WORLDWIDE PDB
PROTEIN DATA BANK

Full wwPDB X-ray Structure Validation Report ⓘ

Aug 19, 2023 – 08:48 PM EDT

PDB ID	:	2GDR
Title	:	Crystal structure of a bacterial glutathione transferase
Authors	:	Tocheva, E.I.; Fortin, P.D.; Eltis, L.D.; Murphy, M.E.P.
Deposited on	:	2006-03-16
Resolution	:	2.10 Å(reported)

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

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

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

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

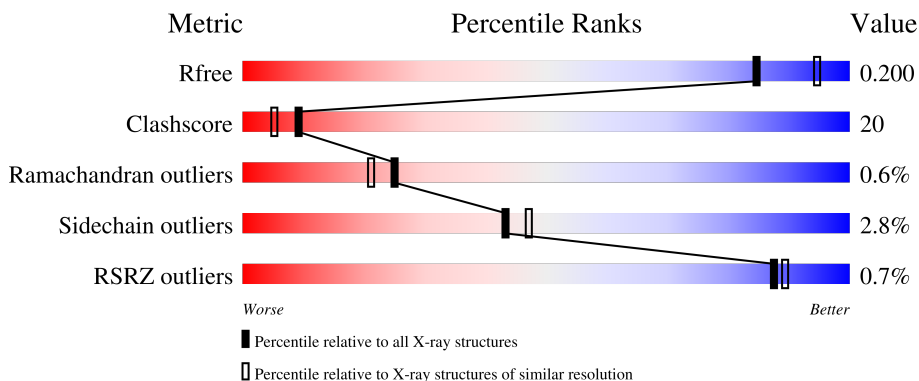|		
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.35
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.35

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 2.10 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	Percentile Ranks	Value
Rfree		0.200
Clashscore		20
Ramachandran outliers		0.6%
Sidechain outliers		2.8%
RSRZ outliers		0.7%

Worse   *Better*

▮ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	5197 (2.10-2.10)
Clashscore	141614	5710 (2.10-2.10)
Ramachandran outliers	138981	5647 (2.10-2.10)
Sidechain outliers	138945	5648 (2.10-2.10)
RSRZ outliers	127900	5083 (2.10-2.10)

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

Mol	Chain	Length	Quality of chain
1	A	202	69% 30% •
1	B	202	66% 33% •
1	C	202	60% 38% •
1	D	202	.% 66% 32% •
1	E	202	.% 54% 44% •

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W O R L D W I D E
wwPDB
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Mol	Chain	Length	Quality of chain
1	F	202	65%　　　　　　　　　　　　　　　　32%　　　　・

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:

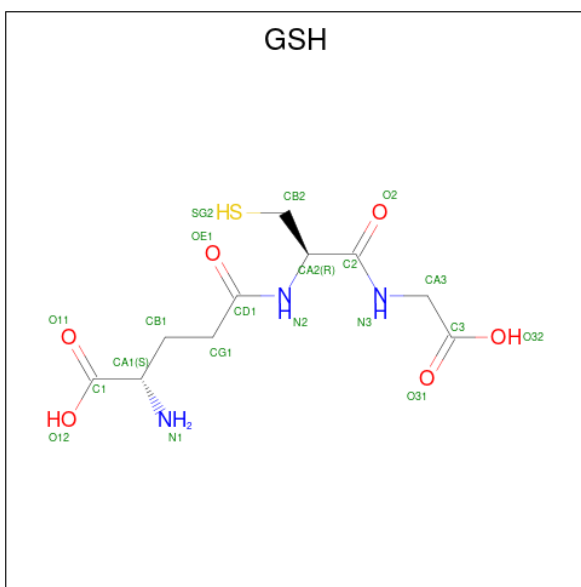| Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	GSH	B	225	-	-	X	X
2	GSH	F	225	-	-	-	X

2   Entry composition ⓘ

There are 3 unique types of molecules in this entry. The entry contains 9809 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 glutathione S-transferase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	202	Total	C	N	O	S	0	0	0
			1574	1005	271	295	3			
1	B	201	Total	C	N	O	S	0	0	0
			1564	999	269	293	3			
1	C	202	Total	C	N	O	S	0	0	0
			1574	1005	271	295	3			
1	D	201	Total	C	N	O	S	0	0	0
			1564	999	269	293	3			
1	E	202	Total	C	N	O	S	0	0	0
			1574	1005	271	295	3			
1	F	201	Total	C	N	O	S	0	0	0
			1564	999	269	293	3			

- Molecule 2 is GLUTATHIONE (three-letter code: GSH) (formula: $C_{10}H_{17}N_3O_6S$).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total 20	C 10	N 3	O 6	S 1	0	0
2	B	1	Total 20	C 10	N 3	O 6	S 1	0	0
2	B	1	Total 20	C 10	N 3	O 6	S 1	0	0
2	C	1	Total 20	C 10	N 3	O 6	S 1	0	0
2	D	1	Total 20	C 10	N 3	O 6	S 1	0	0
2	D	1	Total 20	C 10	N 3	O 6	S 1	0	0
2	E	1	Total 20	C 10	N 3	O 6	S 1	0	0
2	F	1	Total 20	C 10	N 3	O 6	S 1	0	0
2	F	1	Total 20	C 10	N 3	O 6	S 1	0	0

- Molecule 3 is water.

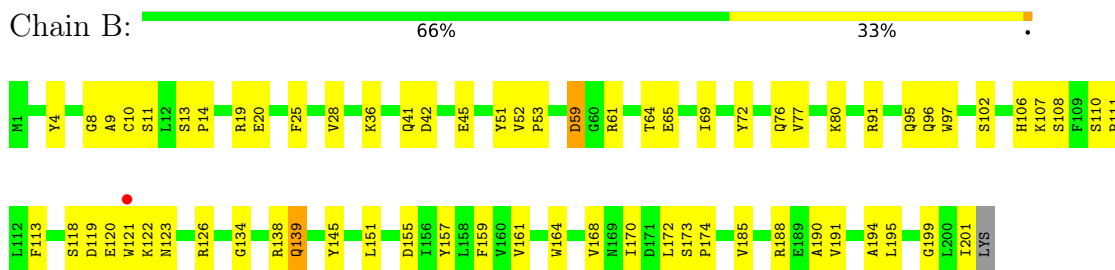| Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	41	Total 41	O 41	0	0
3	B	27	Total 27	O 27	0	0
3	C	43	Total 43	O 43	0	0
3	D	28	Total 28	O 28	0	0
3	E	37	Total 37	O 37	0	0
3	F	39	Total 39	O 39	0	0

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.
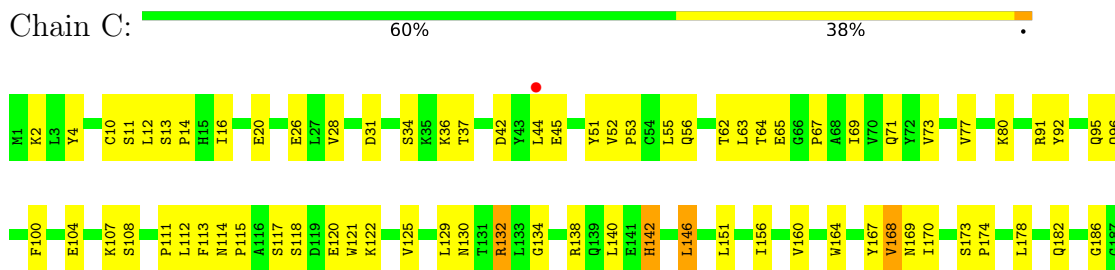
- Molecule 1: glutathione S-transferase

Chain A:

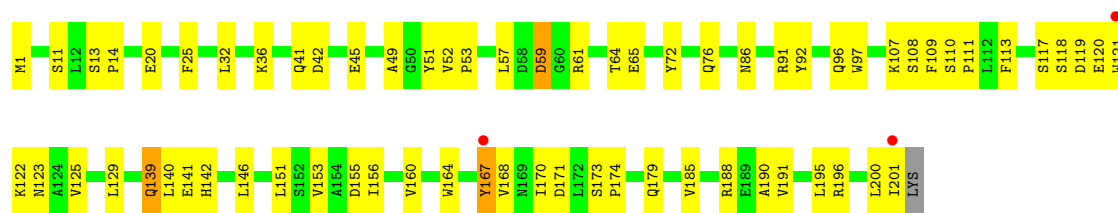

- Molecule 1: glutathione S-transferase
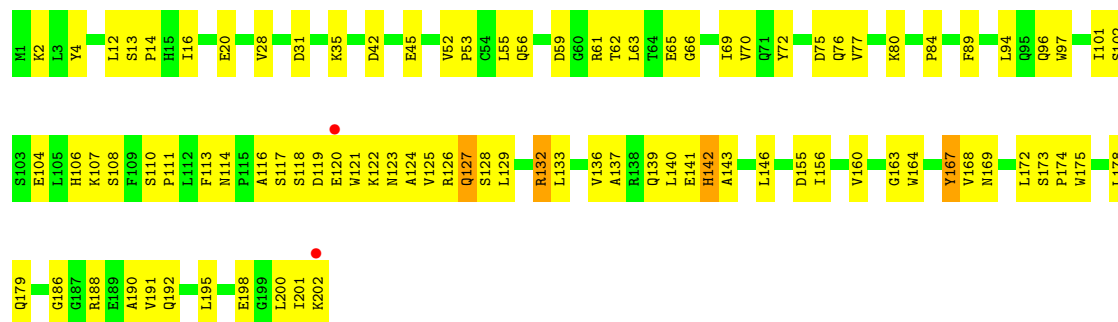
Chain B:

- Molecule 1: glutathione S-transferase
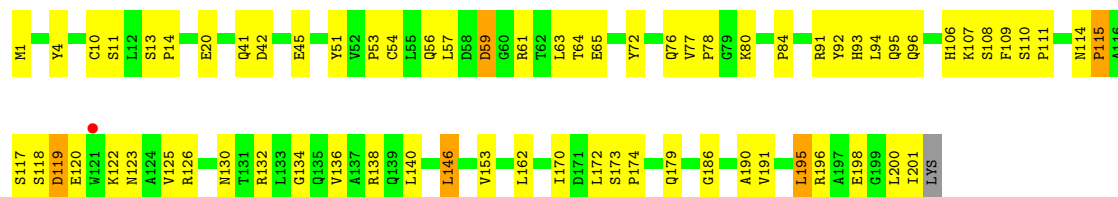
Chain C:

- Molecule 1: glutathione S-transferase

Chain D:

M1 S11 L12 S13 P14 E20 F25 L32 K36 Q41 D42 E45 A49 G50 Y51 V52 P53 L57 D58 D59 G60 R61 T64 E65 Y72 Q76 N86 R91 Y92 Q96 W97 K107 S108 F109 S110 P111 L112 F113 S117 S118 D119 E120 W121

K122 N123 A124 V125 L129 Q139 L140 E141 H142 L146 L151 S152 V153 A154 D155 I156 V160 W164 Y167 V168 N169 I170 D171 L172 S173 P174 Q179 V185 R188 E189 A190 V191 L195 R196 L200 I201 LYS

• Molecule 1: glutathione S-transferase

Chain E:

%

54% 44% •

M1 K2 L3 Y4 L12 S13 P14 H15 I16 E20 V28 D31 K35 D42 E45 V52 P53 C54 L55 Q56 D59 G60 R61 T62 L63 T64 E65 G66 I69 V70 Q71 Y72 D75 Q76 V77 K80 P84 F89 L94 Q95 Q96 W97 I101 S102

S103 E104 L105 H106 K107 S108 F109 S110 P111 L112 F113 N114 P115 A116 S117 S118 D119 E120 W121 K122 N123 A124 V125 R126 Q127 S128 L129 R132 L133 V136 A137 R138 Q139 L140 E141 H142 A143 L146 D155 I156 V160 G163 W164 Y167 V168 N169 L172 S173 P174 W175 L178

Q179 G186 G187 R188 E189 A190 V191 Q192 L195 E198 G199 L200 I201 K202

• Molecule 1: glutathione S-transferase

Chain F:

65% 32% •

M1 Y4 C10 S11 L12 S13 P14 E20 Q41 D42 E45 Y51 V52 P53 C54 L55 Q56 L57 D58 D59 G60 R61 T62 L63 T64 E65 Y72 Q76 V77 P78 G79 K80 P84 R91 Y92 H93 L94 Q95 Q96 H106 K107 S108 F109 S110 P111 N114 P115 A116

S117 S118 D119 E120 W121 K122 N123 A124 V125 R126 N130 T131 R132 L133 G134 Q135 V136 A137 R138 Q139 L140 L146 V153 L162 I170 D171 L172 S173 P174 Q179 G186 A190 V191 L195 R196 A197 E198 G199 L200 I201 LYS

4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 65	Depositor
Cell constants a, b, c, α, β, γ	103.44Å 103.44Å 262.28Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	50.00 – 2.10 39.86 – 2.10	Depositor EDS
% Data completeness (in resolution range)	(Not available) (50.00-2.10) 95.6 (39.86-2.10)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	3.59 (at 2.10Å)	Xtriage
Refinement program	CNS	Depositor
R, R_{free}	0.161 , 0.204 0.158 , 0.200	Depositor DCC
R_{free} test set	4153 reflections (4.72%)	wwPDB-VP
Wilson B-factor (Å^2)	27.2	Xtriage
Anisotropy	0.450	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.37 , 40.8	EDS
L-test for twinning[2]	$< |L| > = 0.40, < L^2 > = 0.22$	Xtriage
Estimated twinning fraction	0.419 for h,-h-k,-l	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	9809	wwPDB-VP
Average B, all atoms (Å^2)	32.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 54.93 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 3.4017e-05.*

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[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: GSH

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	0.36	0/1613	0.56	0/2195
1	B	0.40	0/1603	0.57	0/2184
1	C	0.38	0/1613	0.55	0/2195
1	D	0.37	0/1603	0.58	0/2184
1	E	0.38	0/1613	0.54	0/2195
1	F	0.40	0/1603	0.59	0/2184
All	All	0.38	0/9648	0.56	0/13137

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts ⓘ

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1574	0	1550	52	0
1	B	1564	0	1537	73	0
1	C	1574	0	1550	73	0
1	D	1564	0	1537	67	0
1	E	1574	0	1550	76	0
1	F	1564	0	1537	57	0
2	A	20	0	15	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	B	40	0	30	23	0
2	C	20	0	15	2	0
2	D	40	0	30	1	0
2	E	20	0	15	1	0
2	F	40	0	30	2	0
3	A	41	0	0	0	0
3	B	27	0	0	0	0
3	C	43	0	0	0	0
3	D	28	0	0	1	0
3	E	37	0	0	1	0
3	F	39	0	0	2	0
All	All	9809	0	9396	377	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 20.

All (377) 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:D:173:SER:HA	1:D:179:GLN:NE2	1.68	1.06
1:C:64:THR:H	1:D:96:GLN:HE21	1.04	1.00
1:B:164:TRP:CD1	2:B:225:GSH:HB12	2.02	0.95
1:B:120:GLU:HA	1:B:123:ASN:ND2	1.83	0.94
1:B:120:GLU:HA	1:B:123:ASN:HD22	1.36	0.90
1:B:110:SER:HB2	1:B:111:PRO:HD3	1.54	0.89
1:B:8:GLY:O	2:B:225:GSH:HG12	1.72	0.88
1:B:113:PHE:HE1	2:B:225:GSH:O2	1.56	0.88
1:D:13:SER:HB3	1:D:14:PRO:HD3	1.54	0.88
1:B:8:GLY:HA3	2:B:225:GSH:N1	1.88	0.87
1:A:196:ARG:HG2	1:A:202:LYS:HG3	1.56	0.84
1:C:13:SER:HB3	1:C:14:PRO:HD3	1.58	0.84
1:E:63:LEU:HD12	1:F:96:GLN:HE21	1.43	0.82
1:C:64:THR:H	1:D:96:GLN:NE2	1.78	0.82
1:E:173:SER:HA	1:E:179:GLN:NE2	1.95	0.81
1:C:56:GLN:HG3	1:C:62:THR:HG22	1.64	0.80
1:B:164:TRP:CD1	2:B:225:GSH:CB1	2.65	0.79
1:D:173:SER:CA	1:D:179:GLN:NE2	2.45	0.79
1:F:173:SER:HA	1:F:179:GLN:NE2	1.98	0.79
1:F:13:SER:HB3	1:F:14:PRO:HD3	1.65	0.78
1:A:143:ALA:HB1	1:A:144:PRO:HD2	1.66	0.77
1:C:11:SER:HB3	1:C:53:PRO:HB3	1.67	0.77

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:163:GLY:O	1:E:167:TYR:HE1	1.68	0.77
1:B:113:PHE:CE1	2:B:225:GSH:O2	2.37	0.76
1:F:110:SER:HB2	1:F:111:PRO:HD3	1.68	0.76
1:B:164:TRP:HD1	2:B:225:GSH:HB12	1.50	0.76
1:E:191:VAL:O	1:E:195:LEU:HD23	1.88	0.74
1:E:108:SER:O	1:E:111:PRO:HD2	1.89	0.73
1:B:110:SER:OG	2:B:225:GSH:O32	2.07	0.73
1:C:196:ARG:HD3	1:C:202:LYS:HE3	1.72	0.72
1:B:164:TRP:HE1	2:B:225:GSH:HG12	1.55	0.71
1:A:113:PHE:HZ	1:A:164:TRP:HB3	1.56	0.71
1:C:113:PHE:HZ	1:C:164:TRP:HB3	1.55	0.71
1:B:8:GLY:O	2:B:225:GSH:CG1	2.38	0.71
1:C:104:GLU:HB3	1:C:132:ARG:HD3	1.71	0.71
1:B:113:PHE:HZ	1:B:164:TRP:HB3	1.56	0.71
1:A:202:LYS:NZ	1:A:202:LYS:HB3	2.05	0.70
1:B:8:GLY:HA3	2:B:225:GSH:HN12	1.55	0.70
1:D:97:TRP:CZ2	1:D:139:GLN:HG3	2.26	0.70
1:F:108:SER:O	1:F:125:VAL:HG11	1.92	0.70
1:A:195:LEU:HB3	1:A:201:ILE:HG12	1.74	0.69
1:E:202:LYS:HA	1:E:202:LYS:HZ3	1.57	0.69
1:B:97:TRP:CZ2	1:B:139:GLN:HG3	2.28	0.68
1:B:13:SER:HB3	1:B:14:PRO:HD3	1.75	0.68
1:C:52:VAL:HB	1:C:53:PRO:HA	1.76	0.68
1:C:118:SER:HB2	1:C:120:GLU:OE1	1.94	0.68
1:E:108:SER:O	1:E:125:VAL:HG11	1.94	0.67
1:D:196:ARG:HA	1:D:201:ILE:HA	1.77	0.67
1:E:198:GLU:HB2	1:E:200:LEU:HG	1.76	0.67
1:C:4:TYR:HA	1:C:28:VAL:O	1.95	0.66
1:C:67:PRO:O	1:C:71:GLN:HG3	1.96	0.66
1:C:111:PRO:CG	1:C:125:VAL:HG21	2.25	0.66
1:E:110:SER:HB3	1:E:111:PRO:HD3	1.77	0.66
1:F:173:SER:HA	1:F:179:GLN:HE22	1.58	0.65
1:F:59:ASP:HB2	1:F:61:ARG:HG3	1.79	0.65
1:B:77:VAL:HG12	1:B:80:LYS:HG2	1.79	0.65
1:C:118:SER:HB3	1:D:120:GLU:OE2	1.97	0.65
1:A:113:PHE:CZ	1:A:164:TRP:HB3	2.33	0.64
1:C:142:HIS:H	1:C:142:HIS:CD2	2.14	0.63
1:E:77:VAL:HG11	1:E:80:LYS:HD2	1.80	0.63
1:A:31:ASP:OD1	1:A:33:ALA:HB3	1.98	0.63
1:A:108:SER:HB3	1:A:129:LEU:HG	1.81	0.62
1:B:106:HIS:CD2	2:B:225:GSH:HA32	2.34	0.62

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:108:SER:O	1:F:111:PRO:HD2	1.99	0.62
1:C:64:THR:N	1:D:96:GLN:HE21	1.87	0.62
1:A:52:VAL:HB	1:A:53:PRO:HA	1.80	0.62
1:E:117:SER:HB2	1:E:122:LYS:HD2	1.81	0.62
1:A:201:ILE:O	1:A:202:LYS:HB2	2.00	0.62
1:C:111:PRO:HG3	1:C:125:VAL:HG21	1.81	0.61
1:E:173:SER:HA	1:E:179:GLN:HE22	1.65	0.61
1:D:168:VAL:HG23	1:D:170:ILE:HG13	1.83	0.61
1:D:97:TRP:CH2	1:D:139:GLN:HG3	2.36	0.60
1:C:31:ASP:HB3	1:C:34:SER:OG	2.01	0.60
1:F:134:GLY:O	1:F:138:ARG:HG3	2.01	0.60
1:B:164:TRP:NE1	2:B:225:GSH:CG1	2.65	0.60
1:E:202:LYS:HB3	1:E:202:LYS:HZ2	1.66	0.59
1:A:168:VAL:HG23	1:A:170:ILE:HG13	1.83	0.59
1:B:199:GLY:C	1:B:201:ILE:H	2.03	0.59
1:C:112:LEU:HG	1:C:125:VAL:HG11	1.83	0.59
1:D:110:SER:HB2	1:D:111:PRO:HD3	1.84	0.59
1:C:69:ILE:O	1:C:73:VAL:HG23	2.03	0.59
1:E:119:ASP:HB3	1:E:123:ASN:ND2	2.17	0.59
1:E:186:GLY:O	1:E:192:GLN:NE2	2.35	0.59
1:A:114:ASN:HD21	1:A:116:ALA:HB3	1.66	0.59
1:C:168:VAL:HG23	1:C:170:ILE:HG13	1.84	0.59
1:D:108:SER:O	1:D:111:PRO:HD2	2.03	0.59
1:B:20:GLU:OE2	1:B:190:ALA:HB3	2.03	0.58
2:F:224:GSH:HA2	2:F:225:GSH:O31	2.03	0.58
1:E:2:LYS:O	1:E:55:LEU:HD12	2.04	0.58
1:E:137:ALA:O	1:E:141:GLU:HG3	2.03	0.58
1:E:120:GLU:O	1:E:124:ALA:HB2	2.03	0.58
1:E:202:LYS:HA	1:E:202:LYS:NZ	2.19	0.58
1:D:167:TYR:N	1:D:167:TYR:CD2	2.70	0.58
1:D:72:TYR:O	1:D:76:GLN:HG2	2.04	0.58
1:D:173:SER:N	1:D:174:PRO:CD	2.67	0.58
1:E:113:PHE:HZ	1:E:164:TRP:HB3	1.69	0.58
1:A:202:LYS:HB3	1:A:202:LYS:HZ2	1.68	0.57
1:B:188:ARG:HB2	1:B:191:VAL:HG23	1.86	0.57
1:E:164:TRP:O	1:E:168:VAL:HG22	2.04	0.57
1:D:191:VAL:O	1:D:195:LEU:HD23	2.04	0.57
1:E:108:SER:HB2	1:E:129:LEU:HD21	1.87	0.57
1:F:201:ILE:HG13	1:F:201:ILE:O	2.05	0.57
1:C:14:PRO:HG2	1:C:53:PRO:HG3	1.87	0.57
1:A:31:ASP:O	1:A:35:LYS:N	2.34	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:173:SER:N	1:B:174:PRO:CD	2.68	0.56
1:E:122:LYS:O	1:E:126:ARG:HG3	2.05	0.56
1:F:195:LEU:HD12	1:F:200:LEU:HD12	1.87	0.56
1:C:108:SER:HB2	1:C:129:LEU:HD21	1.86	0.56
1:D:42:ASP:O	1:D:45:GLU:HB2	2.06	0.56
1:D:171:ASP:OD2	1:D:174:PRO:HD3	2.06	0.56
1:E:72:TYR:O	1:E:76:GLN:HG2	2.06	0.56
1:F:72:TYR:O	1:F:76:GLN:HG2	2.04	0.56
1:B:164:TRP:HE1	2:B:225:GSH:CG1	2.18	0.56
1:B:168:VAL:HG23	1:B:170:ILE:HG13	1.87	0.56
1:A:120:GLU:CD	1:A:120:GLU:H	2.08	0.55
1:B:110:SER:HB2	1:B:111:PRO:CD	2.33	0.55
1:E:63:LEU:HD12	1:F:96:GLN:NE2	2.18	0.55
1:E:140:LEU:HD12	1:E:178:LEU:HD23	1.88	0.55
1:C:117:SER:HB2	1:C:122:LYS:HE3	1.88	0.55
1:D:191:VAL:O	1:D:195:LEU:CD2	2.54	0.55
1:B:77:VAL:CG1	1:B:80:LYS:HG2	2.35	0.55
1:C:63:LEU:HD21	1:D:92:TYR:HB3	1.87	0.55
1:D:164:TRP:O	1:D:168:VAL:HG22	2.07	0.55
1:A:196:ARG:HG2	1:A:202:LYS:CG	2.31	0.55
1:A:161:VAL:HG22	1:A:164:TRP:CZ3	2.43	0.54
1:C:140:LEU:HD21	1:C:146:LEU:CD1	2.37	0.54
1:C:186:GLY:HA2	1:C:191:VAL:HG11	1.89	0.54
1:F:84:PRO:HD2	1:F:94:LEU:HD22	1.90	0.54
1:B:170:ILE:O	1:B:170:ILE:HG22	2.07	0.54
1:D:32:LEU:HD13	2:D:224:GSH:O31	2.08	0.54
1:B:191:VAL:O	1:B:195:LEU:HD22	2.07	0.54
1:E:201:ILE:O	1:E:202:LYS:HB2	2.08	0.54
1:A:181:PHE:HA	1:A:184:ARG:HH21	1.72	0.54
1:C:118:SER:HB3	1:D:120:GLU:CD	2.27	0.53
1:A:69:ILE:O	1:A:73:VAL:HG23	2.08	0.53
1:E:66:GLY:O	1:E:70:VAL:HG22	2.07	0.53
1:E:127:GLN:HG3	1:E:128:SER:N	2.23	0.53
1:F:91:ARG:O	1:F:95:GLN:HG3	2.08	0.53
1:E:163:GLY:O	1:E:167:TYR:CE1	2.57	0.53
1:F:41:GLN:HG2	1:F:42:ASP:N	2.23	0.53
1:D:141:GLU:HG2	1:D:142:HIS:CE1	2.43	0.53
1:A:140:LEU:HD12	1:A:178:LEU:HD23	1.90	0.53
1:C:42:ASP:HB3	1:C:45:GLU:HG3	1.90	0.53
1:D:188:ARG:HB2	1:D:191:VAL:HG23	1.91	0.53
1:D:109:PHE:CE1	1:D:170:ILE:HD12	2.44	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:2:LYS:O	1:C:55:LEU:HD12	2.07	0.53
1:A:173:SER:N	1:A:174:PRO:CD	2.71	0.53
1:B:145:TYR:HB3	1:B:155:ASP:OD2	2.09	0.52
1:B:126:ARG:NH2	1:B:168:VAL:O	2.35	0.52
1:E:20:GLU:OE2	1:E:190:ALA:HB3	2.10	0.52
1:E:104:GLU:HB3	1:E:132:ARG:HD3	1.92	0.52
1:C:96:GLN:HG3	1:D:64:THR:O	2.10	0.52
1:E:164:TRP:HA	1:E:167:TYR:CD1	2.45	0.52
1:D:109:PHE:CE1	1:D:168:VAL:HG21	2.44	0.52
1:C:42:ASP:OD2	1:C:44:LEU:HB2	2.10	0.51
1:F:20:GLU:OE2	1:F:190:ALA:HB3	2.10	0.51
1:F:118:SER:O	1:F:122:LYS:HG3	2.10	0.51
1:A:186:GLY:HA2	1:A:191:VAL:HG11	1.91	0.51
1:D:107:LYS:HD3	3:D:226:HOH:O	2.09	0.51
1:B:164:TRP:NE1	2:B:225:GSH:HG12	2.20	0.51
1:F:186:GLY:HA2	1:F:191:VAL:HG11	1.92	0.51
1:A:42:ASP:HB3	1:A:45:GLU:OE1	2.11	0.51
1:E:59:ASP:OD2	1:E:61:ARG:HD3	2.11	0.51
1:C:134:GLY:O	1:C:138:ARG:HG3	2.11	0.51
1:B:164:TRP:O	1:B:168:VAL:HG22	2.11	0.51
1:B:97:TRP:CH2	1:B:139:GLN:HG3	2.46	0.51
1:C:173:SER:N	1:C:174:PRO:CD	2.74	0.51
1:F:198:GLU:HB2	1:F:200:LEU:HG	1.94	0.51
1:B:72:TYR:O	1:B:76:GLN:HG2	2.11	0.50
1:B:164:TRP:NE1	2:B:225:GSH:CB1	2.74	0.50
1:C:11:SER:CB	1:C:53:PRO:HB3	2.37	0.50
1:F:140:LEU:HD21	1:F:146:LEU:HD13	1.93	0.50
1:C:196:ARG:HD3	1:C:202:LYS:CE	2.41	0.50
1:D:121:TRP:O	1:D:125:VAL:HG23	2.10	0.50
1:D:20:GLU:OE2	1:D:190:ALA:HB3	2.12	0.50
1:E:12:LEU:O	1:E:16:ILE:HG13	2.12	0.50
1:F:162:LEU:HD22	1:F:172:LEU:HD21	1.94	0.50
1:A:96:GLN:O	1:B:65:GLU:HG3	2.12	0.50
1:B:52:VAL:HB	1:B:53:PRO:HA	1.92	0.50
1:C:100:PHE:CZ	1:C:132:ARG:HG3	2.46	0.50
1:D:57:LEU:HD12	1:D:61:ARG:HD3	1.93	0.50
1:E:52:VAL:HB	1:E:53:PRO:HA	1.93	0.50
1:A:191:VAL:O	1:A:195:LEU:HD23	2.12	0.49
1:B:113:PHE:CE1	2:B:225:GSH:C2	2.95	0.49
1:B:119:ASP:O	1:B:123:ASN:ND2	2.45	0.49
1:F:78:PRO:HG3	3:F:252:HOH:O	2.11	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:84:PRO:HG2	1:A:90:GLU:HB3	1.93	0.49
1:E:142:HIS:H	1:E:142:HIS:CD2	2.29	0.49
1:E:143:ALA:HB3	3:E:256:HOH:O	2.13	0.49
1:C:178:LEU:O	1:C:182:GLN:HG3	2.13	0.49
1:B:157:TYR:O	1:B:161:VAL:HG23	2.12	0.49
1:C:12:LEU:O	1:C:16:ILE:HG13	2.13	0.49
1:C:188:ARG:HB2	1:C:191:VAL:HG23	1.95	0.49
1:C:2:LYS:HD3	1:C:28:VAL:HG21	1.94	0.49
1:D:41:GLN:HG2	1:D:42:ASP:N	2.27	0.49
1:D:59:ASP:CB	1:D:61:ARG:HD2	2.43	0.49
1:D:119:ASP:O	1:D:123:ASN:ND2	2.46	0.49
1:A:181:PHE:HA	1:A:184:ARG:NH2	2.28	0.49
1:E:96:GLN:HE21	1:F:64:THR:H	1.61	0.49
1:C:34:SER:HB2	1:C:36:LYS:CE	2.42	0.48
1:E:96:GLN:O	1:F:65:GLU:HG3	2.13	0.48
1:F:1:MET:HG2	1:F:57:LEU:HA	1.93	0.48
1:B:185:VAL:O	1:B:191:VAL:HG21	2.13	0.48
1:F:11:SER:HA	1:F:53:PRO:HB3	1.94	0.48
1:F:173:SER:N	1:F:174:PRO:CD	2.75	0.48
1:A:122:LYS:O	1:A:126:ARG:HG3	2.14	0.48
1:E:201:ILE:O	1:E:202:LYS:CB	2.61	0.48
1:A:77:VAL:HG11	1:A:80:LYS:HD2	1.95	0.48
1:B:36:LYS:HA	1:B:41:GLN:O	2.13	0.48
1:D:173:SER:HA	1:D:179:GLN:HE22	1.66	0.48
1:F:109:PHE:CE1	1:F:170:ILE:HD12	2.49	0.48
1:D:113:PHE:HZ	1:D:164:TRP:HB3	1.77	0.48
1:A:92:TYR:CE2	1:B:72:TYR:HA	2.48	0.48
1:C:120:GLU:H	1:C:120:GLU:CD	2.17	0.48
1:E:75:ASP:OD1	1:F:92:TYR:OH	2.27	0.48
1:C:91:ARG:O	1:C:95:GLN:HG3	2.14	0.48
1:C:113:PHE:CZ	1:C:164:TRP:HB3	2.44	0.48
1:E:139:GLN:O	1:E:142:HIS:CD2	2.67	0.48
1:E:188:ARG:HB2	1:E:191:VAL:HG23	1.96	0.48
1:E:96:GLN:NE2	1:F:64:THR:H	2.11	0.48
1:B:91:ARG:O	1:B:95:GLN:HG3	2.14	0.47
1:C:11:SER:O	1:C:14:PRO:HD2	2.14	0.47
1:E:173:SER:HB2	1:E:174:PRO:HD3	1.95	0.47
1:C:195:LEU:HD13	1:C:200:LEU:HD12	1.96	0.47
1:E:77:VAL:HG11	1:E:80:LYS:CD	2.44	0.47
1:F:122:LYS:O	1:F:126:ARG:HG3	2.14	0.47
1:C:156:ILE:O	1:C:160:VAL:HG23	2.14	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:64:THR:O	1:F:65:GLU:HB2	2.13	0.47
1:D:52:VAL:HB	1:D:53:PRO:HA	1.96	0.47
1:F:138:ARG:HD3	3:F:249:HOH:O	2.13	0.47
1:A:20:GLU:OE2	1:A:190:ALA:HB3	2.14	0.47
1:A:42:ASP:O	1:A:45:GLU:HG3	2.14	0.47
1:B:4:TYR:HA	1:B:28:VAL:O	2.14	0.47
1:B:10:CYS:SG	2:B:224:GSH:SG2	3.10	0.47
1:B:42:ASP:O	1:B:45:GLU:HB2	2.15	0.47
1:B:134:GLY:O	1:B:138:ARG:HG3	2.14	0.47
1:F:132:ARG:O	1:F:136:VAL:HG23	2.15	0.47
1:E:195:LEU:HD13	1:E:200:LEU:HD12	1.95	0.47
1:F:108:SER:O	1:F:125:VAL:CG1	2.61	0.46
1:A:64:THR:O	1:A:65:GLU:HB2	2.15	0.46
1:C:167:TYR:CD1	1:C:167:TYR:N	2.84	0.46
1:D:1:MET:HG2	1:D:57:LEU:HA	1.96	0.46
1:D:140:LEU:HD21	1:D:146:LEU:HD13	1.97	0.46
1:C:151:LEU:HD23	1:C:151:LEU:C	2.36	0.46
1:C:64:THR:O	1:C:65:GLU:HB2	2.15	0.46
1:D:13:SER:HB3	1:D:14:PRO:CD	2.37	0.46
1:E:89:PHE:CZ	1:F:63:LEU:HD13	2.51	0.46
1:F:1:MET:HA	1:F:56:GLN:O	2.15	0.46
1:A:55:LEU:HD22	1:A:69:ILE:HG23	1.97	0.46
1:A:195:LEU:HD13	1:A:200:LEU:HD12	1.98	0.46
1:B:191:VAL:O	1:B:195:LEU:CD2	2.64	0.46
1:C:120:GLU:HG3	1:D:118:SER:HB3	1.96	0.46
1:E:4:TYR:HA	1:E:28:VAL:O	2.16	0.46
1:E:118:SER:HB3	1:F:120:GLU:OE1	2.16	0.46
1:B:53:PRO:HG2	1:B:69:ILE:HD12	1.98	0.45
1:C:140:LEU:HD21	1:C:146:LEU:HD13	1.97	0.45
1:E:146:LEU:HD23	1:E:155:ASP:OD2	2.16	0.45
1:B:164:TRP:CE3	2:B:225:GSH:O2	2.69	0.45
1:A:119:ASP:C	1:A:121:TRP:H	2.20	0.45
1:B:8:GLY:C	2:B:225:GSH:HG13	2.38	0.45
1:C:65:GLU:HG3	1:D:96:GLN:O	2.17	0.45
1:E:132:ARG:O	1:E:136:VAL:HG23	2.16	0.45
1:A:65:GLU:HG3	1:B:96:GLN:O	2.16	0.45
1:A:34:SER:HB2	1:A:36:LYS:HE2	1.99	0.44
1:A:106:HIS:C	1:A:106:HIS:CD2	2.90	0.44
1:C:20:GLU:OE2	1:C:190:ALA:HB3	2.16	0.44
1:D:86:ASN:HA	1:D:91:ARG:HG2	1.99	0.44
1:C:118:SER:O	1:C:121:TRP:HB3	2.17	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:53:PRO:HG2	1:E:69:ILE:HD12	1.99	0.44
1:A:167:TYR:HD1	1:A:167:TYR:H	1.64	0.44
1:C:167:TYR:C	1:C:169:ASN:H	2.21	0.44
1:F:13:SER:CB	1:F:14:PRO:HD3	2.43	0.44
1:F:114:ASN:HA	1:F:115:PRO:HD3	1.78	0.44
1:D:156:ILE:O	1:D:160:VAL:HG23	2.18	0.44
1:D:173:SER:CA	1:D:179:GLN:HE21	2.29	0.44
1:E:13:SER:HB3	1:E:14:PRO:CD	2.47	0.44
1:F:10:CYS:SG	1:F:106:HIS:HE1	2.40	0.44
1:E:35:LYS:HE3	2:E:224:GSH:O31	2.17	0.44
1:B:25:PHE:CD1	1:B:25:PHE:N	2.86	0.44
1:D:146:LEU:CD2	1:D:155:ASP:OD2	2.66	0.44
2:F:224:GSH:SG2	2:F:225:GSH:O31	2.70	0.44
1:E:114:ASN:OD1	1:E:116:ALA:HB3	2.17	0.44
1:E:119:ASP:HB3	1:E:123:ASN:HD21	1.81	0.44
1:F:77:VAL:CG1	1:F:80:LYS:HG2	2.47	0.44
1:D:185:VAL:O	1:D:188:ARG:HG3	2.18	0.44
1:E:31:ASP:O	1:E:35:LYS:N	2.51	0.44
1:A:118:SER:O	1:A:121:TRP:HB3	2.18	0.43
1:A:151:LEU:C	1:A:151:LEU:HD23	2.38	0.43
1:D:167:TYR:N	1:D:167:TYR:HD2	2.15	0.43
1:E:173:SER:N	1:E:174:PRO:CD	2.81	0.43
1:E:202:LYS:NZ	1:E:202:LYS:CB	2.81	0.43
1:B:102:SER:O	1:B:106:HIS:HB3	2.17	0.43
1:C:92:TYR:CE2	1:D:72:TYR:HA	2.53	0.43
1:C:191:VAL:O	1:C:195:LEU:HD23	2.18	0.43
1:B:122:LYS:O	1:B:126:ARG:HG3	2.18	0.43
1:C:11:SER:C	1:C:14:PRO:HD2	2.39	0.43
1:A:4:TYR:HA	1:A:28:VAL:O	2.18	0.43
1:E:63:LEU:HD21	1:F:92:TYR:HB3	2.00	0.43
1:B:8:GLY:C	2:B:225:GSH:CG1	2.86	0.43
1:B:14:PRO:HG2	1:B:53:PRO:HG3	2.01	0.43
1:B:118:SER:OG	1:B:121:TRP:HB2	2.18	0.43
1:D:173:SER:N	1:D:179:GLN:HE21	2.16	0.43
1:B:59:ASP:CB	1:B:61:ARG:HD2	2.48	0.43
1:B:64:THR:O	1:B:65:GLU:HB2	2.19	0.43
1:D:11:SER:CB	1:D:53:PRO:HB3	2.49	0.43
1:E:121:TRP:O	1:E:124:ALA:HB3	2.18	0.43
1:A:201:ILE:O	1:A:202:LYS:CB	2.66	0.43
1:C:10:CYS:HG	2:C:224:GSH:HSG	1.59	0.43
1:B:159:PHE:CD1	1:B:185:VAL:HB	2.54	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:49:ALA:HB1	1:D:51:TYR:CE2	2.54	0.43
1:B:113:PHE:CZ	1:B:164:TRP:HB3	2.45	0.43
1:B:199:GLY:C	1:B:201:ILE:N	2.71	0.43
1:C:96:GLN:O	1:D:65:GLU:HG3	2.19	0.43
1:E:97:TRP:O	1:E:101:ILE:HG13	2.19	0.43
1:F:42:ASP:HB3	1:F:45:GLU:OE2	2.18	0.43
1:C:111:PRO:HG2	1:C:125:VAL:HG21	1.99	0.42
1:E:65:GLU:HG3	1:F:96:GLN:O	2.19	0.42
1:F:107:LYS:HA	1:F:107:LYS:HD3	1.74	0.42
2:B:225:GSH:HN12	2:B:225:GSH:HG13	1.70	0.42
1:E:129:LEU:O	1:E:133:LEU:HG	2.19	0.42
1:F:57:LEU:N	1:F:57:LEU:HD23	2.33	0.42
1:F:77:VAL:HG12	1:F:80:LYS:HG2	2.00	0.42
1:C:117:SER:HB2	1:C:122:LYS:CE	2.50	0.42
1:E:156:ILE:O	1:E:160:VAL:HG23	2.20	0.42
1:D:59:ASP:OD1	1:D:59:ASP:N	2.53	0.42
1:E:56:GLN:HG3	1:E:62:THR:HG22	2.01	0.42
1:E:102:SER:O	1:E:106:HIS:HB3	2.20	0.42
1:B:102:SER:O	1:B:107:LYS:HG2	2.20	0.42
1:F:57:LEU:HD12	1:F:61:ARG:HD3	2.02	0.42
1:A:202:LYS:HB3	1:A:202:LYS:HZ3	1.84	0.42
1:D:146:LEU:H	1:D:146:LEU:HD22	1.83	0.42
1:D:36:LYS:HA	1:D:41:GLN:O	2.20	0.42
1:C:114:ASN:HA	1:C:115:PRO:HD3	1.89	0.42
1:A:34:SER:CB	1:A:36:LYS:HE2	2.50	0.42
1:E:42:ASP:O	1:E:45:GLU:HG3	2.19	0.42
1:E:172:LEU:HA	1:E:175:TRP:CE3	2.54	0.42
1:E:108:SER:O	1:E:125:VAL:CG1	2.66	0.41
1:E:140:LEU:HD12	1:E:178:LEU:CD2	2.50	0.41
1:B:59:ASP:OD2	1:B:61:ARG:HD2	2.19	0.41
2:B:225:GSH:HN3	2:B:225:GSH:HB23	1.61	0.41
1:C:51:TYR:CD1	2:C:224:GSH:HG12	2.56	0.41
1:C:77:VAL:CG1	1:C:80:LYS:HG3	2.50	0.41
1:D:109:PHE:HE1	1:D:168:VAL:HG21	1.83	0.41
1:D:117:SER:OG	1:D:122:LYS:HE3	2.20	0.41
1:C:118:SER:OG	1:C:121:TRP:HB2	2.20	0.41
1:E:84:PRO:HD2	1:E:94:LEU:HD22	2.02	0.41
1:E:121:TRP:CD1	1:E:121:TRP:C	2.93	0.41
1:F:4:TYR:HB2	1:F:54:CYS:HB3	2.01	0.41
1:F:119:ASP:O	1:F:123:ASN:ND2	2.54	0.41
1:A:77:VAL:HG11	1:A:80:LYS:CD	2.50	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:145:TYR:CE2	1:B:151:LEU:HD12	2.55	0.41
1:D:25:PHE:N	1:D:25:PHE:CD1	2.88	0.41
1:E:107:LYS:HE2	1:E:107:LYS:HA	2.02	0.41
1:B:19:ARG:HD2	1:B:194:ALA:HB2	2.02	0.41
1:B:170:ILE:O	1:B:172:LEU:HD13	2.20	0.41
1:A:198:GLU:HB2	1:A:200:LEU:HG	2.03	0.41
1:C:96:GLN:NE2	1:D:64:THR:H	2.17	0.41
1:D:146:LEU:HD23	1:D:155:ASP:OD2	2.19	0.41
1:D:200:LEU:O	1:D:201:ILE:O	2.38	0.41
1:D:64:THR:O	1:D:65:GLU:HB2	2.20	0.41
1:D:113:PHE:CZ	1:D:164:TRP:HB3	2.56	0.41
1:A:140:LEU:HD21	1:A:146:LEU:HD13	2.03	0.41
1:B:59:ASP:OD1	1:B:59:ASP:N	2.53	0.41
1:F:59:ASP:CB	1:F:61:ARG:HD2	2.51	0.41
1:F:93:HIS:O	1:F:96:GLN:HB3	2.20	0.41
1:F:111:PRO:HG2	1:F:125:VAL:HG21	2.03	0.41
1:C:2:LYS:HA	1:C:26:GLU:O	2.21	0.41
1:C:202:LYS:NZ	1:C:202:LYS:CB	2.85	0.41
1:D:108:SER:HB2	1:D:129:LEU:HD21	2.02	0.41
1:B:11:SER:O	1:B:14:PRO:HD2	2.21	0.40
1:A:191:VAL:O	1:A:195:LEU:CD2	2.70	0.40
1:C:167:TYR:H	1:C:167:TYR:HD1	1.68	0.40
1:F:196:ARG:HE	1:F:196:ARG:HB3	1.45	0.40
1:A:140:LEU:HD21	1:A:146:LEU:CD1	2.52	0.40
1:A:143:ALA:HB1	1:A:144:PRO:CD	2.44	0.40
1:C:107:LYS:HA	1:C:107:LYS:HD3	1.77	0.40
1:F:114:ASN:HD22	1:F:117:SER:HB3	1.85	0.40

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	200/202 (99%)	191 (96%)	7 (4%)	2 (1%)	15	11
1	B	199/202 (98%)	185 (93%)	13 (6%)	1 (0%)	29	26
1	C	200/202 (99%)	192 (96%)	6 (3%)	2 (1%)	15	11
1	D	199/202 (98%)	189 (95%)	10 (5%)	0	100	100
1	E	200/202 (99%)	193 (96%)	6 (3%)	1 (0%)	29	26
1	F	199/202 (98%)	192 (96%)	6 (3%)	1 (0%)	29	26
All	All	1197/1212 (99%)	1142 (95%)	48 (4%)	7 (1%)	25	21

All (7) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	142	HIS
1	C	37	THR
1	A	81	GLN
1	B	9	ALA
1	E	169	ASN
1	C	168	VAL
1	F	115	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	167/167 (100%)	163 (98%)	4 (2%)	49	53
1	B	166/167 (99%)	162 (98%)	4 (2%)	49	53
1	C	167/167 (100%)	163 (98%)	4 (2%)	49	53
1	D	166/167 (99%)	161 (97%)	5 (3%)	41	44
1	E	167/167 (100%)	163 (98%)	4 (2%)	49	53
1	F	166/167 (99%)	159 (96%)	7 (4%)	30	30
All	All	999/1002 (100%)	971 (97%)	28 (3%)	43	47

All (28) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	35	LYS
1	A	41	GLN
1	A	132	ARG
1	A	146	LEU
1	B	51	TYR
1	B	59	ASP
1	B	108	SER
1	B	139	GLN
1	C	130	ASN
1	C	132	ARG
1	C	142	HIS
1	C	146	LEU
1	D	59	ASP
1	D	139	GLN
1	D	151	LEU
1	D	153	VAL
1	D	167	TYR
1	E	127	GLN
1	E	132	ARG
1	E	142	HIS
1	E	167	TYR
1	F	51	TYR
1	F	59	ASP
1	F	119	ASP
1	F	130	ASN
1	F	146	LEU
1	F	153	VAL
1	F	195	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (39) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	96	GLN
1	A	114	ASN
1	A	130	ASN
1	A	182	GLN
1	B	29	GLN
1	B	41	GLN
1	B	96	GLN
1	B	114	ASN
1	B	123	ASN
1	B	135	GLN
1	B	192	GLN

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Mol	Chain	Res	Type
1	C	96	GLN
1	C	123	ASN
1	C	139	GLN
1	D	29	GLN
1	D	41	GLN
1	D	81	GLN
1	D	93	HIS
1	D	96	GLN
1	D	123	ASN
1	D	127	GLN
1	D	135	GLN
1	D	142	HIS
1	D	179	GLN
1	D	192	GLN
1	E	96	GLN
1	E	123	ASN
1	E	139	GLN
1	E	142	HIS
1	E	179	GLN
1	F	29	GLN
1	F	41	GLN
1	F	56	GLN
1	F	96	GLN
1	F	114	ASN
1	F	135	GLN
1	F	139	GLN
1	F	179	GLN
1	F	192	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

5.6 Ligand geometry ⓘ

9 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#|Z| > 2$	Counts	RMSZ	$\#|Z| > 2$
2	GSH	D	224	-	18,19,19	1.28	2 (11%)	23,24,24	1.43	4 (17%)
2	GSH	E	224	-	18,19,19	1.41	2 (11%)	23,24,24	1.38	4 (17%)
2	GSH	C	224	-	18,19,19	1.39	2 (11%)	23,24,24	1.46	2 (8%)
2	GSH	F	225	-	18,19,19	2.65	8 (44%)	23,24,24	2.11	9 (39%)
2	GSH	D	225	-	18,19,19	1.40	2 (11%)	23,24,24	1.61	5 (21%)
2	GSH	B	224	-	18,19,19	1.38	2 (11%)	23,24,24	1.25	2 (8%)
2	GSH	A	224	-	18,19,19	1.34	2 (11%)	23,24,24	1.46	2 (8%)
2	GSH	F	224	-	18,19,19	1.39	2 (11%)	23,24,24	1.10	0
2	GSH	B	225	-	18,19,19	2.09	6 (33%)	23,24,24	1.56	7 (30%)

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	GSH	D	224	-	-	0/24/24/24	-
2	GSH	E	224	-	-	0/24/24/24	-
2	GSH	C	224	-	-	0/24/24/24	-
2	GSH	F	225	-	-	7/24/24/24	-
2	GSH	D	225	-	-	10/24/24/24	-
2	GSH	B	224	-	-	1/24/24/24	-
2	GSH	A	224	-	-	1/24/24/24	-
2	GSH	F	224	-	-	2/24/24/24	-
2	GSH	B	225	-	-	7/24/24/24	-

All (28) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	F	225	GSH	C2-N3	-5.45	1.21	1.33
2	F	225	GSH	CG1-CD1	-4.51	1.42	1.51
2	F	225	GSH	O11-C1	4.31	1.35	1.22
2	A	224	GSH	O11-C1	4.19	1.34	1.22
2	D	225	GSH	O11-C1	4.15	1.34	1.22
2	C	224	GSH	O11-C1	4.09	1.34	1.22
2	F	224	GSH	O31-C3	4.06	1.35	1.22
2	B	225	GSH	O32-C3	-4.04	1.17	1.30
2	F	225	GSH	CB1-CA1	-4.03	1.44	1.53
2	B	224	GSH	O31-C3	4.02	1.35	1.22
2	E	224	GSH	O11-C1	3.90	1.34	1.22
2	D	224	GSH	O31-C3	3.80	1.34	1.22
2	B	225	GSH	O11-C1	3.68	1.33	1.22
2	B	225	GSH	O31-C3	3.48	1.33	1.22
2	F	225	GSH	CA2-N2	-3.22	1.39	1.45
2	B	225	GSH	CB1-CA1	-3.22	1.46	1.53
2	B	224	GSH	O32-C3	-2.93	1.20	1.30
2	C	224	GSH	O12-C1	-2.92	1.21	1.30
2	E	224	GSH	O12-C1	-2.73	1.21	1.30
2	F	224	GSH	O32-C3	-2.65	1.21	1.30
2	D	225	GSH	O12-C1	-2.63	1.21	1.30
2	D	224	GSH	O32-C3	-2.62	1.21	1.30
2	A	224	GSH	O12-C1	-2.51	1.22	1.30
2	B	225	GSH	CA3-C3	-2.43	1.45	1.51
2	F	225	GSH	CB1-CG1	-2.34	1.45	1.52
2	B	225	GSH	O12-C1	-2.31	1.23	1.30
2	F	225	GSH	O12-C1	-2.23	1.23	1.30
2	F	225	GSH	CB2-SG2	-2.11	1.77	1.81

All (35) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	224	GSH	CA2-CB2-SG2	-4.70	108.91	114.19
2	A	224	GSH	CA2-CB2-SG2	-4.51	109.12	114.19
2	D	225	GSH	CA2-CB2-SG2	-4.32	109.33	114.19
2	F	225	GSH	C2-CA2-N2	-3.90	100.55	111.16
2	D	224	GSH	CA2-CB2-SG2	-3.87	109.84	114.19
2	F	225	GSH	CB1-CG1-CD1	-3.69	104.79	113.04
2	E	224	GSH	CA2-CB2-SG2	-3.37	110.40	114.19
2	F	225	GSH	CG1-CB1-CA1	-3.33	106.06	113.84
2	F	225	GSH	CA2-N2-CD1	-3.22	113.36	121.65
2	B	224	GSH	CA2-CB2-SG2	-3.09	110.72	114.19
2	F	225	GSH	CB1-CA1-C1	-2.94	103.31	110.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	F	225	GSH	C3-CA3-N3	-2.90	104.11	113.06
2	D	225	GSH	CG1-CD1-N2	2.90	120.87	115.83
2	F	225	GSH	CA3-N3-C2	-2.76	114.53	121.37
2	F	225	GSH	CB2-CA2-N2	2.64	115.06	111.28
2	B	225	GSH	CA2-CB2-SG2	-2.60	111.27	114.19
2	B	225	GSH	CG1-CD1-N2	2.58	120.31	115.83
2	B	225	GSH	CA2-C2-N3	2.48	121.55	116.54
2	B	225	GSH	C3-CA3-N3	-2.36	105.79	113.06
2	E	224	GSH	O32-C3-CA3	2.29	120.71	112.74
2	B	225	GSH	O12-C1-CA1	2.28	121.15	113.38
2	D	225	GSH	O12-C1-CA1	2.25	121.03	113.38
2	C	224	GSH	O32-C3-CA3	2.20	120.39	112.74
2	D	225	GSH	O32-C3-CA3	2.17	120.27	112.74
2	D	224	GSH	O32-C3-CA3	2.12	120.12	112.74
2	D	224	GSH	O12-C1-O11	-2.11	119.29	124.09
2	E	224	GSH	O12-C1-O11	-2.11	119.29	124.09
2	B	225	GSH	OE1-CD1-CG1	-2.11	118.16	122.02
2	A	224	GSH	O32-C3-CA3	2.10	120.03	112.74
2	D	224	GSH	O12-C1-CA1	2.07	120.44	113.38
2	B	225	GSH	O2-C2-N3	-2.04	118.62	122.99
2	D	225	GSH	O12-C1-O11	-2.03	119.47	124.09
2	E	224	GSH	O12-C1-CA1	2.03	120.30	113.38
2	F	225	GSH	O32-C3-CA3	2.02	119.75	112.74
2	B	224	GSH	O32-C3-CA3	2.01	119.71	112.74

There are no chirality outliers.

All (28) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	225	GSH	O11-C1-CA1-N1
2	B	225	GSH	O2-C2-CA2-CB2
2	B	225	GSH	N3-C2-CA2-CB2
2	B	225	GSH	N2-CA2-CB2-SG2
2	B	225	GSH	C2-CA2-CB2-SG2
2	D	225	GSH	O11-C1-CA1-N1
2	D	225	GSH	N2-CA2-CB2-SG2
2	D	225	GSH	C2-CA2-CB2-SG2
2	F	225	GSH	O2-C2-CA2-CB2
2	F	225	GSH	N3-C2-CA2-CB2
2	D	225	GSH	O12-C1-CA1-N1
2	F	224	GSH	O32-C3-CA3-N3
2	B	225	GSH	CA1-CB1-CG1-CD1

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Mol	Chain	Res	Type	Atoms
2	D	225	GSH	CA1-CB1-CG1-CD1
2	F	225	GSH	CA1-CB1-CG1-CD1
2	B	225	GSH	O12-C1-CA1-N1
2	F	224	GSH	O31-C3-CA3-N3
2	F	225	GSH	C2-CA2-CB2-SG2
2	D	225	GSH	O11-C1-CA1-CB1
2	D	225	GSH	O12-C1-CA1-CB1
2	D	225	GSH	O32-C3-CA3-N3
2	D	225	GSH	O31-C3-CA3-N3
2	F	225	GSH	O32-C3-CA3-N3
2	F	225	GSH	N2-CA2-CB2-SG2
2	D	225	GSH	C3-CA3-N3-C2
2	B	224	GSH	O12-C1-CA1-N1
2	A	224	GSH	N3-C2-CA2-N2
2	F	225	GSH	O31-C3-CA3-N3

There are no ring outliers.

7 monomers are involved in 29 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	D	224	GSH	1	0
2	E	224	GSH	1	0
2	C	224	GSH	2	0
2	F	225	GSH	2	0
2	B	224	GSH	1	0
2	F	224	GSH	2	0
2	B	225	GSH	22	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 GSH D 224

Bond lengths

Bond angles

Torsions

Rings

Ligand GSH E 224

Bond lengths

Bond angles

Torsions

Rings

Ligand GSH C 224

Bond lengths

Bond angles

Torsions

Rings

Ligand GSH F 225

Bond lengths

Bond angles

Torsions

Rings

Ligand GSH D 225

Bond lengths

Bond angles

Torsions

Rings

Ligand GSH B 224

Bond lengths

Bond angles

Torsions

Rings

Ligand GSH A 224

Bond lengths

Bond angles

Torsions

Rings

Ligand GSH F 224

Bond lengths

Bond angles

Torsions

Rings

Ligand GSH B 225

Bond lengths

Bond angles

Torsions

Rings

5.7 Other polymers ⓘ

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(Å²)	Q<0.9
1	A	202/202 (100%)	-0.15	1 (0%)	91	92	14, 30, 61, 75	0
1	B	201/202 (99%)	-0.08	1 (0%)	91	92	16, 32, 58, 84	0
1	C	202/202 (100%)	-0.18	1 (0%)	91	92	14, 28, 62, 71	0
1	D	201/202 (99%)	-0.14	3 (1%)	73	77	13, 28, 55, 75	0
1	E	202/202 (100%)	-0.17	2 (0%)	82	85	16, 29, 53, 71	0
1	F	201/202 (99%)	-0.18	1 (0%)	91	92	13, 28, 47, 67	0
All	All	1209/1212 (99%)	-0.15	9 (0%)	87	89	13, 29, 60, 84	0

All (9) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	167	TYR	3.6
1	D	121	TRP	3.1
1	B	121	TRP	3.0
1	E	120	GLU	2.8
1	F	121	TRP	2.4
1	A	120	GLU	2.2
1	C	44	LEU	2.2
1	E	202	LYS	2.2
1	D	201	ILE	2.1

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

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

6.3 Carbohydrates ⓘ

There are no monosaccharides in this entry.

6.4 Ligands ⓘ

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. 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($Å^2$)	Q<0.9
2	GSH	B	225	20/20	0.63	0.68	35,36,37,37	20
2	GSH	F	225	20/20	0.80	0.43	34,36,38,39	20
2	GSH	D	225	20/20	0.85	0.31	32,34,37,37	20
2	GSH	E	224	20/20	0.96	0.11	27,33,40,40	0
2	GSH	A	224	20/20	0.96	0.11	24,34,42,42	0
2	GSH	B	224	20/20	0.97	0.11	26,29,40,41	0
2	GSH	C	224	20/20	0.97	0.11	23,30,38,38	0
2	GSH	F	224	20/20	0.97	0.11	21,24,40,41	0
2	GSH	D	224	20/20	0.97	0.10	18,24,43,44	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.

Electron density around GSH B 225:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)
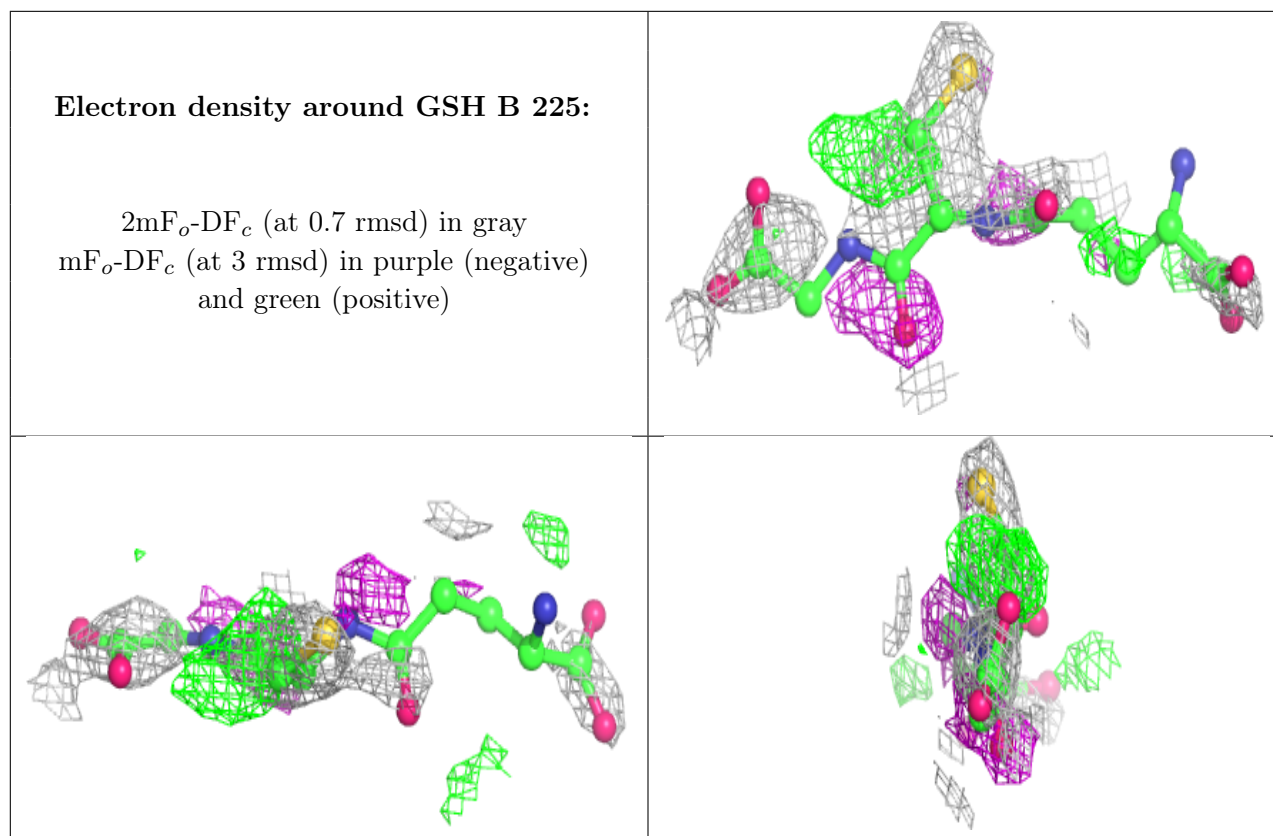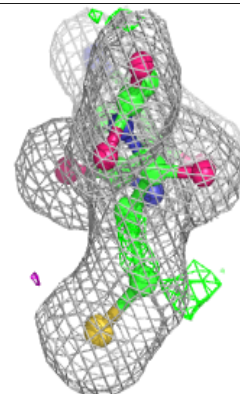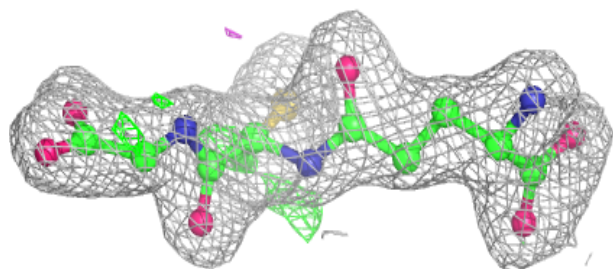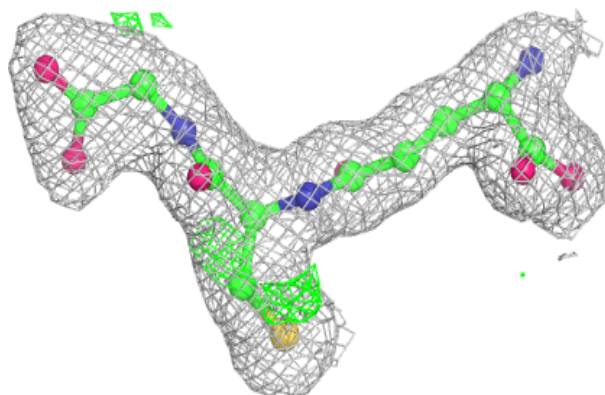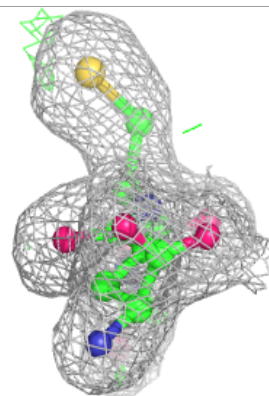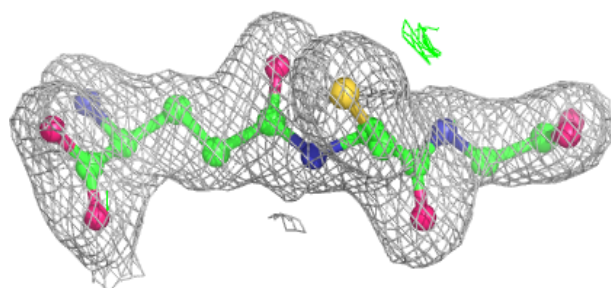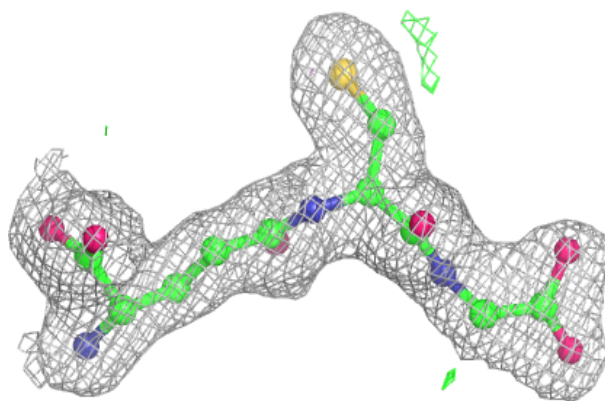
Electron density around GSH F 225:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
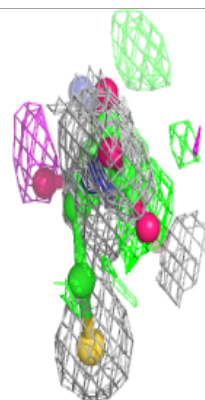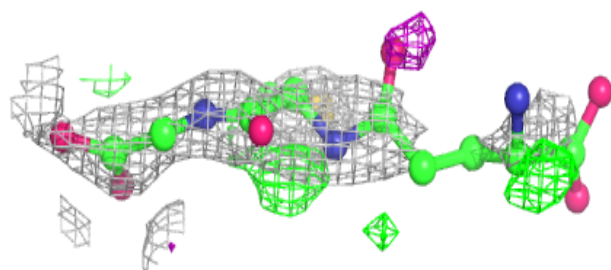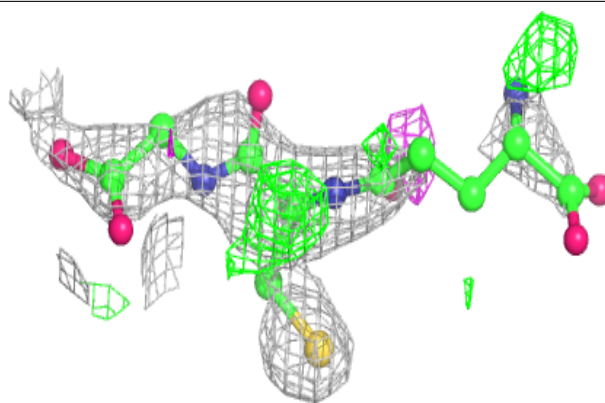
Electron density around GSH D 225:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
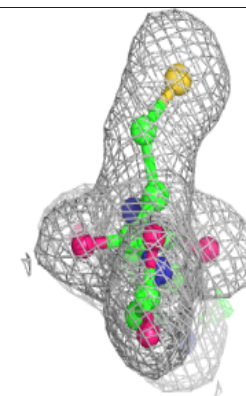and green (positive)
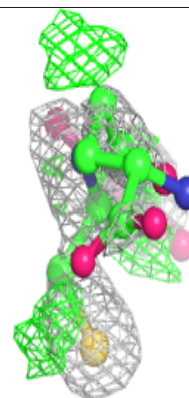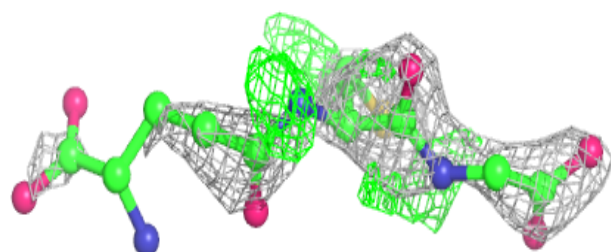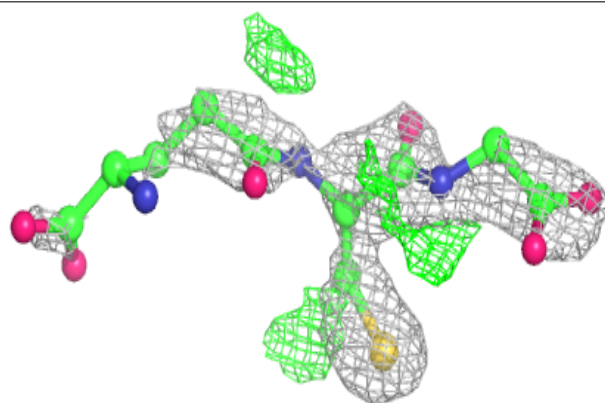
Electron density around GSH E 224:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
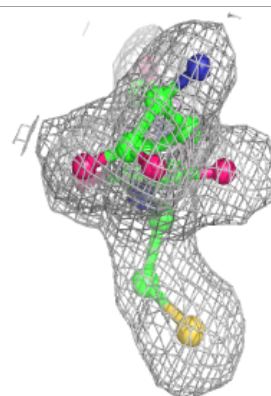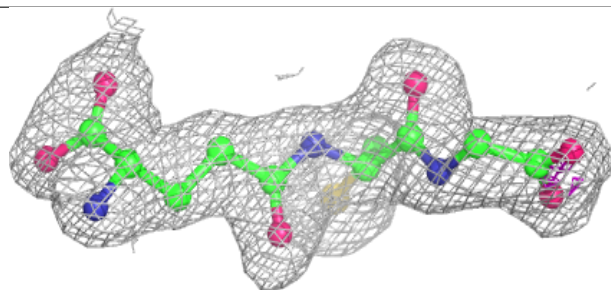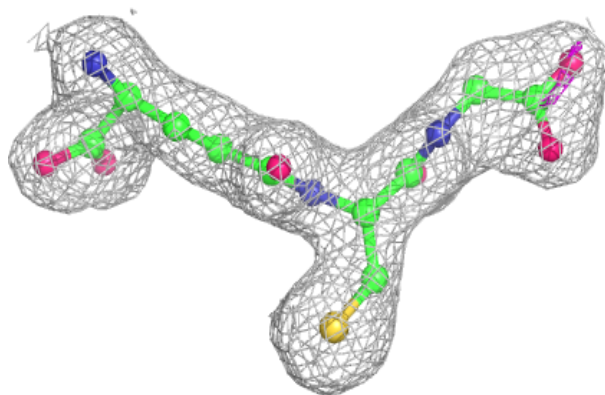
Electron density around GSH A 224:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
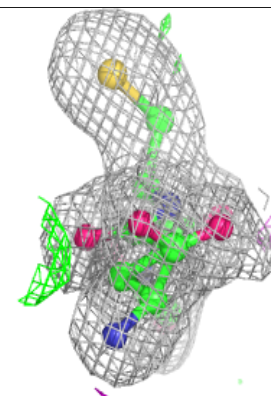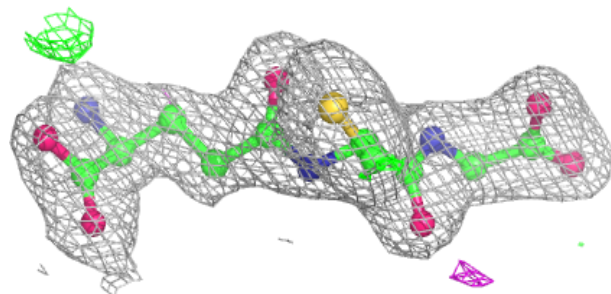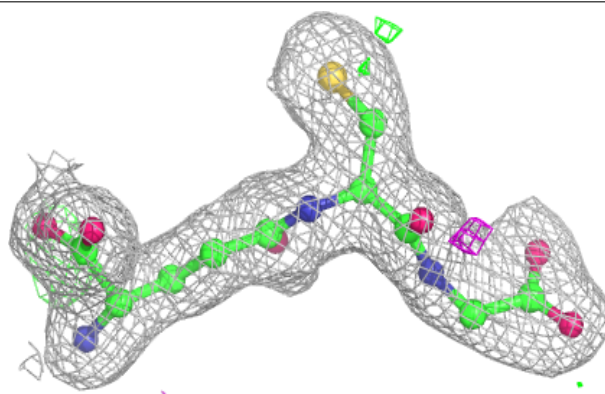
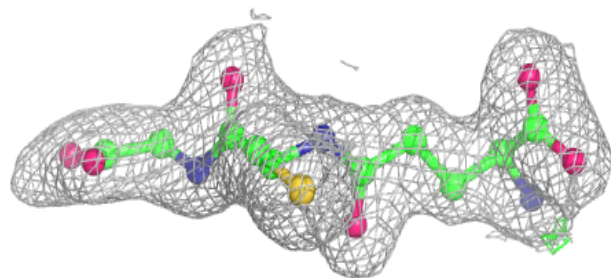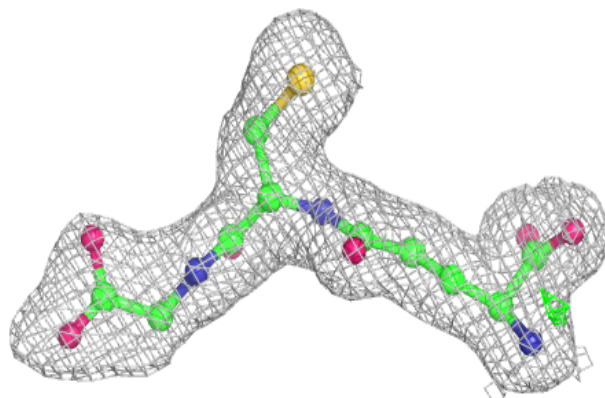**Electron density around GSH B 224:**

2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
and green (positive)
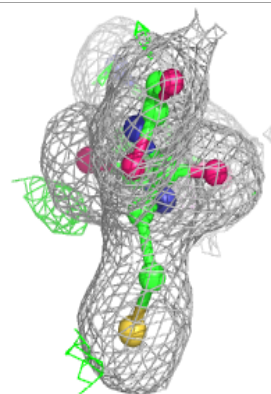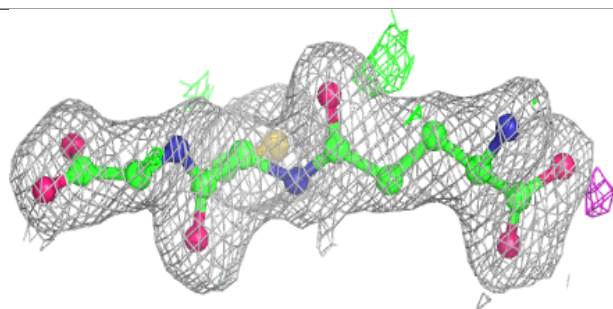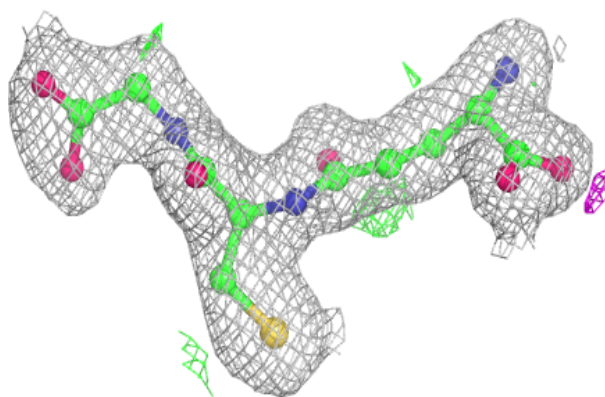
Electron density around GSH C 224:

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 GSH F 224:

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

Electron density around GSH D 224:

$2mF_o$-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 ⓘ

There are no such residues in this entry.