



# Full wwPDB X-ray Structure Validation Report ⓘ

Sep 15, 2020 – 12:25 PM EDT

PDB ID : 7JV8  
Title : Human CD73 (ecto 5'-nucleotidase) in complex with compound 35  
Authors : Gibbons, P.; Du, X.  
Deposited on : 2020-08-20  
Resolution : 2.46 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](mailto: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.

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

MolProbity : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.14.4  
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) : 2.14.4

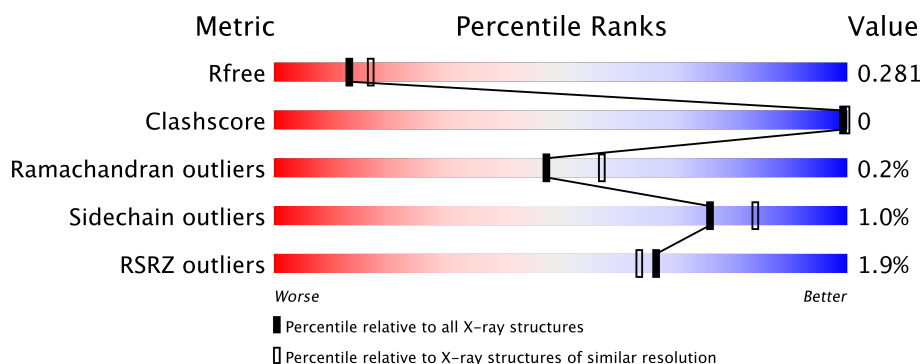
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

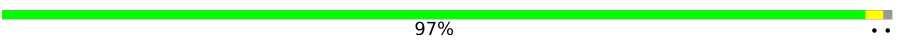
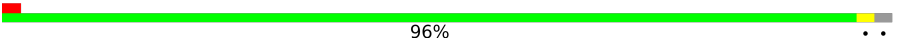
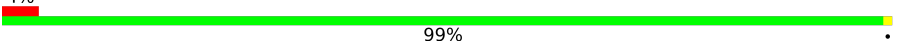
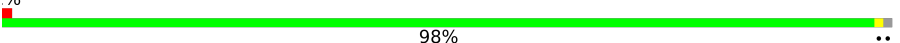
The reported resolution of this entry is 2.46 Å.

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	1544 (2.48-2.44)
Clashscore	141614	1613 (2.48-2.44)
Ramachandran outliers	138981	1598 (2.48-2.44)
Sidechain outliers	138945	1598 (2.48-2.44)
RSRZ outliers	127900	1523 (2.48-2.44)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria 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	529	 97% ..
1	B	529	 2% 96% ..
1	C	529	 4% 99% .
1	D	529	 % 98% ..

## 2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 16768 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 5'-nucleotidase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	525	Total	C	N	O	S	0	2	0
			4068	2594	681	773	20			
1	B	518	Total	C	N	O	S	0	1	0
			3948	2526	649	753	20			
1	C	529	Total	C	N	O	S	0	1	0
			4032	2575	681	758	18			
1	D	525	Total	C	N	O	S	0	2	0
			4066	2592	682	772	20			

There are 36 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	23	LEU	-	expression tag	UNP P21589
A	24	ALA	-	expression tag	UNP P21589
A	25	SER	-	expression tag	UNP P21589
A	26	MET	-	expression tag	UNP P21589
A	53	ASP	ASN	engineered mutation	UNP P21589
A	333	ASP	ASN	engineered mutation	UNP P21589
A	403	ASP	ASN	engineered mutation	UNP P21589
A	550	HIS	-	expression tag	UNP P21589
A	551	HIS	-	expression tag	UNP P21589
B	23	LEU	-	expression tag	UNP P21589
B	24	ALA	-	expression tag	UNP P21589
B	25	SER	-	expression tag	UNP P21589
B	26	MET	-	expression tag	UNP P21589
B	53	ASP	ASN	engineered mutation	UNP P21589
B	333	ASP	ASN	engineered mutation	UNP P21589
B	403	ASP	ASN	engineered mutation	UNP P21589
B	550	HIS	-	expression tag	UNP P21589
B	551	HIS	-	expression tag	UNP P21589
C	23	LEU	-	expression tag	UNP P21589
C	24	ALA	-	expression tag	UNP P21589
C	25	SER	-	expression tag	UNP P21589

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Chain	Residue	Modelled	Actual	Comment	Reference
C	26	MET	-	expression tag	UNP P21589
C	53	ASP	ASN	engineered mutation	UNP P21589
C	333	ASP	ASN	engineered mutation	UNP P21589
C	403	ASP	ASN	engineered mutation	UNP P21589
C	550	HIS	-	expression tag	UNP P21589
C	551	HIS	-	expression tag	UNP P21589
D	23	LEU	-	expression tag	UNP P21589
D	24	ALA	-	expression tag	UNP P21589
D	25	SER	-	expression tag	UNP P21589
D	26	MET	-	expression tag	UNP P21589
D	53	ASP	ASN	engineered mutation	UNP P21589
D	333	ASP	ASN	engineered mutation	UNP P21589
D	403	ASP	ASN	engineered mutation	UNP P21589
D	550	HIS	-	expression tag	UNP P21589
D	551	HIS	-	expression tag	UNP P21589

- Molecule 2 is ZINC ION (three-letter code: ZN) (formula: Zn).

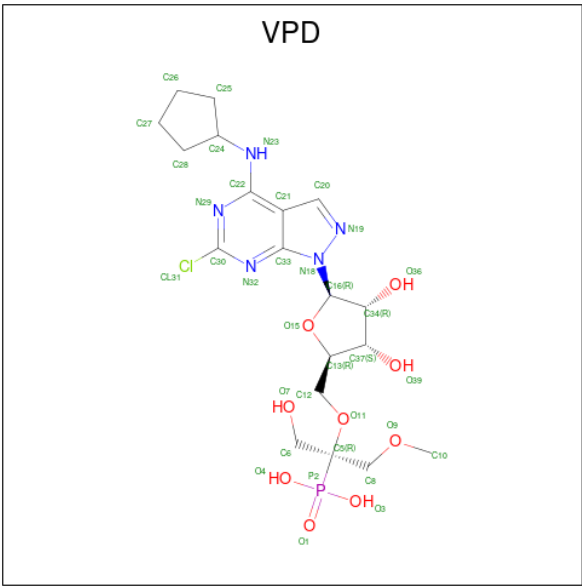
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	B	2	Total Zn 2 2	0	0
2	A	2	Total Zn 2 2	0	0
2	D	2	Total Zn 2 2	0	0
2	C	2	Total Zn 2 2	0	0

- Molecule 3 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	B	1	Total Ca 1 1	0	0
3	A	1	Total Ca 1 1	0	0
3	D	1	Total Ca 1 1	0	0
3	C	1	Total Ca 1 1	0	0

- Molecule 4 is 6-chloro-N-cyclopentyl-1-{5-O-[(2R)-1-hydroxy-3-methoxy-2-phosphonopropan-2-yl]-beta-D-ribofuranosyl}-1H-pyrazolo[3,4-d]pyrimidin-4-amine (three-letter code:

VPD) (formula: C<sub>19</sub>H<sub>29</sub>ClN<sub>5</sub>O<sub>9</sub>P) (labeled as "Ligand of Interest" by author).



Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
4	A	1	Total	C	Cl	N	O	P	0	0
			35	19	1	5	9	1		
4	B	1	Total	C	Cl	N	O	P	0	0
			35	19	1	5	9	1		
4	C	1	Total	C	Cl	N	O	P	0	0
			35	19	1	5	9	1		
4	D	1	Total	C	Cl	N	O	P	0	0
			35	19	1	5	9	1		

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	184	Total	O	0	1
			185	185		
5	B	67	Total	O	0	0
			67	67		
5	C	88	Total	O	0	0
			88	88		
5	D	162	Total	O	0	0
			162	162		

### 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 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: 5'-nucleotidase

Chain A:  97%



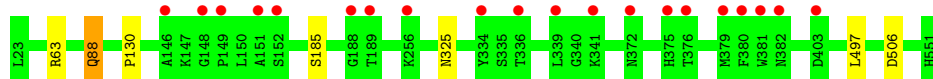
- Molecule 1: 5'-nucleotidase

Chain B:  96%



- Molecule 1: 5'-nucleotidase

Chain C:  99%



- Molecule 1: 5'-nucleotidase

Chain D:  98%



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	87.88Å 102.35Å 129.61Å 90.00° 103.22° 90.00°	Depositor
Resolution (Å)	126.17 – 2.46 46.00 – 2.46	Depositor EDS
% Data completeness (in resolution range)	94.7 (126.17-2.46) 94.7 (46.00-2.46)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.08	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.18 (at 2.45Å)	Xtriage
Refinement program	REFMAC 5.8.0155	Depositor
R, $R_{free}$	0.220 , 0.279 0.224 , 0.281	Depositor DCC
$R_{free}$ test set	988 reflections (1.28%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	37.9	Xtriage
Anisotropy	0.307	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.28 , 27.6	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	16768	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	46.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.10% of the height of the origin peak. No significant pseudotranslation is detected.*

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

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

## 5 Model quality

### 5.1 Standard geometry

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

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	0.56	0/4154	0.78	3/5634 (0.1%)
1	B	0.56	0/4029	0.76	2/5472 (0.0%)
1	C	0.56	0/4120	0.76	1/5596 (0.0%)
1	D	0.55	0/4152	0.77	1/5633 (0.0%)
All	All	0.56	0/16455	0.77	7/22335 (0.0%)

There are no bond length outliers.

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	53	ASP	CB-CG-OD1	7.70	125.23	118.30
1	B	273	ARG	NE-CZ-NH1	5.92	123.26	120.30
1	A	72	ARG	NE-CZ-NH2	-5.67	117.47	120.30
1	B	63	ARG	NE-CZ-NH1	5.37	122.99	120.30
1	A	72	ARG	NE-CZ-NH1	5.25	122.92	120.30
1	C	63	ARG	NE-CZ-NH1	5.23	122.92	120.30
1	D	273	ARG	NE-CZ-NH1	5.23	122.92	120.30

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	4068	0	3980	5	0
1	B	3948	0	3774	2	0
1	C	4032	0	3855	0	0
1	D	4066	0	3965	0	0
2	A	2	0	0	0	0
2	B	2	0	0	0	0
2	C	2	0	0	0	0
2	D	2	0	0	0	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
3	C	1	0	0	0	0
3	D	1	0	0	0	0
4	A	35	0	0	0	0
4	B	35	0	0	0	0
4	C	35	0	0	0	0
4	D	35	0	0	0	0
5	A	185	0	0	0	0
5	B	67	0	0	0	0
5	C	88	0	0	0	0
5	D	162	0	0	0	0
All	All	16768	0	15574	7	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 0.

All (7) 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:125[A]:GLU:OE1	1:A:125[A]:GLU:N	2.23	0.72
1:A:125[A]:GLU:H	1:A:125[A]:GLU:CD	1.92	0.70
1:B:424:VAL:HG22	1:B:497:LEU:HD22	2.00	0.42
1:A:124:VAL:HG11	1:A:150:LEU:HD11	2.00	0.42
1:A:88:GLN:HG2	1:A:417:PHE:CD1	2.56	0.41
1:B:124:VAL:HG13	1:B:154:ILE:HD12	2.02	0.41
1:A:88:GLN:HG2	1:A:417:PHE:CE1	2.56	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	525/529 (99%)	508 (97%)	16 (3%)	1 (0%)	47	57
1	B	513/529 (97%)	497 (97%)	15 (3%)	1 (0%)	47	57
1	C	528/529 (100%)	509 (96%)	17 (3%)	2 (0%)	34	41
1	D	525/529 (99%)	509 (97%)	15 (3%)	1 (0%)	47	57
All	All	2091/2116 (99%)	2023 (97%)	63 (3%)	5 (0%)	47	57

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	88	GLN
1	B	88	GLN
1	C	88	GLN
1	D	88	GLN
1	C	130	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	438/456 (96%)	434 (99%)	4 (1%)	78	86
1	B	406/456 (89%)	401 (99%)	5 (1%)	71	81
1	C	412/456 (90%)	407 (99%)	5 (1%)	71	81
1	D	434/456 (95%)	431 (99%)	3 (1%)	84	90
All	All	1690/1824 (93%)	1673 (99%)	17 (1%)	76	84

All (17) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	185	SER
1	A	325	ASN
1	A	402	ASN
1	A	497	LEU
1	B	88	GLN
1	B	185	SER
1	B	402	ASN
1	B	462	SER
1	B	497	LEU
1	C	88	GLN
1	C	185	SER
1	C	325	ASN
1	C	497	LEU
1	C	506	ASP
1	D	185	SER
1	D	497	LEU
1	D	506	ASP

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	523	GLN
1	C	325	ASN
1	D	311	ASN

### 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

Of 16 ligands modelled in this entry, 12 are monoatomic - leaving 4 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
4	VPD	B	604	2	31,38,38	1.43	4 (12%)	35,57,57	2.72	7 (20%)
4	VPD	A	604	2	31,38,38	1.13	4 (12%)	35,57,57	2.69	9 (25%)
4	VPD	D	604	2	31,38,38	1.03	3 (9%)	35,57,57	2.75	8 (22%)
4	VPD	C	604	2	31,38,38	1.29	4 (12%)	35,57,57	2.90	9 (25%)

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
4	VPD	B	604	2	-	4/10/53/53	0/4/4/4
4	VPD	A	604	2	-	2/10/53/53	0/4/4/4
4	VPD	D	604	2	-	4/10/53/53	0/4/4/4
4	VPD	C	604	2	-	4/10/53/53	0/4/4/4

All (15) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	604	VPD	C30-N32	3.98	1.33	1.30
4	B	604	VPD	P2-O3	3.78	1.61	1.54
4	C	604	VPD	P2-O3	3.61	1.61	1.54
4	B	604	VPD	O15-C16	3.49	1.45	1.41
4	C	604	VPD	C30-N32	3.11	1.32	1.30
4	C	604	VPD	P2-O4	2.99	1.60	1.54
4	A	604	VPD	P2-O4	2.95	1.60	1.54
4	A	604	VPD	P2-O3	2.93	1.60	1.54
4	B	604	VPD	P2-O4	2.93	1.60	1.54
4	C	604	VPD	O15-C16	2.78	1.45	1.41

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	D	604	VPD	P2-O4	2.72	1.59	1.54
4	A	604	VPD	C30-N32	2.63	1.32	1.30
4	A	604	VPD	O15-C16	2.38	1.44	1.41
4	D	604	VPD	P2-O3	2.35	1.59	1.54
4	D	604	VPD	O15-C16	2.18	1.44	1.41

All (33) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	D	604	VPD	N32-C30-N29	-9.52	121.03	130.62
4	C	604	VPD	N32-C30-N29	-9.39	121.16	130.62
4	B	604	VPD	N32-C30-N29	-9.38	121.18	130.62
4	C	604	VPD	C30-N32-C33	9.25	121.42	114.09
4	B	604	VPD	C30-N32-C33	8.85	121.10	114.09
4	D	604	VPD	C30-N32-C33	8.76	121.02	114.09
4	A	604	VPD	N32-C30-N29	-8.67	121.88	130.62
4	A	604	VPD	C30-N32-C33	7.84	120.30	114.09
4	C	604	VPD	C21-C22-N23	5.92	126.21	120.63
4	A	604	VPD	C21-C22-N23	5.81	126.11	120.63
4	D	604	VPD	C21-C22-N23	5.24	125.56	120.63
4	D	604	VPD	C30-N29-C22	4.72	122.74	116.64
4	B	604	VPD	CL31-C30-N32	4.69	119.70	115.70
4	C	604	VPD	C30-N29-C22	4.55	122.52	116.64
4	A	604	VPD	C30-N29-C22	4.51	122.47	116.64
4	D	604	VPD	CL31-C30-N29	4.35	121.37	115.15
4	B	604	VPD	C30-N29-C22	4.35	122.27	116.64
4	B	604	VPD	C21-C22-N23	3.95	124.35	120.63
4	A	604	VPD	CL31-C30-N32	3.70	118.86	115.70
4	C	604	VPD	CL31-C30-N29	3.54	120.21	115.15
4	C	604	VPD	CL31-C30-N32	3.43	118.63	115.70
4	A	604	VPD	CL31-C30-N29	2.86	119.24	115.15
4	B	604	VPD	CL31-C30-N29	2.78	119.12	115.15
4	D	604	VPD	C21-C22-N29	-2.42	118.02	121.98
4	C	604	VPD	C21-C22-N29	-2.41	118.03	121.98
4	C	604	VPD	O3-P2-O1	-2.38	107.72	113.06
4	A	604	VPD	C12-C13-C37	-2.35	106.37	115.18
4	A	604	VPD	C28-C24-N23	-2.30	106.87	111.76
4	A	604	VPD	C21-C22-N29	-2.27	118.26	121.98
4	D	604	VPD	CL31-C30-N32	2.22	117.59	115.70
4	B	604	VPD	C21-C22-N29	-2.21	118.35	121.98
4	D	604	VPD	C28-C24-N23	-2.06	107.39	111.76
4	C	604	VPD	C28-C24-N23	-2.01	107.49	111.76

There are no chirality outliers.

All (14) torsion outliers are listed below:

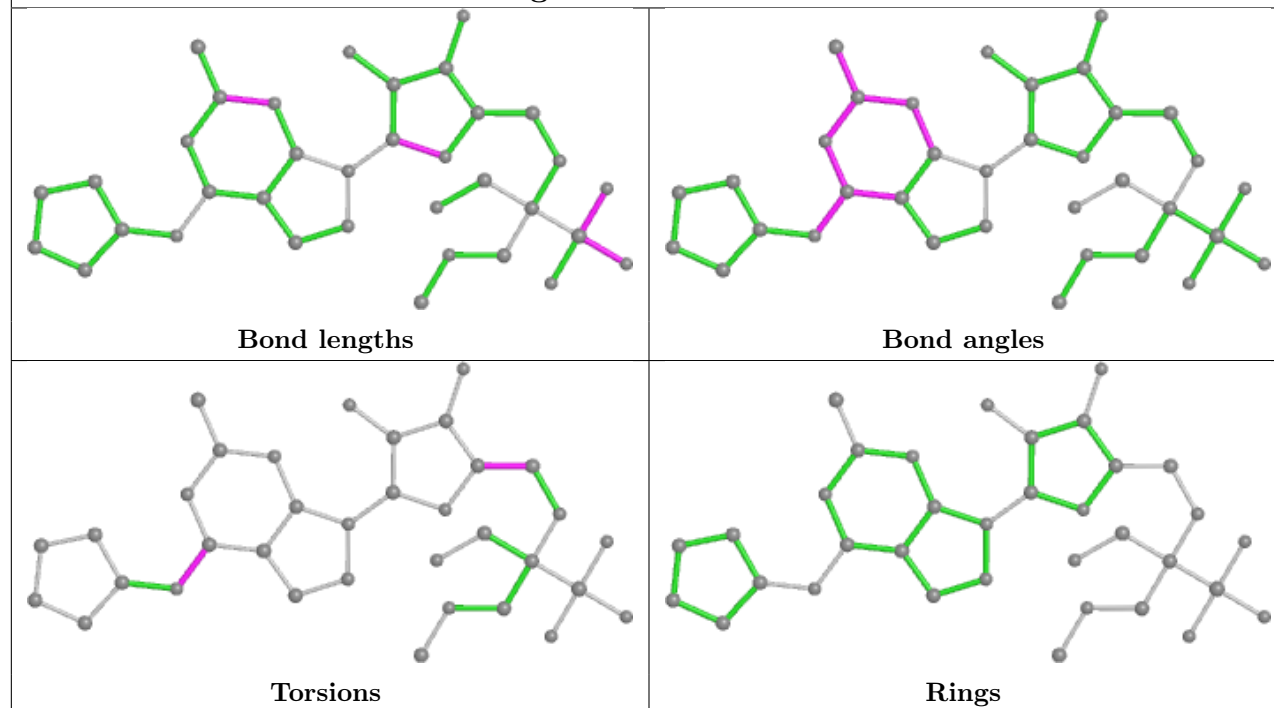
Mol	Chain	Res	Type	Atoms
4	D	604	VPD	O11-C12-C13-O15
4	B	604	VPD	C21-C22-N23-C24
4	B	604	VPD	N29-C22-N23-C24
4	B	604	VPD	O11-C12-C13-O15
4	D	604	VPD	O11-C12-C13-C37
4	C	604	VPD	O11-C12-C13-C37
4	B	604	VPD	O11-C12-C13-C37
4	C	604	VPD	O11-C12-C13-O15
4	C	604	VPD	C21-C22-N23-C24
4	D	604	VPD	C21-C22-N23-C24
4	A	604	VPD	C21-C22-N23-C24
4	C	604	VPD	N29-C22-N23-C24
4	D	604	VPD	N29-C22-N23-C24
4	A	604	VPD	N29-C22-N23-C24

There are no ring outliers.

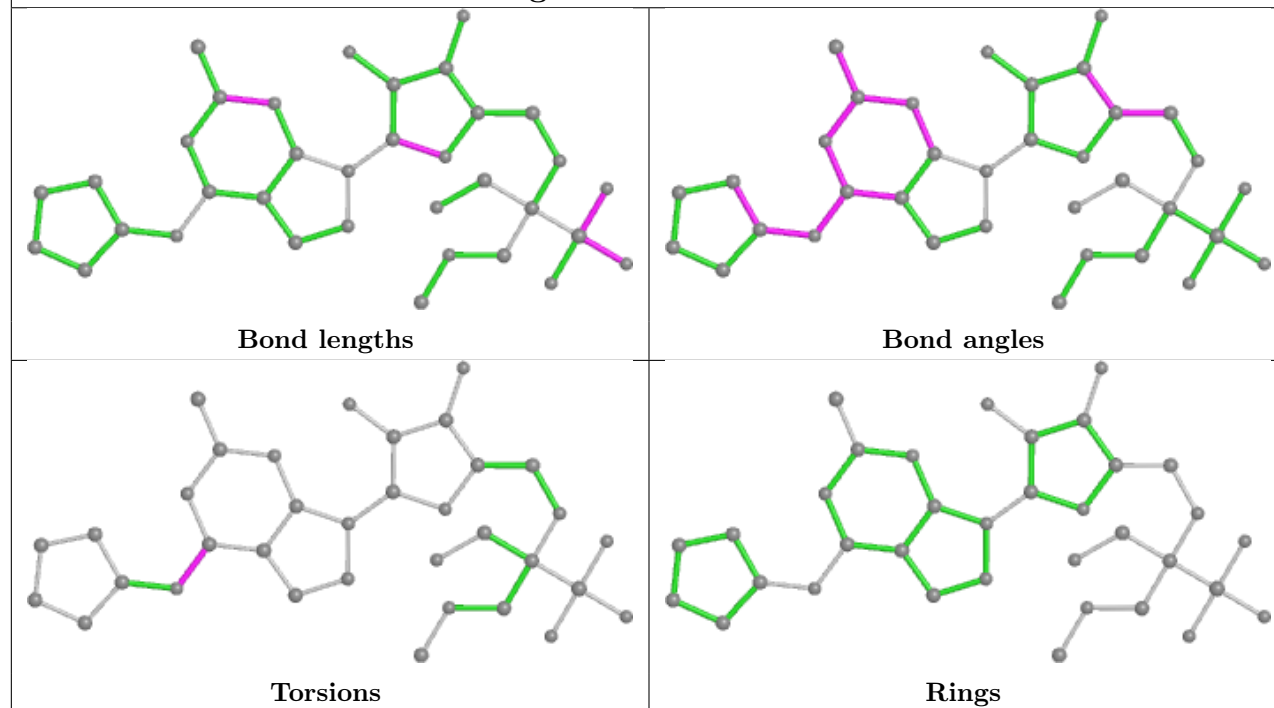
No monomer is involved in short contacts.

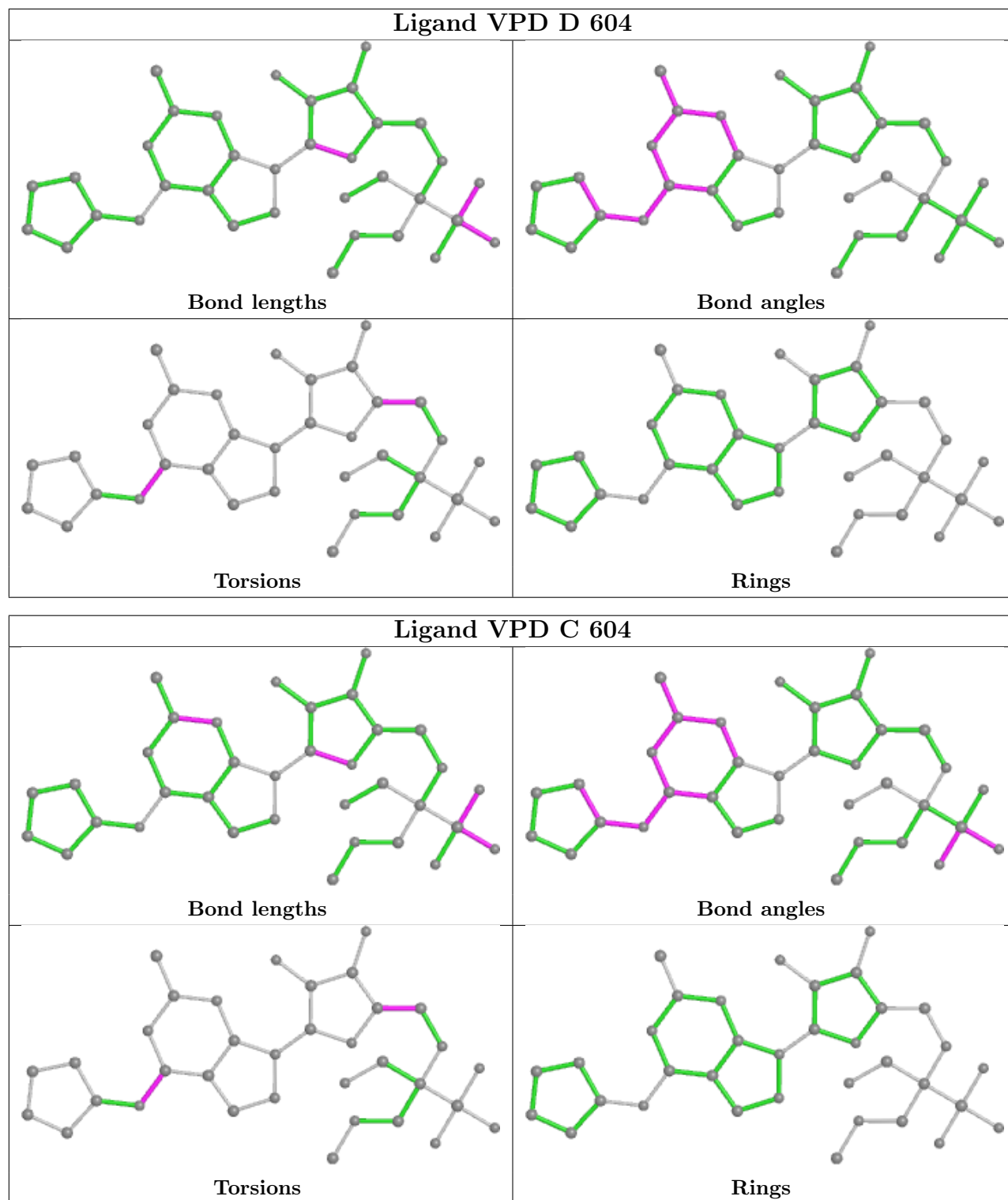
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. 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.

## Ligand VPD B 604



## Ligand VPD A 604





## 5.7 Other polymers [i](#)

There are no such residues in this entry.



## 5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

## 6 Fit of model and data ⓘ

### 6.1 Protein, DNA and RNA chains ⓘ

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95<sup>th</sup> percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q < 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	A	525/529 (99%)	-0.27	1 (0%) 95 95	18, 35, 59, 103	0
1	B	518/529 (97%)	0.15	12 (2%) 60 56	28, 52, 88, 130	0
1	C	529/529 (100%)	0.18	20 (3%) 40 37	23, 50, 96, 143	0
1	D	525/529 (99%)	-0.20	6 (1%) 80 80	21, 37, 67, 100	0
All	All	2097/2116 (99%)	-0.03	39 (1%) 66 64	18, 43, 82, 143	0

All (39) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	149	PRO	5.4
1	C	148	GLY	4.7
1	C	152	SER	3.7
1	C	336	THR	3.6
1	D	334	TYR	3.4
1	B	381	TRP	3.4
1	C	379	MET	3.4
1	B	74	ALA	3.3
1	B	378	GLU	3.2
1	C	382	ASN	3.2
1	C	376	THR	3.0
1	C	188	GLY	3.0
1	B	380	PHE	3.0
1	D	329	ILE	3.0
1	B	25	SER	2.7
1	C	381	TRP	2.7
1	C	146	ALA	2.6
1	B	26	MET	2.6
1	B	254	PRO	2.5
1	C	375	HIS	2.4
1	C	151	ALA	2.4

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Mol	Chain	Res	Type	RSRZ
1	C	189	THR	2.4
1	C	380	PHE	2.4
1	D	335	SER	2.3
1	B	383	HIS	2.3
1	C	256	LYS	2.3
1	B	379	MET	2.2
1	C	372	ASN	2.2
1	B	27	TRP	2.2
1	C	339	LEU	2.2
1	B	289	TYR	2.1
1	D	189	THR	2.1
1	D	168	ASP	2.1
1	C	334	TYR	2.1
1	C	341	LYS	2.1
1	A	376	THR	2.1
1	D	56	ARG	2.1
1	C	403	ASP	2.0
1	B	268	THR	2.0

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

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

## 6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

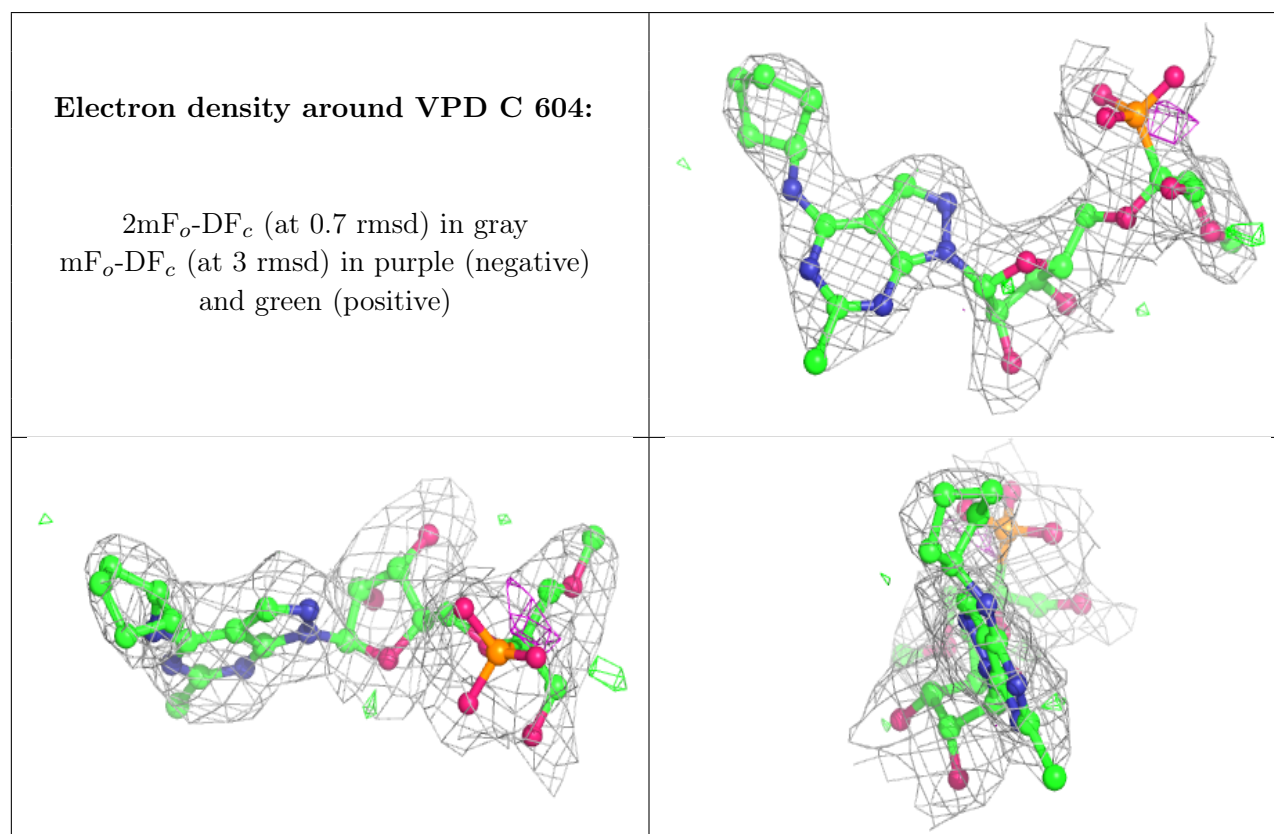
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
3	CA	B	603	1/1	0.86	0.12	64,64,64,64	1
2	ZN	B	601	1/1	0.90	0.07	47,47,47,47	0
4	VPD	C	604	35/35	0.92	0.17	28,48,76,120	0
4	VPD	B	604	35/35	0.94	0.15	34,45,62,102	0
2	ZN	B	602	1/1	0.95	0.07	41,41,41,41	0

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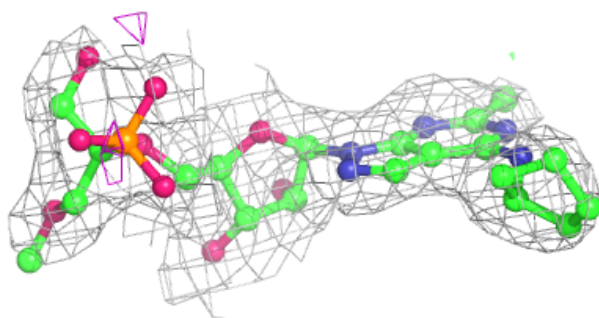
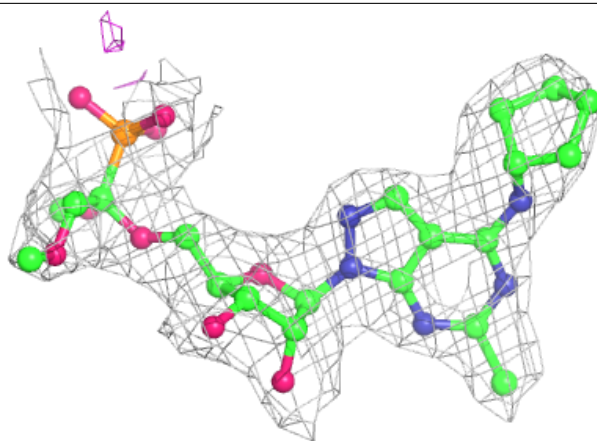
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
3	CA	D	603	1/1	0.95	0.10	36,36,36,36	1
2	ZN	D	601	1/1	0.96	0.04	36,36,36,36	0
4	VPD	D	604	35/35	0.96	0.14	21,29,45,71	0
3	CA	A	603	1/1	0.97	0.06	31,31,31,31	1
4	VPD	A	604	35/35	0.97	0.13	15,26,35,73	0
2	ZN	C	601	1/1	0.97	0.04	52,52,52,52	0
2	ZN	A	601	1/1	0.97	0.06	34,34,34,34	0
3	CA	C	603	1/1	0.98	0.06	28,28,28,28	1
2	ZN	C	602	1/1	0.98	0.06	38,38,38,38	0
2	ZN	A	602	1/1	0.99	0.07	25,25,25,25	0
2	ZN	D	602	1/1	0.99	0.08	29,29,29,29	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.

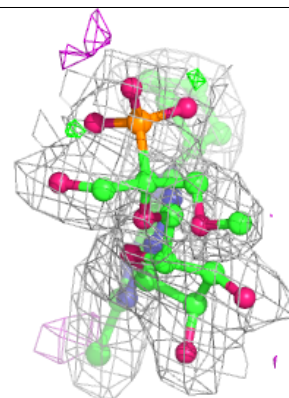
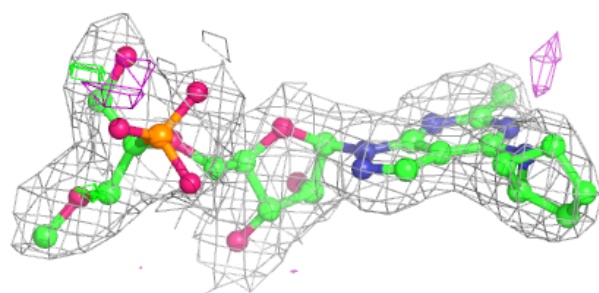
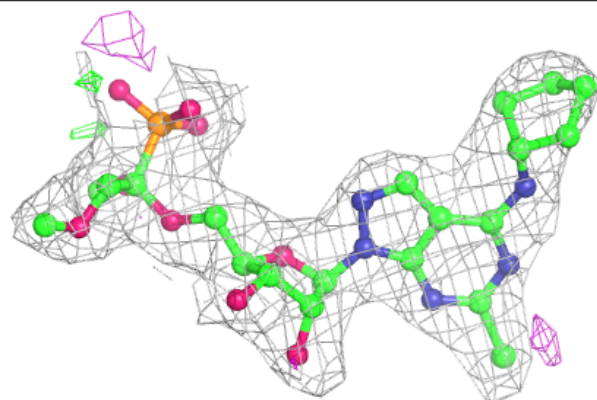


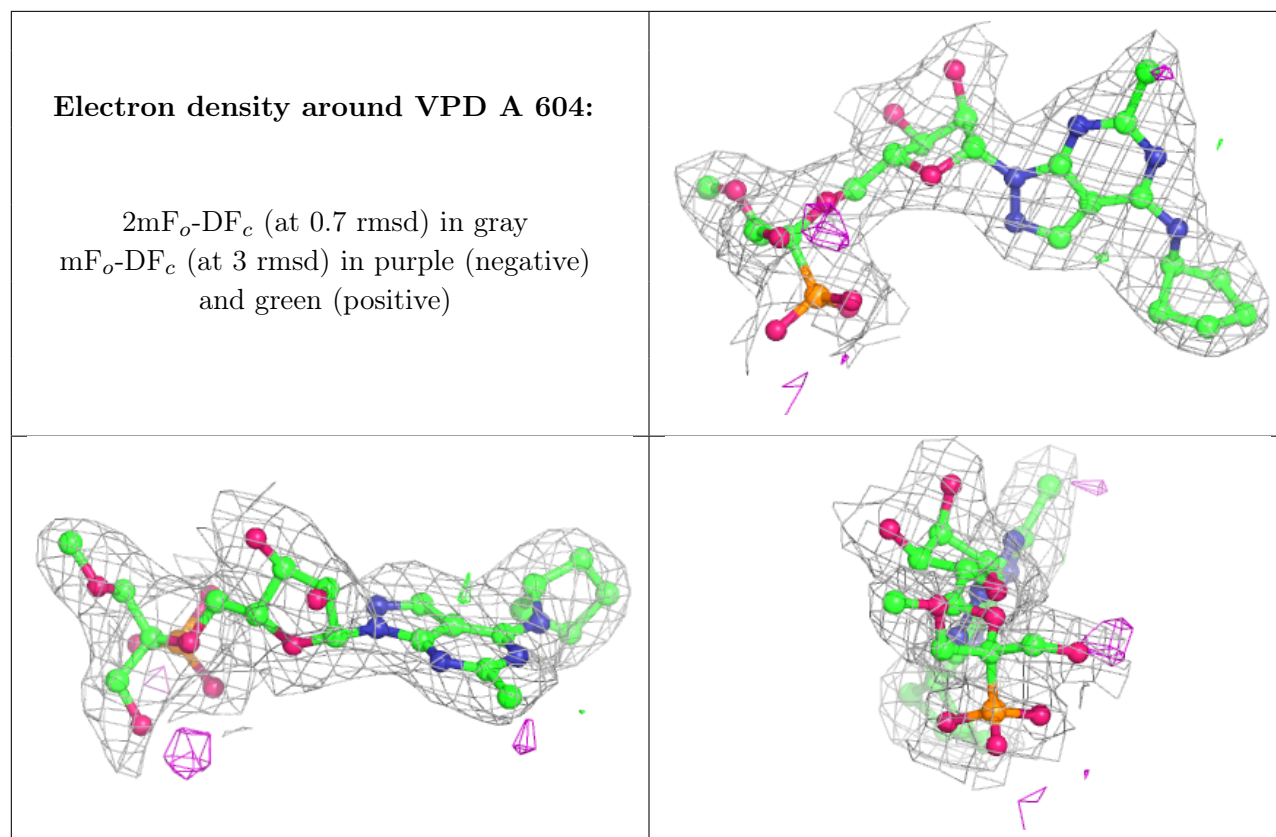
**Electron density around VPD B 604:**

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

**Electron density around VPD D 604:**

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





## 6.5 Other polymers [i](#)

There are no such residues in this entry.