Supplementary materials

Design, synthesis, and structure-activity relationship studies of new quinone derivatives as antibacterial agents

Juan Andrades-Lagos [1,2†*], Javier Campanini-Salinas [2,3†*], América Pedreros-Riquelme [2], Jaime Mella [4,5], Duane Choquesillo-Lazarte [6], P.P. Zamora [7], Hernán Pessoa-Mahana [8]; Ian Burbulis [9] and David Vásquez-Velásquez [2,*]

1 Table

11 Figures

26 Pages

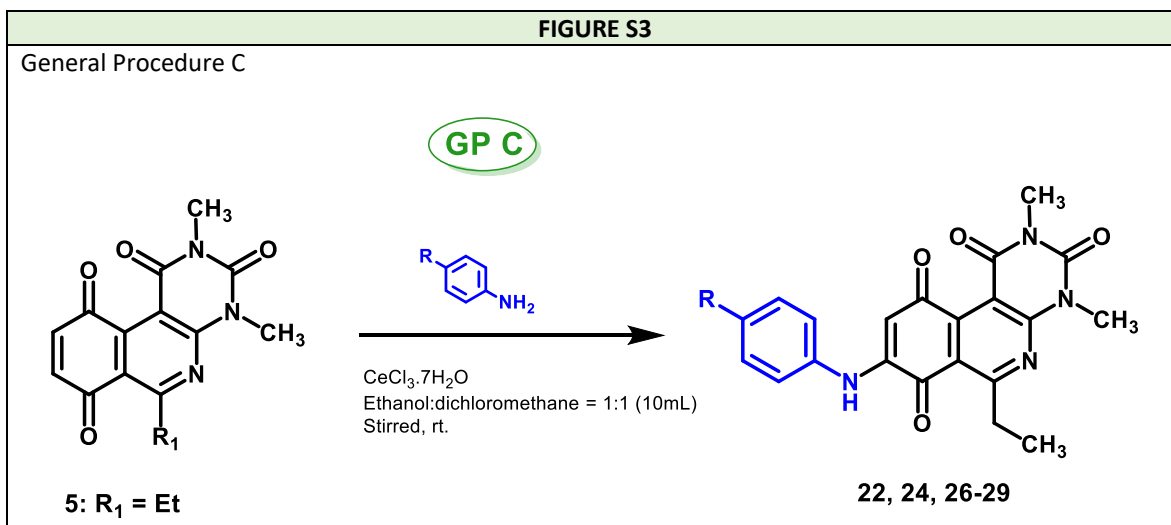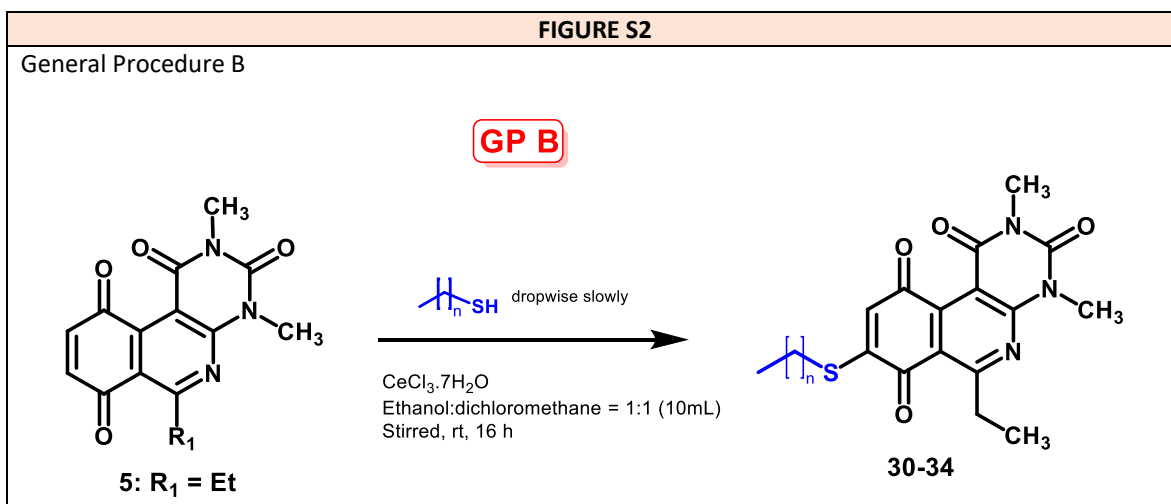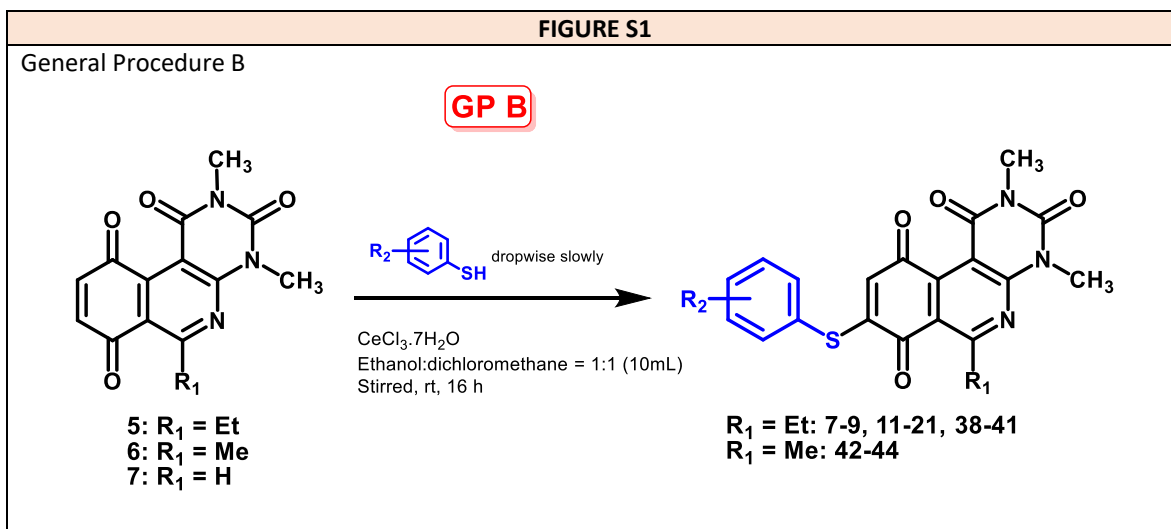# GENERAL SYNTHESIS PROCEDURES PRESENT IN FIGURE 3, INDIVIDUALIZED.

FIGURE S1
General Procedure B

GP B

5: R_1 = Et
6: R_1 = Me
7: R_1 = H

R_2—SH dropwise slowly

$CeCl_3 \cdot 7H_2O$
Ethanol:dichloromethane = 1:1 (10mL)
Stirred, rt, 16 h

R_1 = Et: 7-9, 11-21, 38-41
R_1 = Me: 42-44

FIGURE S2
General Procedure B

GP B

5: R_1 = Et

H_n—SH dropwise slowly

$CeCl_3 \cdot 7H_2O$
Ethanol:dichloromethane = 1:1 (10mL)
Stirred, rt, 16 h

30-34

FIGURE S3
General Procedure C

GP C

5: R_1 = Et

R—NH_2

$CeCl_3 \cdot 7H_2O$
Ethanol:dichloromethane = 1:1 (10mL)
Stirred, rt.

22, 24, 26-29

FIGURE S4

General Procedure D

GP D

2 X R—⬡—SH

or

2 X ⌇SH

CeCl$_3$.7H$_2$O
Ethanol (40mL)
Reflux, 1-4 h.

5: R$_1$ = Et

35-37
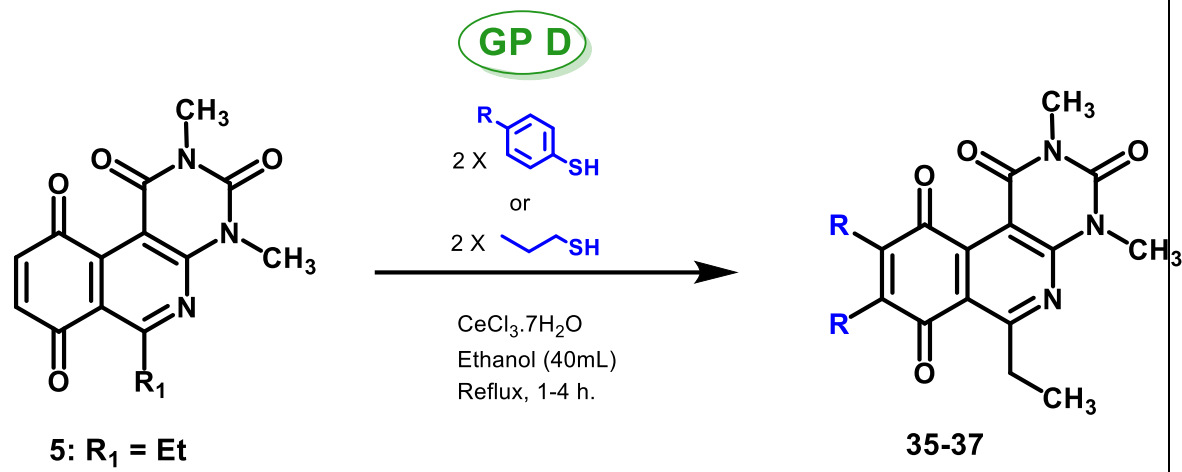
TABLE S1. CRYSTALLOGRAPHIC INFORMATION

	5c.cif	6c.cif	7c.cif	8c.cif	11c.cif	19c.cif	20c.cif
Figure	S5	S6	S7	S8	S9	S10	S11
Empirical formula	$C_{21}H_{15}BrClN_3O_4S$	$C_{17}H_{17}N_3O_4S$	$C_{21}H_{17}ClN_4O_4$	$C_{21}H_{17}BrN_4O_4$	$C_{20}H_{14}BrN_3O_4S$	$C_{19}H_{21}N_3O_4S$	$C_{21}H_{19}N_5O_4$
Formula weight	520.78	359.39	424.84	469.30	472.31	387.45	405.41
Temperature [K]	298(2)	298(2)	298(2)	298(2)	298(2)	298(2)	298(2)
Crystal system	monoclinic	triclinic	monoclinic	monoclinic	orthorhombic	monoclinic	monoclinic
Space group (number)	$P2_1/n$ (14)	$P\bar{1}$ (2)	$P2_1/c$ (14)	$P2_1/c$ (14)	$Pbcn$ (60)	$P2_1/n$ (14)	$P2_1/c$ (14)
a [Å]	9.0790(11)	4.4062(8)	7.6795(2)	7.6848(2)	24.2195(6)	4.5196(2)	8.7845(3)
b [Å]	7.8903(17)	10.9278(19)	16.6845(4)	16.8295(5)	7.5475(2)	26.8428(13)	10.4767(4)
c [Å]	28.412(3)	17.524(3)	15.1553(5)	15.2751(5)	21.3877(6)	15.3585(10)	21.3483(10)
α [°]	90	80.857(5)	90	90	90	90	90
β [°]	90.884(4)	88.521(6)	95.638(2)	95.860(2)	90	95.006(4)	99.351(3)
γ [°]	90	83.122(6)	90	90	90	90	90
Volume [Å³]	2035.1(5)	827.1(3)	1932.43(9)	1965.23(10)	3909.60(18)	1856.17(17)	1938.63(14)
Z	4	2	4	4	8	4	4
ρ_{calc} [gcm⁻³]	1.700	1.443	1.460	1.586	1.605	1.386	1.389
μ [mm⁻¹]	2.290	0.224	2.080	3.177	4.156	1.816	0.821
F(000)	1048	376	880	952	1904	816	848
Reflections collected	16317	11000	22651	38361	19486	18750	36846
Independent reflections	4678	2899	3405	3443	3427	3269	3426
Completeness	99.5 %	99.1 %	99.6 %	99.4 %	99.2 %	98.5 %	99.2 %
Data / Restraints / Parameters	4678/0/283	2899/0/230	3405/0/275	3443/0/275	3427/0/266	3269/0/249	3426/0/276
Goodness-of-fit on F^2	1.034	1.031	1.062	1.074	1.090	1.046	1.043
Final R indexes [$I \geq 2\sigma(I)$]	R_1 = 0.0323 wR_2 = 0.0824	R_1 = 0.0836 wR_2 = 0.1503	R_1 = 0.0684 wR_2 = 0.1497	R_1 = 0.0396 wR_2 = 0.1001	R_1 = 0.0654 wR_2 = 0.1397	R_1 = 0.0441 wR_2 = 0.1083	R_1 = 0.0481 wR_2 = 0.1310
Final R indexes [all data]	R_1 = 0.0466 wR_2 = 0.0888	R_1 = 0.2047 wR_2 = 0.1864	R_1 = 0.1194 wR_2 = 0.1789	R_1 = 0.0469 wR_2 = 0.1059	R_1 = 0.1055 wR_2 = 0.1621	R_1 = 0.0557 wR_2 = 0.1155	R_1 = 0.0508 wR_2 = 0.1334
Largest peak/hole [eÅ⁻³]	0.42/-0.59	0.52/-0.21	0.29/-0.27	0.46/-0.65	0.44/-0.64	0.21/-0.20	0.29/-0.23

checkCIF/PLATON report

You have not supplied any structure factors. As a result the full set of tests cannot be run.

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No syntax errors found.　　CIF dictionary　　Interpreting this report

Datablock: 5c

```
Bond precision:   C-C = 0.0031 A              Wavelength=0.71073

Cell:             a=9.0790(11)     b=7.8903(17)        c=28.412(3)
                  alpha=90         beta=90.884(4)      gamma=90
Temperature:      298 K

                  Calculated                  Reported
Volume            2035.1(5)                   2035.1(5)
Space group       P 21/n                      P2(1)/n
Hall group        -P 2yn                      -P 2yn
Moiety formula    C21 H15 Br Cl N3 O4 S       C21 H15 Br Cl N3 O4 S
Sum formula       C21 H15 Br Cl N3 O4 S       C21 H15 Br Cl N3 O4 S
Mr                520.77                      520.78
Dx,g cm-3         1.700                       1.700
Z                 4                           4
Mu (mm-1)         2.290                       2.290
F000              1048.0                      1048.0
F000'             1048.34
h,k,lmax          11,10,37                    11,10,36
Nref              4721                        4678
Tmin,Tmax         0.760,0.795                 0.508,0.746
Tmin'             0.760

Correction method= # Reported T Limits: Tmin=0.508 Tmax=0.746
AbsCorr = MULTI-SCAN

Data completeness= 0.991          Theta(max)= 27.591

R(reflections)= 0.0323( 3751)      wR2(reflections)= 0.0888( 4678)

S = 1.034                  Npar= 283
```

The following ALERTS were generated. Each ALERT has the format
　　　test-name_ALERT_alert-type_alert-level.
Click on the hyperlinks for more details of the test.

Figure S5

🟡 **Alert level C**
PLAT431_ALERT_2_C Short Inter HL..A Contact Br12   ..O15   .   3.12 Ang.
                                                    x,1+y,z =   1_565 Check

⚪ **Alert level G**
PLAT883_ALERT_1_G No Info/Value for _atom_sites_solution_primary .   Please Do !
PLAT941_ALERT_3_G Average HKL Measurement Multiplicity ....   3.5 Low

```
   0 ALERT level A = Most likely a serious problem - resolve or explain
   0 ALERT level B = A potentially serious problem, consider carefully
   1 ALERT level C = Check. Ensure it is not caused by an omission or oversight
   2 ALERT level G = General information/check it is not something unexpected

   1 ALERT type 1 CIF construction/syntax error, inconsistent or missing data
   1 ALERT type 2 Indicator that the structure model may be wrong or deficient
   1 ALERT type 3 Indicator that the structure quality may be low
   0 ALERT type 4 Improvement, methodology, query or suggestion
   0 ALERT type 5 Informative message, check
```

It is advisable to attempt to resolve as many as possible of the alerts in all categories. Often the minor alerts point to easily fixed oversights, errors and omissions in your CIF or refinement strategy, so attention to these fine details can be worthwhile. In order to resolve some of the more serious problems it may be necessary to carry out additional measurements or structure refinements. However, the purpose of your study may justify the reported deviations and the more serious of these should normally be commented upon in the discussion or experimental section of a paper or in the "special_details" fields of the CIF. checkCIF was carefully designed to identify outliers and unusual parameters, but every test has its limitations and alerts that are not important in a particular case may appear. Conversely, the absence of alerts does not guarantee there are no aspects of the results needing attention. It is up to the individual to critically assess their own results and, if necessary, seek expert advice.

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PLATON version of 10/08/2020; check.def file version of 06/08/2020

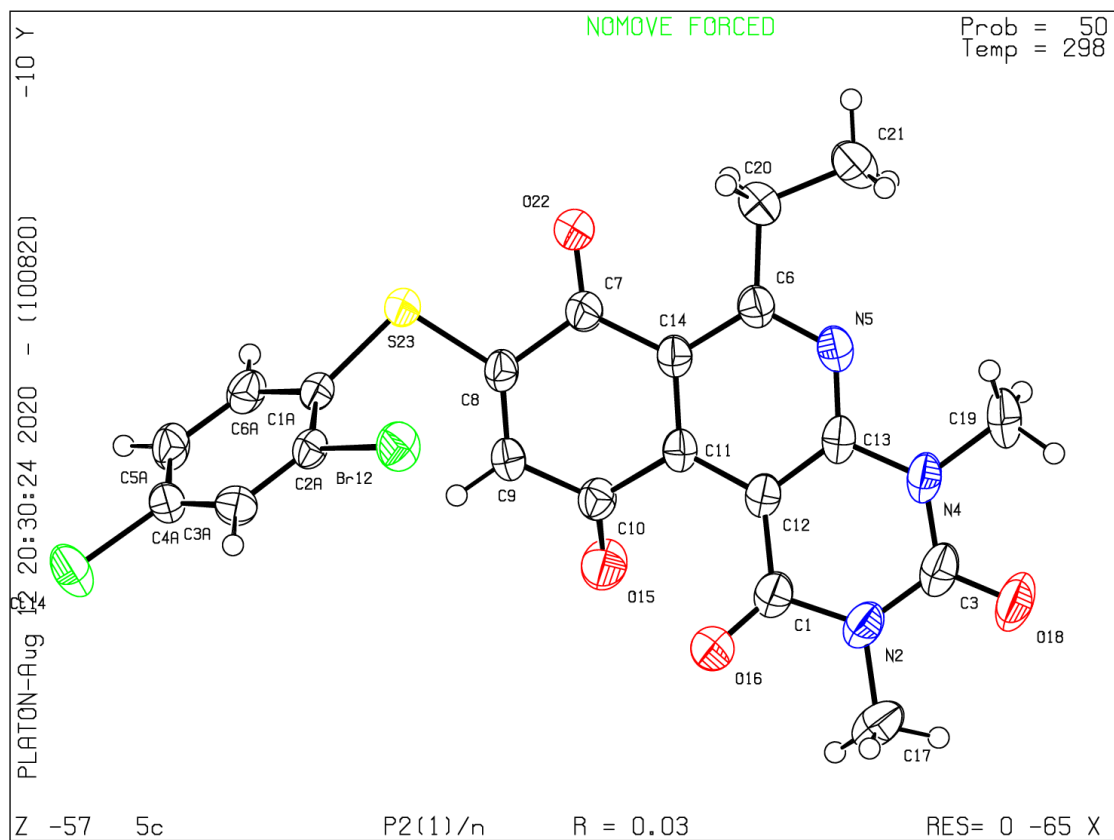Figure S5

Datablock 5c - ellipsoid plot

Figure S6 **checkCIF/PLATON report**

You have not supplied any structure factors. As a result the full set of tests cannot be run.

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No syntax errors found.   CIF dictionary   Interpreting this report

Datablock: 6c

```
Bond precision:   C-C = 0.0073 A              Wavelength=0.71073

Cell:         a=4.4062(8)         b=10.9278(19)     c=17.524(3)
              alpha=80.857(5)   beta=88.521(6)   gamma=83.122(6)
Temperature:  298 K

                 Calculated                 Reported
Volume           827.1(3)                   827.1(3)
Space group      P -1                       P -1
Hall group       -P 1                       -P 1
Moiety formula   C17 H17 N3 O4 S            C17 H17 N3 O4 S
Sum formula      C17 H17 N3 O4 S            C17 H17 N3 O4 S
Mr               359.40                     359.39
Dx,g cm-3        1.443                      1.443
Z                2                          2
Mu (mm-1)        0.224                      0.224
F000             376.0                      376.0
F000'            376.42
h,k,lmax         5,12,20                    5,12,20
Nref             2923                       2899
Tmin,Tmax        0.971,0.976                0.484,0.745
Tmin'            0.971

Correction method= # Reported T Limits: Tmin=0.484 Tmax=0.745
AbsCorr = MULTI-SCAN

Data completeness= 0.992         Theta(max)= 25.008

R(reflections)= 0.0836( 1308)     wR2(reflections)= 0.1864( 2899)

S = 1.031                    Npar= 230
```

The following ALERTS were generated. Each ALERT has the format
    test-name_ALERT_alert-type_alert-level.
Click on the hyperlinks for more details of the test.

Figure S6 🟠 **Alert level B**

RINTA01_ALERT_3_B The value of Rint is greater than 0.18
                Rint given   0.184
PLAT020_ALERT_3_B The Value of Rint is Greater Than 0.12 ....   0.184 Report

🟡 **Alert level C**

PLAT026_ALERT_3_C Ratio Observed / Unique Reflections (too) Low ..   45% Check
PLAT094_ALERT_2_C Ratio of Maximum / Minimum Residual Density ....   2.54 Report
PLAT340_ALERT_3_C Low Bond Precision on C-C Bonds ....   0.00731 Ang.

⚪ **Alert level G**

PLAT883_ALERT_1_G No Info/Value for _atom_sites_solution_primary .   Please Do !
PLAT941_ALERT_3_G Average HKL Measurement Multiplicity ....   3.8 Low


```
   0 ALERT level A = Most likely a serious problem - resolve or explain
   2 ALERT level B = A potentially serious problem, consider carefully
   3 ALERT level C = Check. Ensure it is not caused by an omission or oversight
   2 ALERT level G = General information/check it is not something unexpected

   1 ALERT type 1 CIF construction/syntax error, inconsistent or missing data
   1 ALERT type 2 Indicator that the structure model may be wrong or deficient
   5 ALERT type 3 Indicator that the structure quality may be low
   0 ALERT type 4 Improvement, methodology, query or suggestion
   0 ALERT type 5 Informative message, check
```

Validation response form

Please find below a validation response form (VRF) that can be filled in and pasted into your CIF.

```
# start Validation Reply Form
_vrf_RINTA01_6c
;
PROBLEM: The value of Rint is greater than 0.18
RESPONSE: ...
;
_vrf_PLAT020_6c
;
PROBLEM: The Value of Rint is Greater Than 0.12 ........     0.184 Report
RESPONSE: ...
;
# end Validation Reply Form
```

Figure S6 It is advisable to attempt to resolve as many as possible of the alerts in all categories. Often the minor alerts point to easily fixed oversights, errors and omissions in your CIF or refinement strategy, so attention to these fine details can be worthwhile. In order to resolve some of the more serious problems it may be necessary to carry out additional measurements or structure refinements. However, the purpose of your study may justify the reported deviations and the more serious of these should normally be commented upon in the discussion or experimental section of a paper or in the "special_details" fields of the CIF. checkCIF was carefully designed to identify outliers and unusual parameters, but every test has its limitations and alerts that are not important in a particular case may appear. Conversely, the absence of alerts does not guarantee there are no aspects of the results needing attention. It is up to the individual to critically assess their own results and, if necessary, seek expert advice.

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___

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Figure S6

Datablock 6c - ellipsoid plot
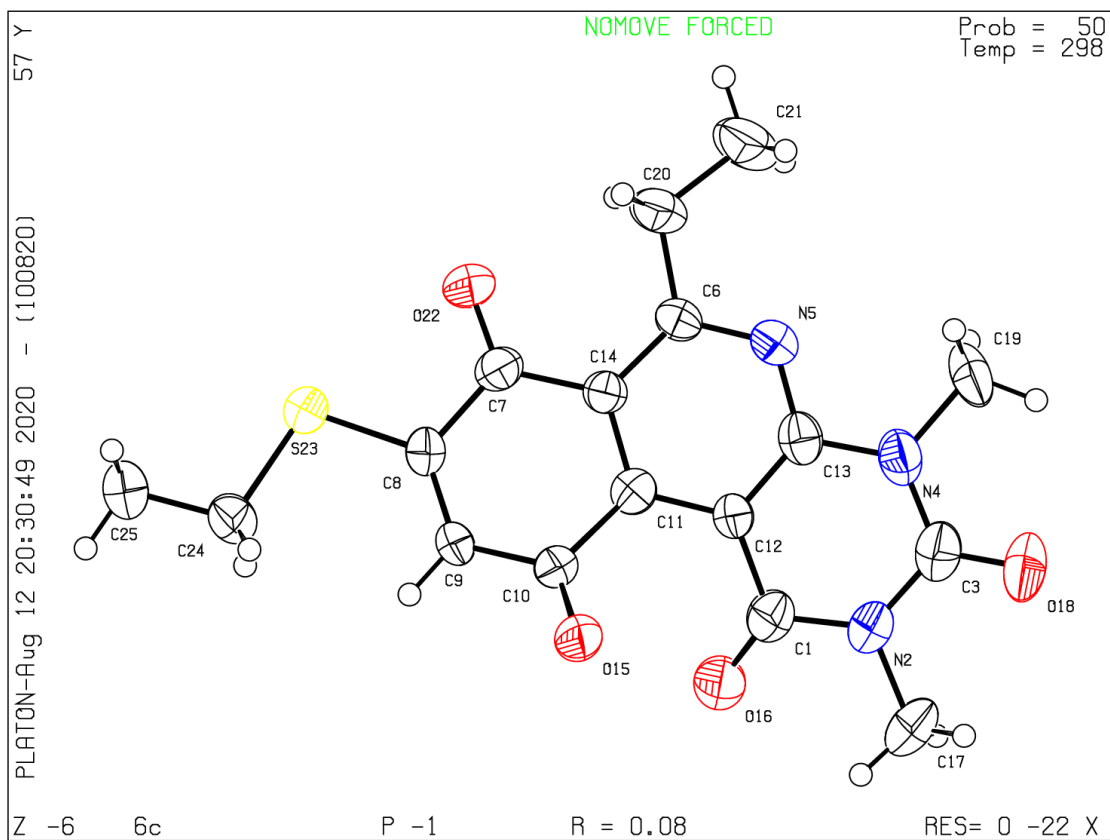
checkCIF/PLATON report

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No syntax errors found. | CIF dictionary | | Interpreting this report |

Datablock: 7c

```
Bond precision:   C-C = 0.0056 A           Wavelength=1.54178

Cell:            a=7.6795(2)     b=16.6845(4)        c=15.1553(5)
                 alpha=90        beta=95.638(2)      gamma=90
Temperature:     298 K

                 Calculated                Reported
Volume           1932.43(9)                1932.43(9)
Space group      P 21/c                    P2(1)/c
Hall group       -P 2ybc                   -P 2ybc
Moiety formula   C21 H17 Cl N4 O4          C21 H17 Cl N4 O4
Sum formula      C21 H17 Cl N4 O4          C21 H17 Cl N4 O4
Mr               424.84                    424.84
Dx,g cm-3        1.460                     1.460
Z                4                         4
Mu (mm-1)        2.080                     2.080
F000             880.0                     880.0
F000'            884.11
h,k,lmax         9,19,18                   9,19,17
Nref             3418                      3405
Tmin,Tmax        0.779,0.812               0.622,0.753
Tmin'            0.779

Correction method= # Reported T Limits: Tmin=0.622 Tmax=0.753
AbsCorr = MULTI-SCAN

Data completeness= 0.996          Theta(max)= 66.758

R(reflections)= 0.0684( 2086)      wR2(reflections)= 0.1789( 3405)

S = 1.062                Npar= 275
```

The following ALERTS were generated. Each ALERT has the format
    test-name_ALERT_alert-type_alert-level.
Click on the hyperlinks for more details of the test.

Figure S7 🟡 `Alert level C`

PLAT340_ALERT_3_C	Low Bond Precision on C-C Bonds	0.00556 Ang.
PLAT410_ALERT_2_C	Short Intra H...H Contact H6A ..H9 .	1.99 Ang.
	x,y,z =	1_555 Check

⚪ `Alert level G`

PLAT007_ALERT_5_G	Number of Unrefined Donor-H Atoms	1 Report
PLAT432_ALERT_2_G	Short Inter X...Y Contact O16 ..C19	2.89 Ang.
	2-x,-1/2+y,3/2-z =	2_746 Check
PLAT883_ALERT_1_G	No Info/Value for _atom_sites_solution_primary .	Please Do !

```
  0 ALERT level A = Most likely a serious problem - resolve or explain
  0 ALERT level B = A potentially serious problem, consider carefully
  2 ALERT level C = Check. Ensure it is not caused by an omission or oversight
  3 ALERT level G = General information/check it is not something unexpected

  1 ALERT type 1 CIF construction/syntax error, inconsistent or missing data
  2 ALERT type 2 Indicator that the structure model may be wrong or deficient
  1 ALERT type 3 Indicator that the structure quality may be low
  0 ALERT type 4 Improvement, methodology, query or suggestion
  1 ALERT type 5 Informative message, check
```

It is advisable to attempt to resolve as many as possible of the alerts in all categories. Often the minor alerts point to easily fixed oversights, errors and omissions in your CIF or refinement strategy, so attention to these fine details can be worthwhile. In order to resolve some of the more serious problems it may be necessary to carry out additional measurements or structure refinements. However, the purpose of your study may justify the reported deviations and the more serious of these should normally be commented upon in the discussion or experimental section of a paper or in the "special_details" fields of the CIF. checkCIF was carefully designed to identify outliers and unusual parameters, but every test has its limitations and alerts that are not important in a particular case may appear. Conversely, the absence of alerts does not guarantee there are no aspects of the results needing attention. It is up to the individual to critically assess their own results and, if necessary, seek expert advice.

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Figure S7 **Datablock 7c** - ellipsoid plot

Figure S8 **checkCIF/PLATON report**

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No syntax errors found.   CIF dictionary   Interpreting this report

Datablock: 8c

```
Bond precision:    C-C = 0.0033 A            Wavelength=1.54178

Cell:              a=7.6848(2)     b=16.8295(5)        c=15.2751(5)
                   alpha=90        beta=95.860(2)      gamma=90
Temperature:       298 K

                   Calculated                Reported
Volume             1965.23(10)               1965.23(10)
Space group        P 21/c                    P2(1)/c
Hall group         -P 2ybc                   -P 2ybc
Moiety formula     C21 H17 Br N4 O4          C21 H17 Br N4 O4
Sum formula        C21 H17 Br N4 O4          C21 H17 Br N4 O4
Mr                 469.29                    469.30
Dx,g cm-3          1.586                     1.586
Z                  4                         4
Mu (mm-1)          3.177                     3.177
F000               952.0                     952.0
F000'              951.93
h,k,lmax           9,20,18                   9,19,18
Nref               3464                      3443
Tmin,Tmax          0.717,0.728               0.537,0.753
Tmin'              0.650

Correction method= # Reported T Limits: Tmin=0.537 Tmax=0.753
AbsCorr = MULTI-SCAN

Data completeness= 0.994          Theta(max)= 66.641

R(reflections)= 0.0396( 2971)      wR2(reflections)= 0.1059( 3443)

S = 1.074                    Npar= 275
```

The following ALERTS were generated. Each ALERT has the format
         test-name_ALERT_alert-type_alert-level.
Click on the hyperlinks for more details of the test.

Figure S8 ◉ **Alert level G**

PLAT007_ALERT_5_G Number of Unrefined Donor-H Atoms ....   1 Report
PLAT432_ALERT_2_G Short Inter X...Y Contact O16   ..C19   2.96 Ang.
                                      2-x,-1/2+y,3/2-z =   2_746 Check
PLAT434_ALERT_2_G Short Inter HL..HL Contact Br14   ..Br14   3.55 Ang.
                                        -x,-y,1-z =   3_556 Check
PLAT883_ALERT_1_G No Info/Value for _atom_sites_solution_primary .   Please Do !


```
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   0 ALERT level B = A potentially serious problem, consider carefully
   0 ALERT level C = Check. Ensure it is not caused by an omission or oversight
   4 ALERT level G = General information/check it is not something unexpected

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   2 ALERT type 2 Indicator that the structure model may be wrong or deficient
   0 ALERT type 3 Indicator that the structure quality may be low
   0 ALERT type 4 Improvement, methodology, query or suggestion
   1 ALERT type 5 Informative message, check
```

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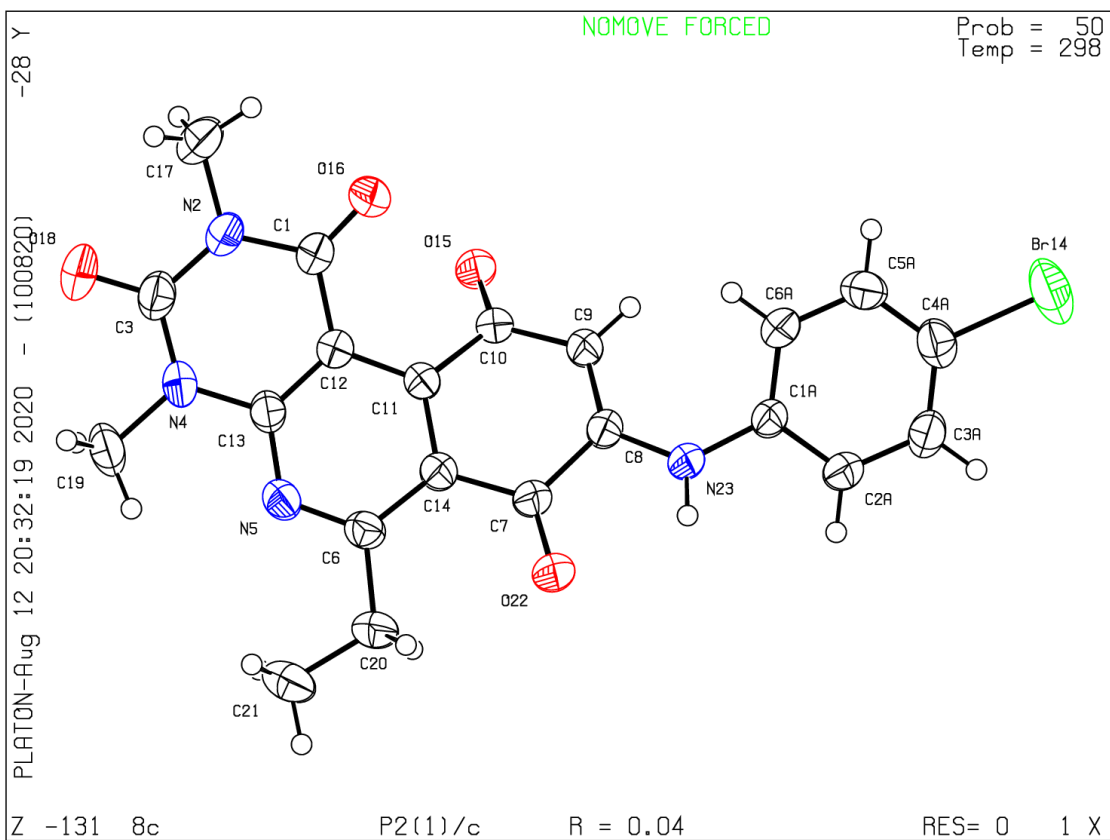**PLATON version of 10/08/2020; check.def file version of 06/08/2020**

Figure S8

checkCIF/PLATON report

You have not supplied any structure factors. As a result the full set of tests cannot be run.

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No syntax errors found.   CIF dictionary   Interpreting this report

Datablock: 11c

```
Bond precision:    C-C = 0.0081 A              Wavelength=1.54178

Cell:              a=24.2195(6)      b=7.5475(2)       c=21.3877(6)
                   alpha=90          beta=90           gamma=90
Temperature:       298 K

                   Calculated                 Reported
Volume             3909.60(18)                3909.60(18)
Space group        P b c n                    P b c n
Hall group         -P 2n 2ab                  -P 2n 2ab
Moiety formula     C20 H14 Br N3 O4 S         C20 H14 Br N3 O4 S
Sum formula        C20 H14 Br N3 O4 S         C20 H14 Br N3 O4 S
Mr                 472.30                     472.31
Dx,g cm-3          1.605                      1.605
Z                  8                          8
Mu (mm-1)          4.156                      4.156
F000               1904.0                     1904.0
F000'              1906.21
h,k,lmax           28,8,25                    28,8,25
Nref               3455                       3427
Tmin,Tmax          0.638,0.660                0.442,0.753
Tmin'              0.578

Correction method= # Reported T Limits: Tmin=0.442 Tmax=0.753
AbsCorr = NONE

Data completeness= 0.992          Theta(max)= 66.747

R(reflections)= 0.0654( 2228)     wR2(reflections)= 0.1621( 3427)

S = 1.090                    Npar= 266
```

The following ALERTS were generated. Each ALERT has the format
        test-name_ALERT_alert-type_alert-level.
Click on the hyperlinks for more details of the test.

Figure S9 🟡 **Alert level C**

`PLAT341_ALERT_3_C` Low Bond Precision on C-C Bonds ....   0.00812 Ang.
`PLAT601_ALERT_2_C` Unit Cell Contains Solvent Accessible VOIDS of .   38 Ang**3

⚪ **Alert level G**

`PLAT083_ALERT_2_G` SHELXL Second Parameter in WGHT Unusually Large   10.26 Why ?
`PLAT432_ALERT_2_G` Short Inter X...Y Contact O16   ..C3   3.01 Ang.
                                  3/2-x,1/2+y,z =   8_765 Check
`PLAT883_ALERT_1_G` No Info/Value for _atom_sites_solution_primary .   Please Do !

```
  0 ALERT level A = Most likely a serious problem - resolve or explain
  0 ALERT level B = A potentially serious problem, consider carefully
  2 ALERT level C = Check. Ensure it is not caused by an omission or oversight
  3 ALERT level G = General information/check it is not something unexpected

  1 ALERT type 1 CIF construction/syntax error, inconsistent or missing data
  3 ALERT type 2 Indicator that the structure model may be wrong or deficient
  1 ALERT type 3 Indicator that the structure quality may be low
  0 ALERT type 4 Improvement, methodology, query or suggestion
  0 ALERT type 5 Informative message, check
```

It is advisable to attempt to resolve as many as possible of the alerts in all categories. Often the minor alerts point to easily fixed oversights, errors and omissions in your CIF or refinement strategy, so attention to these fine details can be worthwhile. In order to resolve some of the more serious problems it may be necessary to carry out additional measurements or structure refinements. However, the purpose of your study may justify the reported deviations and the more serious of these should normally be commented upon in the discussion or experimental section of a paper or in the "special_details" fields of the CIF. checkCIF was carefully designed to identify outliers and unusual parameters, but every test has its limitations and alerts that are not important in a particular case may appear. Conversely, the absence of alerts does not guarantee there are no aspects of the results needing attention. It is up to the individual to critically assess their own results and, if necessary, seek expert advice.

Publication of your CIF in IUCr journals

A basic structural check has been run on your CIF. These basic checks will be run on all CIFs submitted for publication in IUCr journals (*Acta Crystallographica*, *Journal of Applied Crystallography*, *Journal of Synchrotron Radiation*); however, if you intend to submit to *Acta Crystallographica Section C* or *E* or *IUCrData*, you should make sure that full publication checks are run on the final version of your CIF prior to submission.
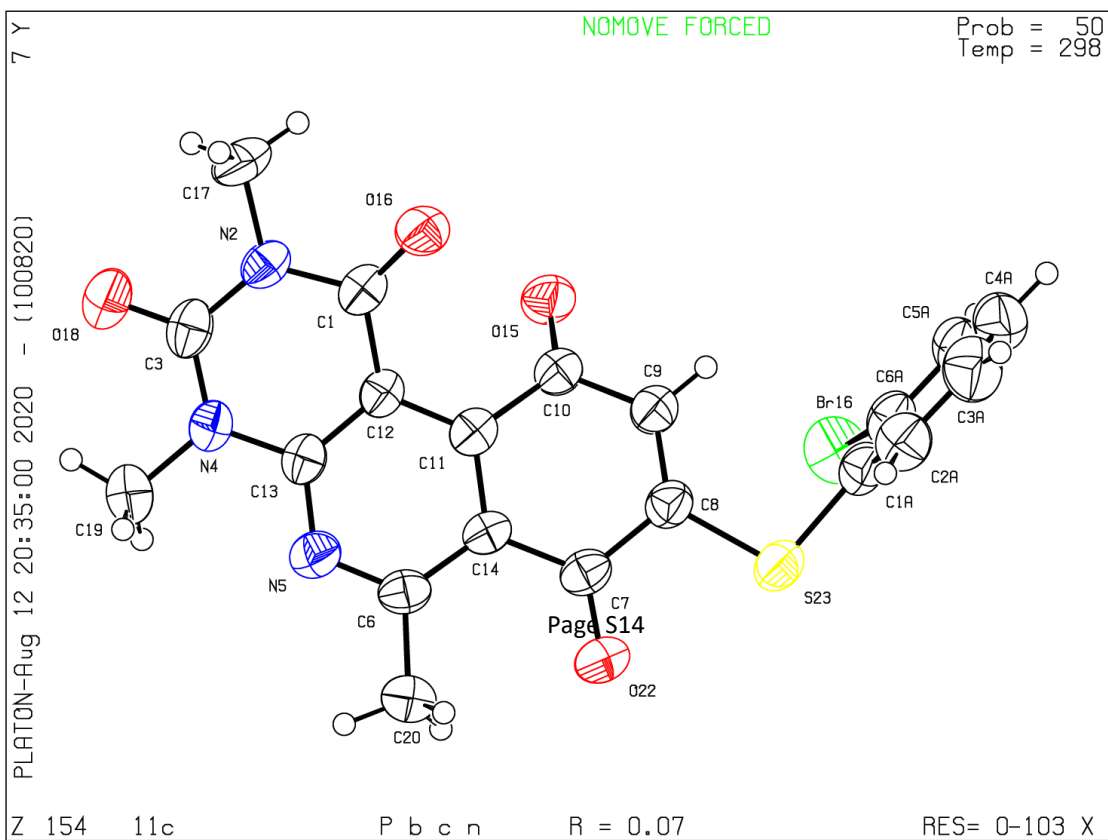
Publication of your CIF in other journals

Please refer to the *Notes for Authors* of the relevant journal for any special instructions relating to CIF submission.

PLATON version of 10/08/2020; check.def file version of 06/08/2020

Figure S9 **Datablock 11c** - ellipsoid plot

checkCIF/PLATON report

You have not supplied any structure factors. As a result the full set of tests cannot be run.

THIS REPORT IS FOR GUIDANCE ONLY. IF USED AS PART OF A REVIEW PROCEDURE FOR PUBLICATION, IT SHOULD NOT REPLACE THE EXPERTISE OF AN EXPERIENCED CRYSTALLOGRAPHIC REFEREE.

No syntax errors found. 　CIF dictionary　 　Interpreting this report

Datablock: 19c

```
Bond precision:   C-C = 0.0032 A            Wavelength=1.54178

Cell:           a=4.5196(2)      b=26.8428(13)       c=15.3585(10)
                alpha=90         beta=95.006(4)      gamma=90
Temperature:    298 K

                Calculated                Reported
Volume          1856.17(17)               1856.17(17)
Space group     P 21/n                    P2(1)/n
Hall group      -P 2yn                    -P 2yn
Moiety formula  C19 H21 N3 O4 S           C19 H21 N3 O4 S
Sum formula     C19 H21 N3 O4 S           C19 H21 N3 O4 S
Mr              387.45                    387.45
Dx,g cm-3       1.387                     1.386
Z               4                         4
Mu (mm-1)       1.816                     1.816
F000            816.0                     816.0
F000'           819.74
h,k,lmax        5,32,18                   5,31,18
Nref            3318                      3269
Tmin,Tmax       0.819,0.849               0.529,0.753
Tmin'           0.819

Correction method= # Reported T Limits: Tmin=0.529 Tmax=0.753
AbsCorr = MULTI-SCAN

Data completeness= 0.985        Theta(max)= 66.839

R(reflections)= 0.0441( 2724)    wR2(reflections)= 0.1155( 3269)

S = 1.046                 Npar= 249
```

```
The following ALERTS were generated. Each ALERT has the format
      test-name_ALERT_alert-type_alert-level.
Click on the hyperlinks for more details of the test.
```

Figure S10 ⬤ **Alert level G**

PLAT335_ALERT_2_G Check Large C6 Ring C-C Range C7   -C14   0.17 Ang.
PLAT883_ALERT_1_G No Info/Value for _atom_sites_solution_primary .   Please Do !

```
   0 ALERT level A = Most likely a serious problem - resolve or explain
   0 ALERT level B = A potentially serious problem, consider carefully
   0 ALERT level C = Check. Ensure it is not caused by an omission or oversight
   2 ALERT level G = General information/check it is not something unexpected

   1 ALERT type 1 CIF construction/syntax error, inconsistent or missing data
   1 ALERT type 2 Indicator that the structure model may be wrong or deficient
   0 ALERT type 3 Indicator that the structure quality may be low
   0 ALERT type 4 Improvement, methodology, query or suggestion
   0 ALERT type 5 Informative message, check
```

It is advisable to attempt to resolve as many as possible of the alerts in all categories. Often the minor alerts point to easily fixed oversights, errors and omissions in your CIF or refinement strategy, so attention to these fine details can be worthwhile. In order to resolve some of the more serious problems it may be necessary to carry out additional measurements or structure refinements. However, the purpose of your study may justify the reported deviations and the more serious of these should normally be commented upon in the discussion or experimental section of a paper or in the "special_details" fields of the CIF. checkCIF was carefully designed to identify outliers and unusual parameters, but every test has its limitations and alerts that are not important in a particular case may appear. Conversely, the absence of alerts does not guarantee there are no aspects of the results needing attention. It is up to the individual to critically assess their own results and, if necessary, seek expert advice.

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Publication of your CIF in other journals

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PLATON version of 10/08/2020; check.def file version of 06/08/2020

Figure S10 **Datablock 19c** - ellipsoid plot
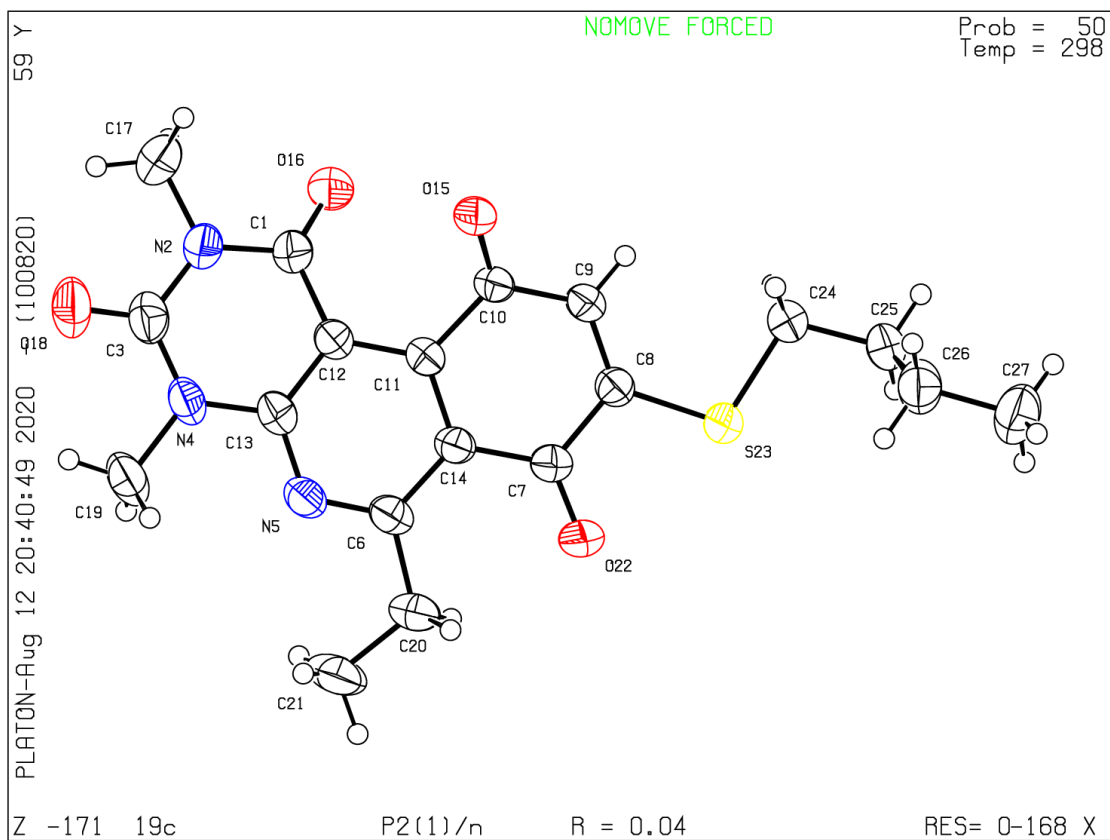
checkCIF/PLATON report

You have not supplied any structure factors. As a result the full set of tests cannot be run.

THIS REPORT IS FOR GUIDANCE ONLY. IF USED AS PART OF A REVIEW PROCEDURE FOR PUBLICATION, IT SHOULD NOT REPLACE THE EXPERTISE OF AN EXPERIENCED CRYSTALLOGRAPHIC REFEREE.

No syntax errors found. 　CIF dictionary　 　Interpreting this report

Datablock: 20c

```
Bond precision:   C-C = 0.0021 A            Wavelength=1.54178

Cell:           a=8.7845(3)    b=10.4767(4)        c=21.3483(10)
                alpha=90       beta=99.351(3)      gamma=90
Temperature:    298 K

                Calculated                 Reported
Volume          1938.63(14)                1938.63(14)
Space group     P 21/c                     P2(1)/c
Hall group      -P 2ybc                    -P 2ybc
Moiety formula  C21 H19 N5 O4              C21 H19 N5 O4
Sum formula     C21 H19 N5 O4              C21 H19 N5 O4
Mr              405.41                     405.41
Dx,g cm-3       1.389                      1.389
Z               4                          4
Mu (mm-1)       0.821                      0.821
F000            848.0                      848.0
F000'           850.74
h,k,lmax        10,12,25                   10,12,25
Nref            3453                       3426
Tmin,Tmax       0.906,0.914                0.488,0.753
Tmin'           0.906

Correction method= # Reported T Limits: Tmin=0.488 Tmax=0.753
AbsCorr = MULTI-SCAN

Data completeness= 0.992        Theta(max)= 66.788

R(reflections)= 0.0481( 3178)    wR2(reflections)= 0.1334( 3426)

S = 1.043               Npar= 276
```

The following ALERTS were generated. Each ALERT has the format
test-name_ALERT_alert-type_alert-level.
Click on the hyperlinks for more details of the test.

Figure S11 🟡 **Alert level C**

```
PLAT220_ALERT_2_C NonSolvent   Resd 1  C   Ueq(max)/Ueq(min) Range     3.1 Ratio
PLAT242_ALERT_2_C Low    'MainMol' Ueq as Compared to Neighbors of    C20 Check
```

⚪ **Alert level G**

```
PLAT007_ALERT_5_G Number of Unrefined Donor-H Atoms ..............     3 Report
PLAT432_ALERT_2_G Short Inter X...Y Contact  O15     ..C7            2.92 Ang.
                                         1-x,1-y,1-z  =    3_666 Check
PLAT432_ALERT_2_G Short Inter X...Y Contact  O22     ..C3            2.98 Ang.
                                         -x,1-y,1-z   =    3_566 Check
PLAT883_ALERT_1_G No Info/Value for _atom_sites_solution_primary .   Please Do !
PLAT933_ALERT_2_G Number of OMIT Records in Embedded .res File ...      1 Note
```

```
   0 ALERT level A = Most likely a serious problem - resolve or explain
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   5 ALERT level G = General information/check it is not something unexpected

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   0 ALERT type 3 Indicator that the structure quality may be low
   0 ALERT type 4 Improvement, methodology, query or suggestion
   1 ALERT type 5 Informative message, check
```

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Figure S11

Datablock 20c - ellipsoid plot