLU:HB2	1.98	0.63
1:D:159:ASP:HA	1:D:176:ILE:HD13	1.79	0.63
1:D:239:LYS:HA	1:D:242:VAL:HG22	1.79	0.63
2:B:128:ARG:HG2	2:B:128:ARG:HH11	1.63	0.63
2:B:62:ALA:HA	2:B:193:LEU:HD13	1.81	0.63
2:B:162:VAL:H	2:B:166:THR:HG23	1.62	0.62
1:D:243:ALA:O	1:D:245:LYS:N	2.32	0.62
2:C:8:ILE:HG23	2:C:49:LEU:HD12	1.81	0.62
1:A:276:HIS:ND1	1:A:278:HIS:NE2	2.44	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:97:LYS:HB2	1:A:98:PRO:CD	2.30	0.61
2:B:71:LEU:HD22	2:B:112:ILE:HG23	1.82	0.61
1:A:168:VAL:HG12	1:A:246:THR:HB	1.81	0.61
1:D:138:ARG:NH2	1:D:200:GLU:OE1	2.34	0.61
2:C:250:ASN:HA	2:C:253:LEU:HB2	1.83	0.60
1:A:87:CYS:O	2:B:103:ASN:HB3	2.01	0.60
1:D:135:ARG:HG3	1:D:135:ARG:NH1	2.16	0.60
1:D:215:LEU:HG	1:D:264:LEU:HD11	1.83	0.60
2:B:128:ARG:CG	2:B:128:ARG:HH11	2.14	0.60
1:D:165:MET:HB2	1:D:167:GLU:HG2	1.82	0.60
2:C:43:ALA:HB3	2:C:183:HIS:HE1	1.66	0.59
2:B:249:LYS:O	2:B:253:LEU:N	2.36	0.59
2:C:238:LEU:O	2:C:242:GLU:HG2	2.02	0.59
2:C:8:ILE:CG2	2:C:46:THR:HG22	2.31	0.59
2:B:149:GLU:OE1	6:B:296:HOH:O	2.15	0.59
1:A:75:ILE:HG21	1:A:147:ILE:HG21	1.84	0.59
2:B:18:LYS:C	2:B:18:LYS:HD2	2.22	0.59
1:A:168:VAL:HG12	1:A:246:THR:OG1	2.04	0.58
1:A:207:ARG:HG3	1:A:207:ARG:HH11	1.67	0.58
1:A:80:LEU:HD13	1:A:94:ARG:HE	1.68	0.58
1:D:166:ALA:HA	1:D:244:ASP:OD1	2.03	0.57
1:A:168:VAL:HG21	1:A:172:HIS:CD2	2.39	0.57
1:D:75:ILE:O	1:D:78:MET:HG3	2.04	0.57
2:B:183:HIS:HD2	2:B:211:GLN:OE1	1.87	0.57
2:B:249:LYS:HZ2	2:B:253:LEU:HD22	1.70	0.57
1:D:3:ASP:OD2	6:D:315:HOH:O	2.18	0.57
2:B:138:VAL:HG13	2:B:189:CYS:SG	2.44	0.57
1:D:158:VAL:HG21	1:D:175:PHE:CE1	2.40	0.57
2:B:101:GLY:O	2:B:105:GLU:HG3	2.05	0.56
1:D:97:LYS:HB2	1:D:98:PRO:CD	2.36	0.56
1:A:246:THR:CG2	1:A:251:LEU:HD11	2.35	0.56
1:A:265:ASN:O	1:A:269:GLN:HG3	2.06	0.55
2:B:161:ILE:HA	2:B:166:THR:HG21	1.87	0.55
1:A:222:ASP:OD2	1:A:247:THR:HB	2.07	0.55
2:B:249:LYS:HG2	2:B:249:LYS:O	2.05	0.55
2:B:173:TYR:CE2	1:D:29:LEU:HD11	2.42	0.55
2:C:151:MET:CE	2:C:182:MET:HG3	2.32	0.55
1:D:165:MET:SD	1:D:165:MET:N	2.80	0.54
1:D:143:LEU:HD13	1:D:191:LEU:HD11	1.89	0.54
1:D:158:VAL:HG12	1:D:176:ILE:HD11	1.88	0.54
2:C:69:ILE:HG23	2:C:182:MET:CE	2.36	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:225:ASP:O	1:A:228:LYS:HD2	2.06	0.54
2:B:58:ASP:HB3	2:B:61:GLN:HG3	1.89	0.54
1:D:186:GLN:O	1:D:190:VAL:HG23	2.08	0.54
1:A:294:ASP:N	1:A:294:ASP:OD2	2.34	0.53
2:C:172:GLU:HG3	2:C:217:MET:CE	2.39	0.53
1:D:128:THR:O	1:D:129:LYS:HD3	2.08	0.53
1:D:156:GLN:OE1	1:D:156:GLN:HA	2.08	0.53
1:D:215:LEU:HG	1:D:264:LEU:CD1	2.38	0.53
1:A:170:LEU:O	1:A:170:LEU:HG	2.08	0.53
1:D:215:LEU:O	1:D:215:LEU:HD12	2.09	0.53
1:A:176:ILE:O	1:A:180:LYS:HB2	2.07	0.53
1:A:80:LEU:HB3	1:A:94:ARG:NE	2.24	0.53
1:A:125:ALA:HB2	1:A:140:LEU:HD11	1.90	0.53
1:A:94:ARG:CG	1:A:95:ARG:HG3	2.38	0.53
2:B:196:ALA:HB1	2:B:200:GLU:CD	2.28	0.53
1:D:132:PRO:O	1:D:135:ARG:N	2.40	0.53
2:C:240:LEU:C	2:C:242:GLU:N	2.62	0.53
2:B:211:GLN:NE2	2:B:257:LEU:HD23	2.23	0.53
2:B:8:ILE:HG23	2:B:49:LEU:CD1	2.23	0.53
1:A:95:ARG:NH1	6:A:304:HOH:O	2.42	0.52
2:B:162:VAL:H	2:B:166:THR:HG21	1.70	0.52
2:C:54:LEU:O	2:C:54:LEU:HG	2.08	0.52
1:A:207:ARG:HG3	1:A:207:ARG:NH1	2.24	0.52
2:B:236:LYS:HE3	2:B:258:VAL:O	2.08	0.52
1:D:171:ASP:OD2	1:D:174:GLU:CB	2.52	0.52
2:C:239:ALA:O	2:C:242:GLU:HB2	2.09	0.52
2:C:43:ALA:O	2:C:47:LEU:HB2	2.10	0.52
1:D:266:ARG:NH1	1:D:266:ARG:HG3	2.23	0.52
1:A:219:VAL:HG22	1:A:248:TYR:CE2	2.45	0.52
2:C:151:MET:CE	2:C:182:MET:CG	2.85	0.52
2:C:53:GLU:OE2	2:C:59:ARG:HB2	2.10	0.52
2:B:113:VAL:HB	2:B:114:PRO:HD3	1.92	0.52
2:B:13:GLU:OE2	2:B:17:LYS:NZ	2.36	0.52
1:D:266:ARG:HH11	1:D:266:ARG:HG3	1.74	0.52
2:B:248:GLY:O	2:B:251:ALA:HB3	2.10	0.52
2:C:237:GLU:O	2:C:241:GLU:HG3	2.10	0.51
2:C:47:LEU:HD23	2:C:187:ALA:HB2	1.92	0.51
2:B:240:LEU:HD21	2:B:258:VAL:HG23	1.87	0.51
2:C:151:MET:HE2	2:C:182:MET:HG2	1.85	0.51
1:D:168:VAL:HG21	1:D:246:THR:OG1	2.10	0.51
1:D:295:ASN:C	1:D:295:ASN:HD22	2.14	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:82:HIS:ND1	2:B:110:ASP:OD2	2.38	0.51
1:A:279:ARG:NH1	1:A:279:ARG:HG3	2.26	0.51
1:A:78:MET:CE	1:A:82:HIS:CE1	2.93	0.51
1:A:267:GLU:O	1:A:271:GLN:HG2	2.11	0.51
1:D:186:GLN:HA	1:D:210:ALA:CB	2.41	0.51
1:A:132:PRO:HG2	1:A:135:ARG:HB2	1.93	0.50
1:A:44:LYS:HB2	1:A:46:VAL:HG23	1.92	0.50
2:C:188:ALA:O	2:C:192:ILE:HG13	2.11	0.50
1:D:159:ASP:HA	1:D:176:ILE:CD1	2.40	0.50
1:A:217:PHE:HD1	1:A:290:ILE:HG23	1.77	0.50
2:B:249:LYS:HZ3	2:B:253:LEU:HD22	1.75	0.50
1:D:178:HIS:HE1	1:D:186:GLN:NE2	2.09	0.50
1:D:71:ALA:HB2	1:D:124:VAL:HG23	1.92	0.50
1:D:75:ILE:HG21	1:D:147:ILE:HG21	1.93	0.50
1:A:149:SER:O	1:A:154:ALA:HB2	2.12	0.50
2:B:96:ILE:HG22	2:B:97:GLN:H	1.77	0.49
1:D:163:GLU:HG3	1:D:244:ASP:O	2.12	0.49
1:D:182:ALA:O	1:D:186:GLN:HG3	2.11	0.49
1:A:158:VAL:O	1:A:158:VAL:HG12	2.12	0.49
1:A:75:ILE:HG21	1:A:147:ILE:CG2	2.42	0.49
1:A:80:LEU:HD22	1:A:94:ARG:NH1	2.24	0.49
2:B:221:LYS:HG3	2:B:227:ILE:CD1	2.42	0.49
1:A:177:HIS:ND1	1:A:218:GLN:HG3	2.28	0.49
1:A:122:GLU:CB	2:B:143:SER:OG	2.60	0.49
1:A:279:ARG:HH11	1:A:279:ARG:HG3	1.78	0.49
2:B:131:ASP:HB2	2:B:132:PRO:HD3	1.95	0.49
2:B:237:GLU:O	2:B:241:GLU:HG3	2.13	0.49
1:D:44:LYS:HE3	1:D:293:ARG:NH2	2.26	0.49
1:A:20:GLU:O	1:A:24:GLN:NE2	2.45	0.49
1:A:267:GLU:OE2	1:A:271:GLN:NE2	2.46	0.48
1:A:276:HIS:CB	1:A:278:HIS:CD2	2.86	0.48
2:C:178:LYS:HD3	2:C:179:TYR:CE1	2.47	0.48
2:C:21:THR:O	2:C:23:ARG:NH1	2.46	0.48
1:D:139:VAL:HG21	1:D:195:LEU:HG	1.94	0.48
1:A:275:PHE:CD1	1:A:275:PHE:N	2.81	0.48
2:B:58:ASP:O	2:B:59:ARG:C	2.51	0.48
2:C:43:ALA:HB3	2:C:183:HIS:CE1	2.47	0.48
2:C:20:ILE:HG23	2:C:32:MET:CE	2.44	0.48
1:D:240:ASP:OD2	1:D:247:THR:HG21	2.13	0.48
1:D:97:LYS:HB2	1:D:98:PRO:HD2	1.96	0.48
1:D:180:LYS:HG2	4:D:2002:DST:H142	1.95	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:272:LEU:C	1:D:274:HIS:N	2.67	0.47
1:D:173:LEU:HG	1:D:173:LEU:O	2.11	0.47
2:B:247:HIS:HA	2:B:251:ALA:CB	2.44	0.47
2:B:63:MET:CA	2:B:63:MET:HE2	2.45	0.47
1:A:293:ARG:HD2	1:A:295:ASN:C	2.34	0.47
2:B:215:ARG:HH11	2:B:215:ARG:HG3	1.79	0.47
2:B:243:LEU:CD1	2:B:254:MET:HB3	2.45	0.47
1:A:80:LEU:HB3	1:A:94:ARG:HE	1.78	0.47
1:A:226:VAL:HG12	1:A:227:THR:N	2.29	0.47
2:C:172:GLU:HG3	2:C:217:MET:HE1	1.96	0.47
2:C:55:VAL:HG11	2:C:196:ALA:HB2	1.97	0.47
1:D:189:VAL:CG1	1:D:206:LEU:HB3	2.44	0.47
1:A:215:LEU:HD12	1:A:215:LEU:HA	1.64	0.46
2:C:118:GLU:HG3	1:D:145:VAL:HG23	1.96	0.46
2:C:125:ASP:OD2	2:C:128:ARG:HG2	2.16	0.46
1:D:249:PRO:O	1:D:253:GLY:N	2.49	0.46
2:C:59:ARG:CZ	2:C:59:ARG:HB2	2.46	0.46
2:C:51:ALA:O	2:C:55:VAL:HG22	2.16	0.46
2:B:211:GLN:HE21	2:B:257:LEU:HD23	1.80	0.45
2:C:77:TYR:O	2:C:81:HIS:CD2	2.69	0.45
1:D:50:LEU:HA	1:D:50:LEU:HD23	1.69	0.45
1:D:272:LEU:C	1:D:274:HIS:H	2.20	0.45
1:A:75:ILE:HD12	1:A:117:LEU:HD13	1.97	0.45
1:D:217:PHE:CD1	1:D:290:ILE:HG23	2.52	0.45
2:B:28:VAL:O	2:B:31:PRO:HD2	2.17	0.45
2:C:240:LEU:HD21	2:C:258:VAL:HG22	1.98	0.45
2:C:31:PRO:HG3	2:C:100:TYR:CE1	2.52	0.45
2:C:253:LEU:HA	2:C:256:SER:OG	2.17	0.45
1:A:248:TYR:HB2	1:A:249:PRO:HD3	1.99	0.44
1:A:258:LYS:O	1:A:262:ASP:OD2	2.35	0.44
1:A:49:MET:CE	1:A:53:ALA:HB2	2.47	0.44
2:C:161:ILE:HA	2:C:166:THR:HG21	1.99	0.44
2:C:240:LEU:C	2:C:242:GLU:H	2.21	0.44
2:B:111:GLY:C	2:B:114:PRO:HD2	2.37	0.44
2:C:2:GLN:HB3	2:C:5:TRP:HD1	1.83	0.44
1:D:23:VAL:O	1:D:36:ARG:NH1	2.46	0.44
1:D:267:GLU:CD	1:D:267:GLU:O	2.56	0.44
1:D:47:ARG:HB2	1:D:48:PRO:HD3	2.00	0.44
1:A:89:ASP:O	1:A:90:ASN:HB3	2.18	0.44
2:C:225:GLN:C	2:C:227:ILE:H	2.21	0.44
1:A:168:VAL:CG2	1:A:169:GLY:N	2.80	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:48:PRO:HG3	1:A:73:GLU:HB2	1.99	0.44
1:D:286:LEU:HA	1:D:286:LEU:HD23	1.87	0.44
2:B:236:LYS:O	2:B:240:LEU:HG	2.18	0.44
2:C:234:LYS:HB3	2:C:234:LYS:HE2	1.76	0.44
2:C:124:VAL:O	2:C:126:PRO:HD3	2.18	0.43
2:C:6:ALA:O	2:C:9:GLU:HB3	2.18	0.43
1:D:29:LEU:O	1:D:33:GLU:HB2	2.18	0.43
2:C:21:THR:H	2:C:23:ARG:HH12	1.66	0.43
1:D:223:ILE:HD13	1:D:258:LYS:HG2	2.00	0.43
1:A:37:TYR:CZ	1:A:97:LYS:HE3	2.54	0.43
2:B:227:ILE:O	2:B:227:ILE:HD12	2.18	0.43
2:B:8:ILE:CG2	2:B:49:LEU:HD12	2.23	0.43
1:D:57:LEU:HD22	1:D:283:LEU:HD12	1.99	0.43
2:B:253:LEU:HD12	2:B:253:LEU:HA	1.56	0.43
2:C:59:ARG:NH1	2:C:59:ARG:HB2	2.33	0.43
1:D:139:VAL:HG13	1:D:191:LEU:HD22	2.00	0.43
1:D:219:VAL:O	1:D:223:ILE:HG13	2.19	0.43
1:D:283:LEU:HD23	1:D:283:LEU:HA	1.52	0.43
1:A:186:GLN:HA	1:A:210:ALA:CB	2.48	0.43
2:B:235:LEU:HA	2:B:235:LEU:HD23	1.78	0.43
2:B:197:ALA:O	2:B:200:GLU:HG2	2.19	0.43
2:B:14:ARG:CG	2:B:14:ARG:HH11	2.31	0.43
1:D:279:ARG:HH11	1:D:279:ARG:CG	2.32	0.43
2:B:148:PRO:HA	2:B:152:ILE:HB	2.01	0.43
1:D:149:SER:O	1:D:154:ALA:HB2	2.19	0.43
1:A:245:LYS:NZ	1:A:245:LYS:HB3	2.33	0.42
1:A:49:MET:HE2	1:A:53:ALA:HB2	2.00	0.42
1:A:177:HIS:CG	1:A:218:GLN:HG3	2.54	0.42
1:A:279:ARG:O	1:A:282:PRO:HD2	2.18	0.42
1:A:23:VAL:O	1:A:36:ARG:NH1	2.46	0.42
2:C:150:GLY:O	2:C:153:SER:HB2	2.20	0.42
2:C:257:LEU:HD12	2:C:257:LEU:HA	1.57	0.42
1:A:151:GLY:O	1:A:179:HIS:HB3	2.20	0.42
1:D:78:MET:HB2	1:D:78:MET:HE3	1.86	0.42
2:B:2:GLN:N	2:B:3:PRO:CD	2.83	0.42
1:D:186:GLN:NE2	1:D:211:ASN:HB2	2.34	0.42
1:D:226:VAL:O	1:D:227:THR:HG23	2.19	0.42
1:D:226:VAL:HG23	1:D:226:VAL:O	2.20	0.42
2:B:162:VAL:N	2:B:166:THR:HG21	2.35	0.42
1:A:132:PRO:HA	1:A:133:PRO:HD3	1.92	0.42
1:A:48:PRO:O	1:A:52:ILE:HD12	2.20	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:168:LEU:HD13	2:B:231:ILE:HD13	1.86	0.42
1:A:246:THR:HG21	1:A:251:LEU:HD11	2.02	0.41
2:B:77:TYR:CE1	2:B:81:HIS:CE1	3.08	0.41
2:C:20:ILE:HG23	2:C:32:MET:HE3	2.02	0.41
1:D:92:ASP:OD2	1:D:102:MET:HE2	2.20	0.41
1:D:255:GLU:HB2	6:D:316:HOH:O	2.19	0.41
2:B:240:LEU:O	2:B:241:GLU:C	2.56	0.41
2:B:35:LEU:HD23	2:B:35:LEU:HA	1.75	0.41
1:D:117:LEU:HD12	1:D:117:LEU:O	2.20	0.41
1:D:132:PRO:HA	1:D:133:PRO:HD3	1.92	0.41
1:D:229:SER:OG	1:D:232:GLU:HG3	2.21	0.41
1:D:218:GLN:OE1	3:D:2001:IPE:H51	2.20	0.41
1:D:78:MET:O	1:D:78:MET:HE2	2.21	0.41
1:A:37:TYR:CE1	1:A:97:LYS:HE3	2.56	0.41
2:B:162:VAL:N	2:B:166:THR:CG2	2.78	0.41
1:A:216:LEU:HD21	1:A:291:ALA:HB2	2.01	0.41
1:A:190:VAL:CG1	1:A:194:ILE:HD12	2.51	0.41
2:C:58:ASP:O	2:C:61:GLN:N	2.41	0.41
1:A:224:LEU:O	1:A:225:ASP:C	2.59	0.41
2:B:169:ASP:CG	1:D:36:ARG:HE	2.25	0.41
1:D:132:PRO:HG2	1:D:135:ARG:HB2	2.02	0.41
2:B:204:LEU:HA	2:B:204:LEU:HD23	1.90	0.41
1:D:35:MET:HG2	1:D:116:LEU:HG	2.03	0.41
1:A:222:ASP:CG	1:A:247:THR:HB	2.41	0.40
1:D:264:LEU:HA	1:D:264:LEU:HD23	1.83	0.40
1:D:30:LYS:HD2	1:D:30:LYS:HA	1.84	0.40
2:C:3:PRO:HG2	2:C:4:TYR:H	1.86	0.40
1:D:159:ASP:CA	1:D:176:ILE:HD13	2.48	0.40
1:D:205:LYS:HD3	1:D:205:LYS:HA	1.87	0.40
2:B:246:PHE:O	2:B:247:HIS:CG	2.75	0.40
2:C:172:GLU:HG3	2:C:217:MET:HE3	2.02	0.40
1:D:125:ALA:HB2	1:D:140:LEU:HD11	2.02	0.40
1:A:90:ASN:CG	1:A:90:ASN:O	2.58	0.40

All (2) 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)
2:B:97:GLN:NE2	2:C:243:LEU:O[2_555]	2.04	0.16
1:A:174:GLU:OE1	2:B:247:HIS:O[3_545]	2.14	0.06

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	275/295 (93%)	270 (98%)	5 (2%)	0	100	100
1	D	293/295 (99%)	280 (96%)	10 (3%)	3 (1%)	15	32
2	B	246/264 (93%)	230 (94%)	10 (4%)	6 (2%)	6	10
2	C	246/264 (93%)	227 (92%)	17 (7%)	2 (1%)	19	39
All	All	1060/1118 (95%)	1007 (95%)	42 (4%)	11 (1%)	15	32

All (11) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	163	ASP
2	C	163	ASP
2	B	227	ILE
1	D	244	ASP
2	C	83	PRO
2	B	222	ASN
2	B	255	SER
1	D	42	GLY
2	B	96	ILE
2	B	132	PRO
1	D	133	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	222/234 (95%)	197 (89%)	25 (11%)	6	10
1	D	234/234 (100%)	216 (92%)	18 (8%)	13	25
2	B	191/205 (93%)	179 (94%)	12 (6%)	18	36
2	C	191/205 (93%)	179 (94%)	12 (6%)	18	36
All	All	838/878 (95%)	771 (92%)	67 (8%)	12	24

All (67) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	1	MET
1	A	9	LEU
1	A	13	LYS
1	A	44	LYS
1	A	49	MET
1	A	78	MET
1	A	94	ARG
1	A	117	LEU
1	A	134	GLU
1	A	135	ARG
1	A	138	ARG
1	A	163	GLU
1	A	168	VAL
1	A	174	GLU
1	A	189	VAL
1	A	200	GLU
1	A	221	ASP
1	A	228	LYS
1	A	245	LYS
1	A	262	ASP
1	A	278	HIS
1	A	279	ARG
1	A	293	ARG
1	A	294	ASP
1	A	295	ASN
2	B	18	LYS
2	B	32	MET
2	B	47	LEU
2	B	82	LEU
2	B	128	ARG
2	B	130	ASP
2	B	134	ARG
2	B	153	SER

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Mol	Chain	Res	Type
2	B	177	LYS
2	B	181	GLU
2	B	214	LEU
2	B	246	PHE
2	C	73	HIS
2	C	128	ARG
2	C	129	THR
2	C	134	ARG
2	C	153	SER
2	C	163	ASP
2	C	211	GLN
2	C	214	LEU
2	C	215	ARG
2	C	249	LYS
2	C	256	SER
2	C	258	VAL
1	D	9	LEU
1	D	14	SER
1	D	20	GLU
1	D	63	SER
1	D	78	MET
1	D	107	SER
1	D	118	SER
1	D	165	MET
1	D	167	GLU
1	D	170	LEU
1	D	171	ASP
1	D	173	LEU
1	D	185	LEU
1	D	215	LEU
1	D	239	LYS
1	D	246	THR
1	D	267	GLU
1	D	295	ASN

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (12) such sidechains are listed below:

Mol	Chain	Res	Type
2	B	61	GLN
2	B	183	HIS
2	B	222	ASN
2	B	247	HIS

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Mol	Chain	Res	Type
2	C	183	HIS
2	C	206	ASN
2	C	225	GLN
2	C	230	ASN
1	D	186	GLN
1	D	265	ASN
1	D	288	ASN
1	D	295	ASN

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 carbohydrates in this entry.

5.6 Ligand geometry [i](#)

Of 4 ligands modelled in this entry, 2 are monoatomic - 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	$\# Z > 2$
3	IPE	D	2001	-	11,13,13	3.14	2 (18%)	15,19,19	1.82	4 (26%)
4	DST	D	2002	5	9,13,13	1.36	1 (11%)	11,19,19	2.71	4 (36%)

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
3	IPE	D	2001	-	-	3/13/13/13	-
4	DST	D	2002	5	-	0/7/13/13	-

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	D	2001	IPE	C4-C3	7.52	1.54	1.33
3	D	2001	IPE	C2-C3	-6.88	1.38	1.51
4	D	2002	DST	C10-S9	-2.35	1.81	1.84

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	D	2002	DST	O8-P3-O7	6.33	125.14	109.82
3	D	2001	IPE	O1B-PB-O3A	4.89	121.03	104.64
4	D	2002	DST	O4-P1-O2	4.53	119.81	104.64
4	D	2002	DST	O6-P1-O2	2.64	113.48	104.64
3	D	2001	IPE	O3B-PB-O1B	-2.50	98.07	107.64
3	D	2001	IPE	C5-C3-C4	-2.43	116.63	121.98
4	D	2002	DST	O6-P1-O4	-2.32	98.76	107.64
3	D	2001	IPE	O3B-PB-O2B	-2.03	102.73	110.68

There are no chirality outliers.

All (3) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	D	2001	IPE	O1-C1-C2-C3
3	D	2001	IPE	PB-O3A-PA-O2A
3	D	2001	IPE	PB-O3A-PA-O1A

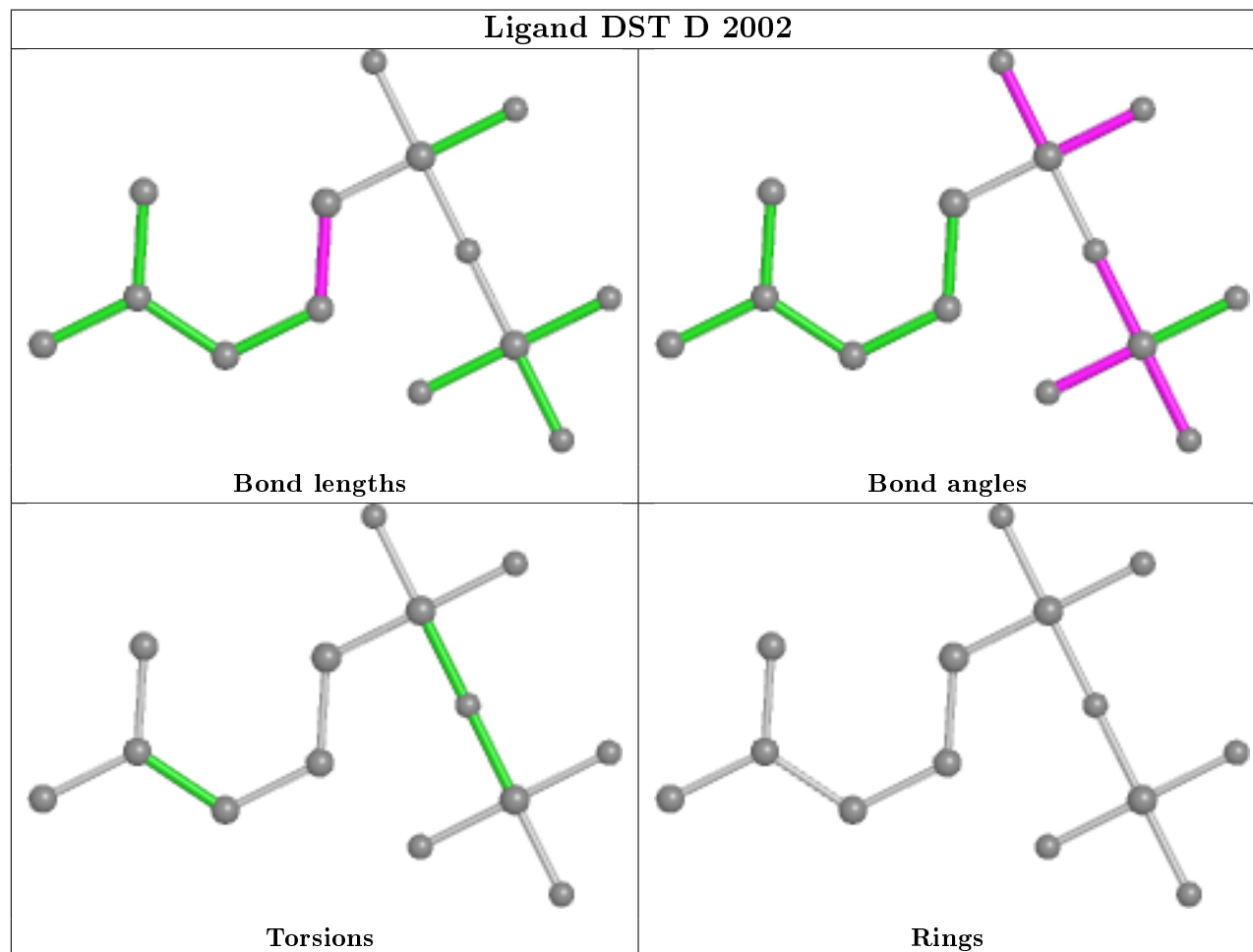
There are no ring outliers.

2 monomers are involved in 7 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	D	2001	IPE	2	0
4	D	2002	DST	6	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](#)

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, 95th 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	279/295 (94%)	-0.31	9 (3%) 47 40	18, 33, 58, 84	0
1	D	295/295 (100%)	-0.17	10 (3%) 45 38	18, 36, 67, 99	0
2	B	248/264 (93%)	0.18	21 (8%) 10 7	23, 38, 98, 123	0
2	C	248/264 (93%)	0.13	22 (8%) 9 6	24, 45, 77, 83	0
All	All	1070/1118 (95%)	-0.06	62 (5%) 23 17	18, 37, 77, 123	0

All (62) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	259	ALA	12.1
1	D	168	VAL	8.7
2	B	250	ASN	8.1
2	C	226	LEU	7.8
1	A	166	ALA	7.3
1	D	171	ASP	7.1
2	B	95	ALA	7.0
2	B	251	ALA	6.7
2	C	94	PRO	6.5
2	C	127	ALA	5.9
2	B	257	LEU	5.5
2	C	227	ILE	5.2
1	A	1	MET	5.0
2	C	95	ALA	4.9
2	C	96	ILE	4.7
2	C	225	GLN	4.6
2	B	94	PRO	4.4
2	B	96	ILE	4.2
2	B	222	ASN	4.2
2	B	246	PHE	4.2
1	D	1	MET	4.2

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Mol	Chain	Res	Type	RSRZ
2	B	249	LYS	4.1
2	B	247	HIS	4.1
1	A	165	MET	3.8
2	C	221	LYS	3.8
2	B	258	VAL	3.7
1	D	170	LEU	3.6
1	D	166	ALA	3.6
2	C	126	PRO	3.5
2	C	3	PRO	3.3
2	C	128	ARG	3.3
2	B	228	ASP	3.3
2	B	248	GLY	3.2
2	C	163	ASP	3.0
1	A	167	GLU	3.0
2	B	224	HIS	2.9
1	D	244	ASP	2.9
1	D	169	GLY	2.9
2	B	245	GLY	2.9
2	C	129	THR	2.8
1	D	226	VAL	2.8
2	C	98	HIS	2.8
2	C	61	GLN	2.8
1	A	295	ASN	2.8
2	B	253	LEU	2.7
2	B	229	GLU	2.7
1	D	167	GLU	2.7
1	A	95	ARG	2.6
1	A	226	VAL	2.5
2	C	4	TYR	2.5
2	C	224	HIS	2.5
2	B	244	GLY	2.4
1	A	227	THR	2.4
1	D	165	MET	2.4
2	B	163	ASP	2.4
2	C	164	GLY	2.3
2	C	222	ASN	2.3
2	B	232	ILE	2.3
2	C	259	ALA	2.2
2	C	165	ASN	2.2
2	C	82	LEU	2.2
1	A	163	GLU	2.1

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](#)

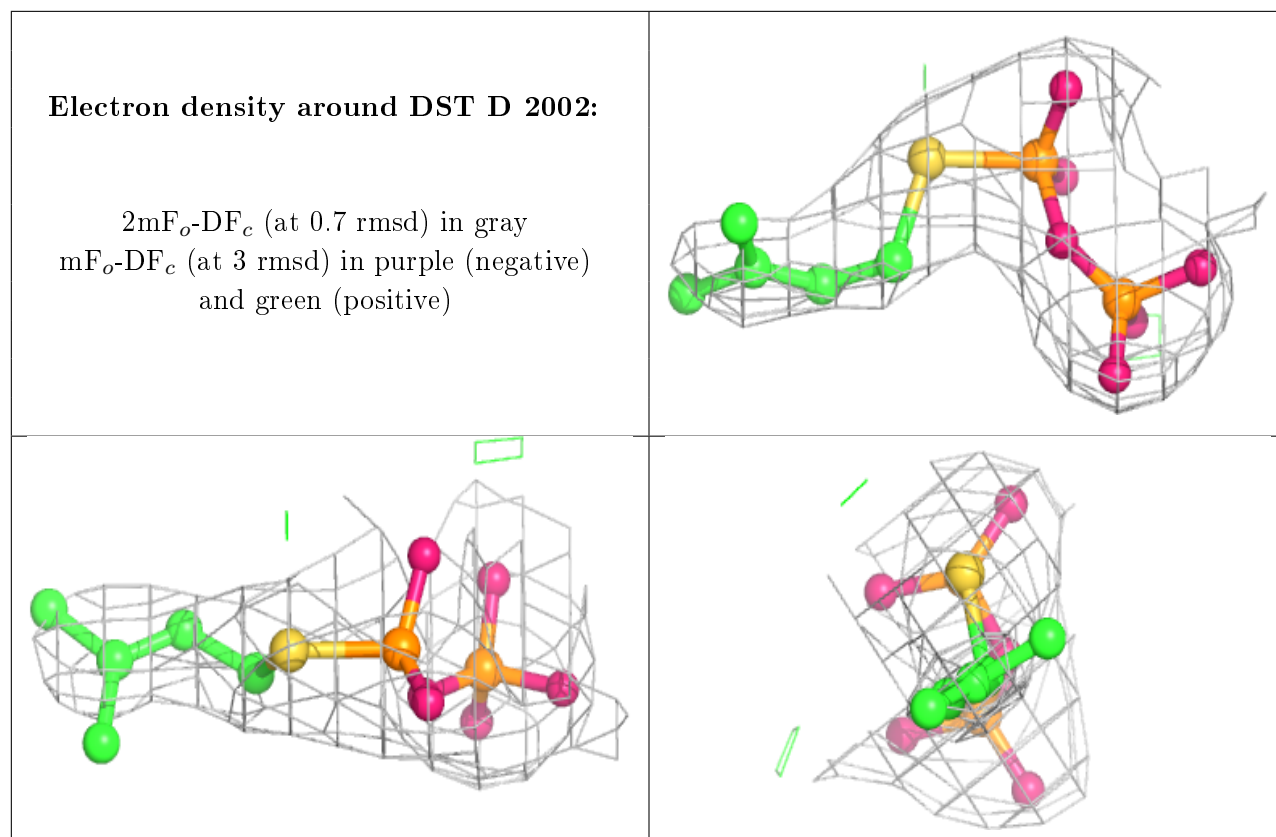
There are no carbohydrates in this entry.

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, 95th 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(\AA^2)	Q<0.9
5	MG	D	3001	1/1	0.79	0.28	41,41,41,41	0
5	MG	D	3002	1/1	0.93	0.20	45,45,45,45	0
3	IPE	D	2001	14/14	0.98	0.20	25,34,45,46	0
4	DST	D	2002	14/14	0.99	0.12	38,43,52,52	0

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.