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# **easypipe Documentation**

***Release 1.4.7***

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You can also grab a hardcopy of the [easYPipe documentation in PDF](#)



## GETTING STARTED (LINUX)

### 1.1 Check your python version

First, open a terminal.

easYPipe needs at least Python 3.6.

You may already have [Python](#) installed – you can check which version by doing:

```
$ python --version
```

If the version is < 3.0, do:

```
$ python3 --version
```

If that fails or Python 3 version is <3.6, install a version of Python  $\geq$  3.6 using the package manager of your distribution. For example for Ubuntu 18.04:

Installing add-apt-repository (if add-apt-repository command not found):

```
$ su
# apt update
# install software-properties-common
```

Then:

```
$ su
# add-apt-repository ppa:deadsnakes/ppa
# apt update
# apt-get install python3.7
```

If you encounter difficulties, see supported versions for this [repository](#) ... maybe it's time to upgrade your operating system !!

If you've updated your Python version from 3.5 to 3.6, you can change default Python 3 to Python 3.6:

```
# update-alternatives --install /usr/bin/python3 python3 /usr/bin/python3.5 1
# update-alternatives --install /usr/bin/python3 python3 /usr/bin/python3.6 2
```

Check that Python 3 has been correctly installed:

```
$ python3 --version
Python 3.6
```

To swap between versions of Python, run the following:

```
# update-alternatives --config python3
```

## 1.2 Check if pip is installed

`pip` is a package management tool for Python.

Check if `pip3` is installed:

```
$ which pip3
```

If that fails, install `pip3` using the package manager of your distribution. For example for Ubuntu:

```
$ su
# apt-get install python3-pip
```

Check if `pip3` is linked to Python  $\geq 3.6$ :

```
$ pip3 --version
pip 21.0.1 from /home/username/.local/lib/python3.6/site-packages/pip (python 3.6)
```

If it's not the case, you can try:

```
$ wget https://bootstrap.pypa.io/get-pip.py
$ su
# python3 get-pip.py
then check:
$ pip3 --version
```

## 1.3 Software requirements

easYPipe is a pipeline that requires other software.

### 1.3.1 Phenix

You need [Phenix](https://www.phenix-online.org/)<sup>1</sup> installed and to modify `PHENIX_PATH` value in `config.py` file accordingly.

Example for `PHENIX_PATH` in `config.py`:

```
PHENIX_PATH = "/usr/local/phenix-1.18.2-3874/"
```

### 1.3.2 Open Babel

[Open Babel](http://openbabel.org/wiki/Main_Page)<sup>2</sup> is a chemical toolbox needed for ligands.

Example for `BABEL_PATH` in `config.py`:

```
BABEL_PATH = "/usr/local/OPENBABEL/openbabel-2-4-1/build/bin/"
```

---

<sup>1</sup> <https://www.phenix-online.org/>

<sup>2</sup> [http://openbabel.org/wiki/Main\\_Page](http://openbabel.org/wiki/Main_Page)



---

**Important:** paths to these software have to be modified in `config.py` file accordingly to your installation (see next step)

---

## 1.4 Download and install easypipe package

Download the zip archive that should look like `easypipe-1.4.7.tar.gz`.

Go where is the archive and unzip:

```
$ tar -xvzf easypipe-1.4.7.tar.gz
```

Go to folder `easypipe-1.4.7`:

```
$ cd easypipe-1.4.7
```

Modify (open in a text editor) **config.py** file (in `easypipe-1.4.7` folder), in particular ‘Software used by modules’ part since nothing will work without links to *software*.

**Warning:** `config.py` file modifications have to be done before installation !! If you want to modify it afterwards, just launch installation again.

Then install:

```
$ su
# python setup.py install # if your default python version is >=3.6
or
# python3 setup.py install # if your python3 version is >=3.6
or
# python3.6 setup.py install # if your python3 version is linked to python3.5
```

If you’ve updated you Python version from 3.5 to 3.6, you may encountered some dependencies and conflict problems. Read carefully the error messages. These commands can help you:

```
$ su
# apt-get install libffi-dev

# pip3 uninstall PyNaCl
# pip3 install PyNaCl

# pip3 install setuptools_rust

# cd /usr/lib/python3/dist-packages
# sudo ln -s apt_pkg.cpython-{35m,36m}-x86_64-linux-gnu.so
```

## 1.5 Check easypipe installation

You can test if installation is successfull doing:

```
$ easypipe.py -h
```

If you get no error but the help message, easypipe installation is successful.

If you've updated your Python version from 3.5 to 3.6, you may encounter the following error:

```
$ PermissionError: [Errno 13] Permission denied: '/usr/local/lib/python3.6/dist-  
→packages/easypipe-1.4.7-py3.6.egg/EGG-INFO/requires.txt '
```

In this case, this command should help:

```
$ cd /usr/local/lib/python3.6/dist-packages/easypipe-1.4.7-py3.6.egg/EGG-INFO/  
$ su  
# chmod a+r requires.txt
```

In the way, if you have 3.8 Python version (in Ubuntu 20.04 for example), you may encounter the following error:

```
$ PermissionError: [Errno 13] Permission denied: '/usr/local/lib/python3.8/dist-  
→packages/easypipe-1.4.7-py3.8.egg/EGG-INFO/requires.txt '
```

In this case, this command should help:

```
$ cd /usr/local/lib/python3.8/dist-packages/easypipe-1.4.7-py3.8.egg/EGG-INFO/  
$ su  
# chmod a+r requires.txt
```

## 1.6 Uninstall easypipe package

To uninstall easypipe package properly, do:

```
$ su  
# pip3 uninstall easypipe  
or  
# python3 -m pip uninstall easypipe  
or  
# python3.6 -m pip uninstall easypipe
```

If you have such an error message: “Can’t uninstall ‘easypipe’. No files were found to uninstall.”, try again after changing working directory (not in easypipe package directory), it should work.

---

**Note:** ‘pip3 freeze’ lists the names of all python packages installed.

---

## 1.7 References

## GETTING STARTED (WINDOWS)

### 2.1 Check your python version

First, open a Command Prompt.

---

**Note:** To open Command Prompt, simply type 'cmd' in the search box of the Windows taskbar.

---

easYPipe needs at least Python 3.6.

You may already have [Python](#) installed – you can check which version by doing:

```
C:\> python --version
or
C:\> py -V
```

If Python version is <3.6, install the latest Python 3 version. Download the latest python version [Python downloads site](#). You can follow instructions [here](#). But what you need is simply:

- Run the installer. You can do so by double-clicking python-<version>.exe in your Downloads folder.
- !!!!! Check the box next to "Add Python <version> to PATH." It's at the bottom of the window.
- Install Now (customize installation not compulsory).
- Click Disable path length limit. This ensures that Python (and other apps) to use paths more than 260 characters in length.

Check that Python 3 has been correctly installed:

```
C:\> python --version
Python 3.9

or

C:\> py -V
Python 3.9
```

### 2.2 Software requirements

easYPipe is a pipeline that requires other software.

### 2.2.1 Phenix

You need [Phenix](https://www.phenix-online.org/)<sup>1</sup> installed and to modify PHENIX\_PATH value in config.py file accordingly.

Example for PHENIX\_PATH in config.py:

```
PHENIX_PATH = r"C:\Users\myname\Phenix\phenix-installer-1.19.1-4122-intel-windows-x86_
↪ 64"
```

### 2.2.2 Open Babel

[Open Babel](http://openbabel.org/wiki/Main_Page)<sup>2</sup> is a chemical toolbox needed for ligands.

Install Open Babel GUI for Windows.

Example for BABEL\_PATH in config.py:

```
BABEL_PATH = r"C:\Program Files\OpenBabel-3.1.1"
```

### 2.2.3 Advices

---

**Important:** paths to these software have to be modified in config.py file accordingly to your installation (see next step)

---

---

**Tip:** it might be wise to use [LibreOffice](https://www.libreoffice.org/)<sup>3</sup> as many csv spreadsheets are generated by easYPipe and Excel does not handle the official csv format (i.e. comma-separated values) well for non-English speaking versions

---

## 2.3 Download and install easypipe package

Download the zip archive that should look like easypipe-1.4.7.tar.gz.

Go where is the archive and unzip:

```
C:\> tar -xvzf easypipe-1.4.7.tar.gz
```

Go to folder easypipe-1.4.7:

```
C:\> cd easypipe-1.4.7
```

Modify (open with a text editor like Notepad) **config.py** file (in easypipe-1.4.7 folder), in particular ‘Software used by modules’ part since nothing will work without links to *software*.

**Warning:** **config.py** file modifications have to be done before installation !! If you want to modify it afterwards, just launch installation again. Use a basic text editor and not a word processing software !

---

<sup>1</sup> <https://www.phenix-online.org/>

<sup>2</sup> [http://openbabel.org/wiki/Main\\_Page](http://openbabel.org/wiki/Main_Page)

<sup>3</sup> <https://www.libreoffice.org/>

Then install:

```
C:\> python setup.py install  
or  
C:\> py setup.py install
```

## 2.4 Check easypipe installation

You can test if installation is successful doing:

```
$ easypipe.py -h
```

If you get no error but the help message, easypipe installation is successful.

Depending on your python version, you may encounter some dependencies and conflict problems. Read carefully the error messages.

In case of the following error:

```
$ cffi>=1.4.3 distribution was not found and is required by PyNaCl
```

This command should help:

```
$ py -m pip install cffi
```

## 2.5 Uninstall easypipe package

To uninstall easypipe package properly, do:

```
C:\> pip uninstall easypipe
```

---

**Note:** 'py -m pip freeze' lists the names of all python packages installed.

---

## 2.6 References



## EASYGET

easYGet comes with *easYPipe*.

easYGet makes it possible to download all at once the mx 'PROCESSED\_DATA' from a synchrotron for a given beamline (several dates possible) and a given acronym.

Downloaded processed datasets are organized by dataset folders, ready to launch easypipe.

For the moment, only works for data from Grenoble ESRF and Barcelone ALBA synchrotrons.

### 3.1 easYGet usage

easyget.py [-h] [-s {ESRF}] [-l LOGIN] [[-m MX] [-b BEAMLINE] [-d DATES [DATES ...]] [-p PROTEIN] [-g GROUP]

| optional arguments                              | description  |
|---|--|
| -h, --help                                      | show this help message and exit  |
| -s {ESRF}, --synchrotron {ESRF,ALBA}            | which synchrotron? (default = ERSF)  |
| -l LOGIN, --login LOGIN                         | synchrotron login (your personal SMIS login)   |
| -m MX, --mx MX                                  | name of mx proposal synchrotron login (Example: 'mx---')                                       |
| -b BEAMLINE, --beamline BEAM-LINE               | name of the beamline   |
| -d DATES [DATES ...], --dates DATES [DATES ...] | date of the run (format AAAAMMJJ) or list of dates for the same run (format AAAAMMJJ AAAAMMJJ) |
| -p PROTEIN, --protein PROTEIN                   | protein acronym or space if no acronym (manual collections)                                    |
| -g GROUP, --group GROUP                         | group added via MxCube3 as a supplementary folder level before acronym                         |

Information can be provided either in command line or in interactive mode in a terminal, or mix.

For example, you can simply run:

```
$ easyget.py
```

or:

```
$ easyget.py --login anna2502 --mx mx1000
```

or:

```
$ easyget.py --login anna2502 --mx mx1000 --protein myprot --beamline id30a1 --dates 20210131 20210201
```

other commands are possible ...

**Note:** test also the day after each date given (useful for 24h experiments ...)

## 3.2 What does it do ?

Processed data @ESRF: for each crystal collected, several processes can succeed and for each a zip is available for download

The screenshot shows the ExiMX web interface. The main content area displays a table of data collections. A modal window titled "XDSAPP [ P 41 2 2 ]" is open, listing the following files:

- cypD-203\_5min30\_w1\_1\_91\_F.mtz
- CORRECT.LP
- cypD-203\_5min30\_w1\_1\_89\_F\_plus\_F\_minus.mtz
- XDS\_ASCII.HKL
- XDS.INP
- results\_cypD-203\_5min30\_w1\_1.txt
- pointless.log
- cypD-203\_5min30\_w1\_1\_89\_F.mtz
- phenix\_xtriage.log
- cypD-203\_5min30\_w1\_1\_91\_F\_plus\_F\_minus.mtz

The modal window has a "Close" button at the bottom right.

All these processed data are copied this way by easYGet:

- **dataset folder for each dataset**
  - PROC\_1, PROC\_2, ... if run 1, run 2 ...
  - process sub-folder, with processed data for each process



```

└─ PROCESSED_DATA
  └─ cypD-134_37s
    └─ PROC_1
      └─ autoPROC
        ├── ap_w1_run1_anom_autoPROC.log
        ├── ap_w1_run1_anom_report.pdf
        ├── ap_w1_run1_anom_staraniso_alldata-unique.mtz
        ├── ap_w1_run1_anom_staraniso_alldata-unique.stats
        ├── ap_w1_run1_anom_staraniso_alldata-unique.table1
        ├── ap_w1_run1_anom_summary_inlined.html
        ├── ap_w1_run1_anom_truncate.mtz
        ├── ap_w1_run1_anom_truncate-unique.stats
        ├── ap_w1_run1_anom_truncate-unique.table1
        └── ap_w1_run1_anom_XDS_ASCII.HKL.gz
      └─ XDSAPP
        ├── CORRECT.LP
        ├── cypD-134_37s_w1_1_F.mtz
        ├── cypD-134_37s_w1_1_F_plus_F_minus.mtz
        ├── phenix_xtriage.log
        ├── pointless.log
        ├── results_cypD-134_37s_w1_1.txt
        ├── XDS_ASCII.HKL
        └── XDS.INP
    └─ cypD-172_1min20
      └─ PROC_1
        └─ autoPROC
          ├── ap_w1_run1_anom_autoPROC.log
          ├── ap_w1_run1_anom_report.pdf
          ├── ap_w1_run1_anom_staraniso_alldata-unique.mtz
          ├── ap_w1_run1_anom_staraniso_alldata-unique.stats
          ├── ap_w1_run1_anom_staraniso_alldata-unique.table1
          ├── ap_w1_run1_anom_summary_inlined.html
          ├── ap_w1_run1_anom_truncate.mtz
          ├── ap_w1_run1_anom_truncate-unique.stats
          ├── ap_w1_run1_anom_truncate-unique.table1
          └── ap_w1_run1_anom_XDS_ASCII.HKL.gz
        └─ XDSAPP
          ├── CORRECT.LP
          ├── cypD-172_1min20_w1_1_F.mtz
          └── cypD-172_1min20_w1_1_F_plus_F_minus.mtz

```



## EASYPE

easYPipe is a pipeline for the automatization of ligand and fragment X-Ray crystallographic screening.

easYPipe sequentially runs [phenix.ligand\\_pipeline](#)<sup>1</sup> on several datasets of a protein that has been screened with different ligands.

When ligand smiles are given, ligand can be placed automatically in each corresponding structure.

Results are gathered and organized in a 'RESULTS' directory, which facilitates future visualization, refinement and deposition. Corresponding relevant information is summarized in a csv file.

easYPipe is specially adapted for ligand or fragment screening in structure-based drug design projects.

**See also:**

*easYGet* that comes with easYPipe, for an automated download of processed data from synchrotron.

### 4.1 easYPipe usage

easypipe.py [-h] data {prep,reindex,ligands,launch,pandda} ...

| arguments  | description                                    |
|------------|--|
| data       | folder with datasets in subfolders (mandatory) |
| -h, --help | show this help message and exit                |

Example:

```
$ easypipe.py PROCESSED_DATA -h
```

---

<sup>1</sup> [https://www.phenix-online.org/documentation/reference/ligand\\_pipeline.html](https://www.phenix-online.org/documentation/reference/ligand_pipeline.html)

| subcom-<br>mands | description   |
|------------------|---|
| <i>prep</i>      | prepare data: listing of mtz to treat with information  |
| <i>reindex</i>   | try to reindex mtz according to the space group of reference file                                     |
| <i>ligands</i>   | generate ligands files before launching with ligand search  |
| <i>launch</i>    | launch all the “phenix.ligand-pipeline” (after the preparation steps)                                 |
| <i>summary</i>   | compile the results of all the ‘launch’ execution in a single csv file                                |
| <i>auto</i>      | run main easYPipe steps (prep, reindex, launch, summary) in automatic mode, but without ligand search |
| <i>pandda</i>    | copy results from easypipe to a ‘PANDDA’ folder, as data ready to launch PanDDA                       |

Example:

```
$ easypipe.py PROCESSED_DATA prep
```

You can have a look to the [quickstart guide](#).

For a better experience, also read instructions for each subcommands.

### 4.1.1 References

## EASYPEPIPE QUICKSTART GUIDE

### 5.1 1. Retrieve and organize your processed data

---

**Note:** You can retrieve your processed data from synchrotron using *easYGet*.

---

Processed data should be in datasets folders, all grouped in a folder. More information on how to organize your data [here](#).

### 5.2 2. Prepare the data with ‘prep’

The first step is intended to list mtz to be treated:

```
$ easypipe.py PROCESSED_DATA prep
```

where here ‘PROCESSED\_DATA’ is the folder with your datasets.

**Warning:** For Windows users, \$ is the Linux prompt that corresponds to C:> in Windows command prompt, and should not be written

Now, you can have a look at /easypipe/1a\_prep/mtz\_to\_treat\_ALL.csv file that lists mtz found in your processed data with information like resolution, completeness or space group.

For more details on this step see [here](#).

### 5.3 3. Reindex if necessary with ‘reindex’

If you see that some mtz should be in higher symmetry space group (in /easypipe/1a\_prep/mtz\_to\_treat\_ALL.csv file), then you can try to reindex.

Run:

```
$ easypipe.py PROCESSED_DATA reindex P41212  
equivalent to:  
$ easypipe.py PROCESSED_DATA reindex 92
```

For more details on this step see [here](#).

## 5.4 4. Add ligands with ‘ligands’

This step is necessary if you want Phenix to try to find and place ligands, or if you want to automatically generate the CIF and PDB of your ligands.

First, you have to fill in the fields <ligand name> and <ligand smiles> of /1c\_ligands/ligands\_for\_datasets.csv file.

Then, run:

```
$ easypipe.py PROCESSED_DATA ligands easYPipe/1c_ligands/ligands_for_datasets_OK.csv
```

where here ligands\_for\_datasets\_OK.csv is the name of your filled ligand csv file.

For more details on this step see [here](#).

## 5.5 5. Process the data with ‘launch’

Now you can run Phenix on your processed mtz.

### 5.5.1 Mode

Default mode, is ‘fast’ mode. This mode uses rigid body refinement and can be run to get a first result rapidly.

Example:

```
$ easypipe.py PROCESSED_DATA launch my_ref_folder
```

where my\_ref\_folder gather fasta file and pdb files for replacement, and cif file if there is a ligand in the model.

**Warning:** pdb files should include the row starting with ‘CRYST1’ containing information on space group

Now, have a look at your [results](#) in the corresponding ‘RESULTS’ csv file.

If some processes failed, they probably need longer calculations. You can try ‘full’ mode:

```
$ easypipe.py PROCESSED_DATA launch my_ref_folder --mode full
```

In case your protein changes its space group, with ligand for example, you can ask not to fix space group. As a result, all mtz could be treated even with ‘bad’ space group. The duration for this will be much longer. But you can only do it for some using simulation mode first (see above):

```
$ easypipe.py PROCESSED_DATA launch my_ref_folder --mode allsg
```

### 5.5.2 Ligand search

If you want LigandFit to place ligands, you first have to run ‘ligand’ subcommand ([see above](#)).

Then just add ‘-lig’ option:

```
$ easypipe.py PROCESSED_DATA launch my_ref_folder --mode full --lig
```

The default cutoff for LigandFit to place a ligand is 0.7, but you can change it if you see that it is too high, with ‘-cclig’ option:

```
$ easypipe.py PROCESSED_DATA launch my_ref_folder --mode full --lig --cclig 0.6
```

If several ligands are supposed to fix, you can ask for LigandFit to place more than one ligand, with ‘-nblig’ option:

```
$ easypipe.py PROCESSED_DATA launch my_ref_folder --mode full --lig --cclig 0.6 --
↪nblig 5
```

### 5.5.3 Datasets to treat

Default behavior is to run phenix.ligand\_pipeline on the mtz of best completeness for each dataset, you can start with it.

If there are failures in the treatment of ‘best completeness’ mtz, you can try to treat a higher number of mtz for each dataset.

You can first start by running on mtz from autoPROC process which is generally a good compromise between resolution and completeness:

```
$ easypipe.py PROCESSED_DATA launch my_ref_folder --mode full --lig --autoproc
```

Or you can run on the two first mtz of best completeness for each dataset:

```
$ easypipe.py PROCESSED_DATA launch my_ref_folder --mode full --lig --best 2
```

or more ...:

```
$ easypipe.py PROCESSED_DATA launch my_ref_folder --mode full --lig --best 5
```

or on the whole processed mtz files:

```
$ easypipe.py PROCESSED_DATA launch my_ref_folder --mode full --lig --whole
```

If only some datasets are problematic, you can run in simulation mode first, modify the corresponding ‘launch’ csv file in /easYPipe/2\_launch/ (replace ‘yes’ by ‘no’ in the ‘to treat’ column, for those not to process), then run again:

```
$ easypipe.py PROCESSED_DATA launch my_ref_folder --mode full --lig --whole --simulate
then, after modification of the 'launch' csv file:
$ easypipe.py PROCESSED_DATA launch my_ref_folder --mode full --lig --whole
```

Then, only selected mtz will be treated, reducing the duration of the treatment.

For more details on this step see [here](#).

## 5.6 6. Compile results in a summary file

If you have run several times the ‘launch’ subcommand, you will have several ‘RESULT’ csv files in the RESULTS folder, that you probably wish to compile and clean.

The ‘*summary*’ subcommand is automatically run at the end of each ‘launch’ subcommand.

If you have done several ‘launch’ with different space group for example, you will have to run manually the ‘*summary*’ subcommand.

Then a global SUMMARY file will be created, that compiles all SUMMARY files present in RESULTS folders.

Then run:

```
$ easypipe.py PROCESSED_DATA summary
```

## 5.7 7. Automatic mode

This mode allows to run main easYPipe steps (prep, reindex, launch, summary) without any intervention. It could be a good starting point before running more ‘launch’ commands or ligand search.

Example:

```
$ easypipe.py PROCESSED_DATA auto my_ref_folder --best 2 --mode full
```

---

**Note:** Ligand search is not supported at this time in this mode.

---

For more details on this mode see [here](#).



## EASYPEPIPE ‘PREP’

---

**Important:** This step is a first mandatory step for the preparation of the data.

---

### 6.1 Usage

easypipe.py data prep [-h]

Example:

```
$ easypipe.py PROCESSED_DATA prep
```

### 6.2 How the data should be organized ?

The data folder (whatever it’s name) must contain only datasets folders.

Within each dataset folder, the processed data can be organized in several ways:

- a mtz file directly in dataset folder
- a mtz file in a sub-folder, or in a sub-sub-folder ... of dataset folder
- several processes are possible for a dataset, better if they are in different sub-folders, but not mandatory
- if several mtz files are present in the same sub-folder, only the ones fitting the templates (from EDNA processes) will be treated, or if none fits only the first mtz file will be considered

```
- data folder
  - dataset1
    - file.mtz
    - other-file.log
    :
  - dataset2
    - proc-folder
      - file-direct.mtz
      - other-file.txt
      - other-file.csv
      :
  - dataset3
    - PROC_1
      - autoPROC
        - ap_cypD-122-2min_run1_anom_autoPROC.log
        - ap_cypD-122-2min_run1_anom_report.pdf
        - ap_cypD-122-2min_run1_anom_starano_alldata-unique.mtz
        - ap_cypD-122-2min_run1_anom_starano_alldata-unique.stats
        - ap_cypD-122-2min_run1_anom_starano_alldata-unique.table1
        - ap_cypD-122-2min_run1_anom_summary_inlined.html
        - ap_cypD-122-2min_run1_anom_truncate.mtz
        - ap_cypD-122-2min_run1_anom_truncate-unique.stats
        - ap_cypD-122-2min_run1_anom_truncate-unique.table1
        - ap_cypD-122-2min_run1_anom_XDS_ASCII.HKL.gz
      - another-process
      :
    - PROC_2
      :
```

---

**Note:** Data downloaded with *easYGet* are directly in the right tree organization.

---

## 6.3 What does it do ?

In an ‘easYPipe’ folder created at the place where it is executed, ‘prep’ copies each processed data mtz in a sub-folder of the dataset in this way:

- creation of an ‘easYPipe’ treatment directory where it is run
- creation of a subdirectory ‘0\_processed\_datasets’ where all the datasets folder are created
- creation of a ‘data’ folder in each dataset folder and copy in this folder of processed mtz and log files
- if there are several mtz in a folder, search for ‘EDNA’ treatment template and selects the right mtz files

---

**Note:** if you add a process for a dataset after a first ‘prep’, you can launch ‘prep’ sub-command again, this process will be added to the processes already copied

---

Then:

- launch of *xtriage*<sup>1</sup> for each mtz to get resolution, completeness, space group and cell parameters

---

<sup>1</sup> <https://www.phenix-online.org/documentation/reference/xtriage.html>

```

easYPipe/
├── 0_processed_datasets
│   ├── cypD-134_37s
│   │   ├── data
│   │   │   ├── mtz001_PROC_1_autoPROC
│   │   │   │   ├── ap_w1_run1_anom_autoPROC.log
│   │   │   │   ├── ap_w1_run1_anom_truncate.mtz
│   │   │   │   ├── ap_w1_run1_anom_XDS_ASCII.HKL.gz
│   │   │   │   ├── xtriage_ap_w1_run1_anom_truncate.log
│   │   │   │   ├── xtriage-verbose_labels.log
│   │   │   │   └── xtriage-verbose.log
│   │   │   └── mtz002_PROC_1_XDSAPP
│   │   │       ├── CORRECT.LP
│   │   │       ├── cypD-134_37s_w1_1_F_plus_F_minus.mtz
│   │   │       ├── phenix_xtriage.log
│   │   │       ├── pointless.log
│   │   │       ├── XDS_ASCII.HKL
│   │   │       ├── xtriage_cypD-134_37s_w1_1_F_plus_F_minus.log
│   │   │       ├── xtriage-verbose_labels.log
│   │   │       └── xtriage-verbose.log
│   │   └── ligand
│   └── cypD-172_1min20
│       ├── data
│       │   ├── mtz001_PROC_1_autoPROC
│       │   │   ├── ap_w1_run1_anom_autoPROC.log
│       │   │   ├── ap_w1_run1_anom_truncate.mtz
│       │   │   ├── ap_w1_run1_anom_XDS_ASCII.HKL.gz
│       │   │   ├── xtriage_ap_w1_run1_anom_truncate.log
│       │   │   ├── xtriage-verbose_labels.log
│       │   │   └── xtriage-verbose.log
│       │   └── mtz002_PROC_1_XDSAPP
│       │       ├── CORRECT.LP
│       │       ├── cypD-172_1min20_w1_1_F_plus_F_minus.mtz
│       │       ├── phenix_xtriage.log
│       │       ├── pointless.log
│       │       ├── XDS_ASCII.HKL
│       │       ├── xtriage_cypD-172_1min20_w1_1_F_plus_F_minus.log
│       │       ├── xtriage-verbose_labels.log
│       │       └── xtriage-verbose.log
│       └── mtz003_PROC_1_XIA2_DIALS
│           └── di_w1_run1_anom_AUTOMATIC_DEFAULT_aimless.log

```

- information on mtz files to be treated written in ‘/easypipe/1a\_prep/mtz\_to\_treat\_ALL.csv’ file

mtz\_to\_treat\_ALL.csv - LibreOffice Calc

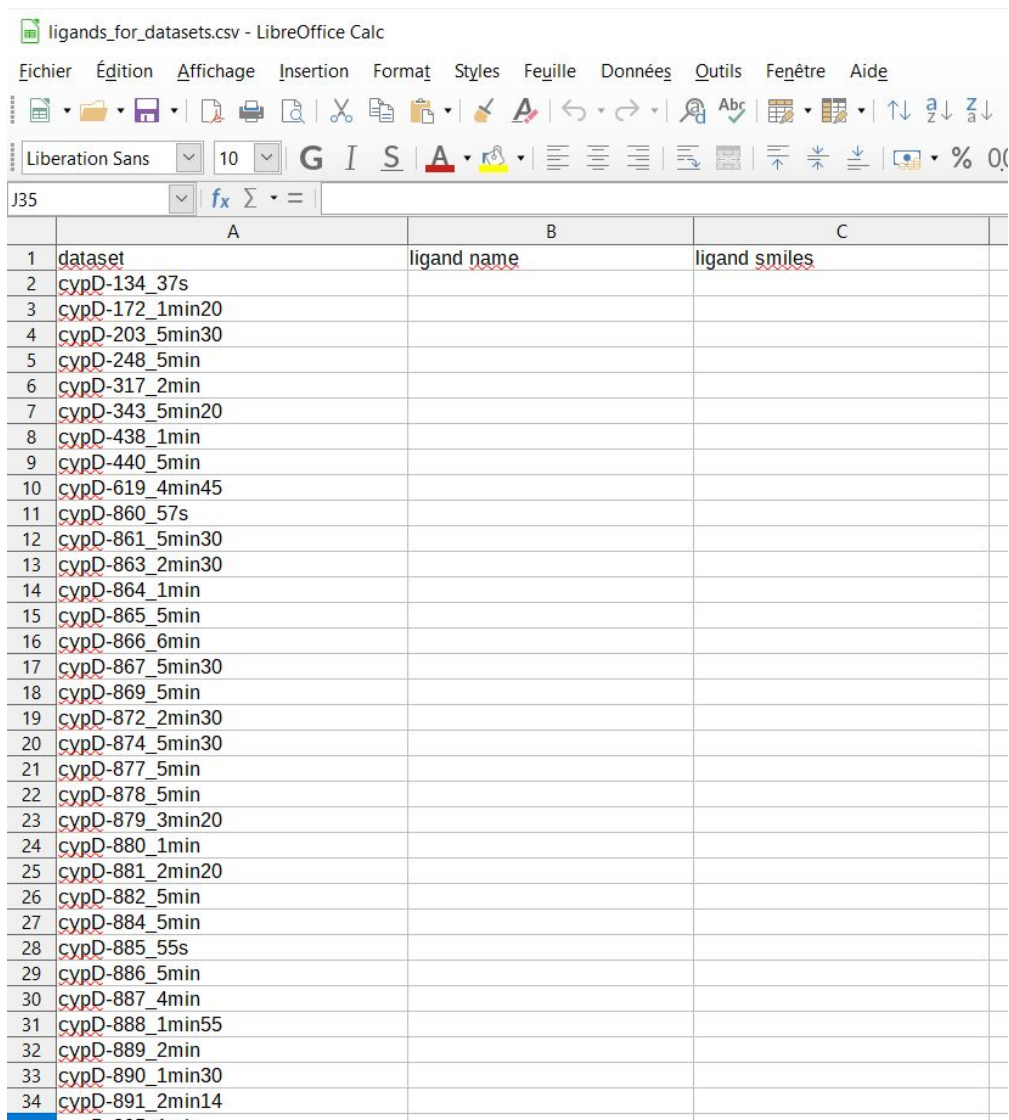
Fichier Édition Affichage Insertion Format Styles Feuille Données Outils Fenêtre Aide

Libération Sans 10 G I S A •

|    | A               | B      | C                 | D  | E             | F               | G           | H  |
|----|-----------------|--------|-------------------|--|---------------|-----------------|-------------|--|
| 1  | dataset         | mtz nb | process name      | mtz file                                     | resolution(Å) | completeness(%) | space group | unit cell                                    |
| 2  | cypD-134_37s    | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate.mtz                 | 1.31          | 97.98           | P422        | 56.858, 56.858, 87.565, 90, 90, 90           |
| 3  | cypD-134_37s    | mtz002 | PROC_1_XDSAPP     | cypD-134_37s_w1_1_F.mtz                      | 1.64          | 42.53           | P2          | 57.0855, 57.0855, 87.787, 90, 90, 90         |
| 4  | cypD-172_1min20 | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate.mtz                 | 4.05          | 52.83           | P1          | 55.243, 55.313, 79.525, 90, 90, 90           |
| 5  | cypD-172_1min20 | mtz002 | PROC_1_XDSAPP     | cypD-172_1min20_w1_1_F.mtz                   | 3.88          | 43.0            | P1          | 55.816, 55.848, 80.31, 89.882, 89.99, 89.867 |
| 6  | cypD-172_1min20 | mtz003 | PROC_1_XIA2_DIALS | di_w1_run1_anom_AUTOMATIC_DEFAULT_free.mtz   | 3.08          | 71.63           | P21         | 55.3039, 55.3039, 79.668, 90, 90, 90         |
| 7  | cypD-203_5min30 | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate.mtz                 | 1.51          | 97.88           | P422        | 56.74, 56.74, 80.034, 90, 90, 90             |
| 8  | cypD-203_5min30 | mtz002 | PROC_1_XDSAPP     | cypD-203_5min30_w1_1_89_F.mtz                | 1.32          | 90.39           | P422        | 56.593, 56.593, 79.576, 90, 90, 90           |
| 9  | cypD-203_5min30 | mtz003 | PROC_1_XIA2_DIALS | di_w1_run1_anom_AUTOMATIC_DEFAULT_free.mtz   | 1.67          | 83.63           | C2          | 56.701, 56.701, 79.7425, 90, 90, 90          |
| 10 | cypD-248_5min   | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate.mtz                 | 1.14          | 98.49           | P41212      | 57.282, 57.282, 87.853, 90, 90, 90           |
| 11 | cypD-248_5min   | mtz002 | PROC_1_EDNA_proc  | ep_cypD-248_5min_w1_run1_anom_truncate.mtz   | 1.0           | 85.05           | P41212      | 57.264, 57.264, 87.827, 90, 90, 90           |
| 12 | cypD-248_5min   | mtz003 | PROC_1_XDSAPP     | cypD-248_5min_w1_1_96_F.mtz                  | 1.03          | 85.68           | P43212      | 57.274, 57.274, 87.837, 90, 90, 90           |
| 13 | cypD-248_5min   | mtz004 | PROC_1_XIA2_DIALS | di_w1_run1_anom_AUTOMATIC_DEFAULT_free.mtz   | 1.38          | 80.19           | P2          | 57.2164, 57.2164, 87.6953, 90, 90, 90        |
| 14 | cypD-317_2min   | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate.mtz                 | 1.14          | 98.9            | P422        | 57.024, 57.024, 87.466, 90, 90, 90           |
| 15 | cypD-317_2min   | mtz002 | PROC_1_EDNA_proc  | ep_cypD-317_2min_w1_run1_anom_truncate.mtz   | 1.07          | 95.13           | P4212       | 56.9836, 56.9836, 87.471, 90, 90, 90         |
| 16 | cypD-317_2min   | mtz003 | PROC_1_XDSAPP     | cypD-317_2min_w1_1_92_F.mtz                  | 1.06          | 90.43           | P41212      | 57.017, 57.017, 87.46, 90, 90, 90            |
| 17 | cypD-343_5min20 | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate.mtz                 | 1.11          | 83.81           | P41212      | 57.256, 57.256, 87.603, 90, 90, 90           |
| 18 | cypD-343_5min20 | mtz002 | PROC_1_EDNA_proc  | ep_cypD-343_5min20_w1_run1_anom_truncate.mtz | 1.11          | 83.97           | P41212      | 57.235, 57.235, 87.572, 90, 90, 90           |
| 19 | cypD-343_5min20 | mtz003 | PROC_1_XDSAPP     | cypD-343_5min20_w1_1_96_F.mtz                | 1.11          | 77.88           | P43212      | 57.269, 57.269, 87.62, 90, 90, 90            |
| 20 | cypD-343_5min20 | mtz004 | PROC_1_XIA2_DIALS | di_w1_run1_anom_AUTOMATIC_DEFAULT_free.mtz   | 1.44          | 83.17           | C2          | 80.585, 80.1558, 87.5141, 90, 88.1608, 90    |
| 21 | cypD-438_1min   | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate.mtz                 | 1.07          | 93.24           | P422        | 57.294, 57.294, 87.555, 90, 90, 90           |
| 22 | cypD-438_1min   | mtz002 | PROC_1_XIA2_DIALS | di_w1_run1_anom_AUTOMATIC_DEFAULT_free.mtz   | 1.05          | 82.57           | C2221       | 80.7025, 80.8632, 87.4104, 90, 90, 90        |
| 23 | cypD-440_5min   | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate.mtz                 | 2.7           | 57.25           | P1          | 55.3529, 55.3529, 78.971, 90, 90, 90         |
| 24 | cypD-440_5min   | mtz002 | PROC_1_XDSAPP     | cypD-440_5min_w1_1_92_F.mtz                  | 1.62          | 96.57           | P41212      | 56.512, 56.512, 61.831, 90, 90, 90           |
| 25 | cypD-619_4min45 | mtz001 | PROC_1_EDNA_proc  | ep_cypD-619_4min45_w1_run1_anom_truncate.mtz | 1.96          | 90.86           | P422        | 55.887, 55.887, 79.878, 90, 90, 90           |
| 26 | cypD-619_4min45 | mtz002 | PROC_1_XDSAPP     | cypD-619_4min45_w1_1_F.mtz                   | 1.96          | 90.86           | P422        | 55.887, 55.887, 79.878, 90, 90, 90           |
| 27 | cypD-619_4min45 | mtz003 | PROC_1_XIA2_DIALS | di_w1_run1_anom_AUTOMATIC_DEFAULT_free.mtz   | 1.69          | 97.05           | P4212       | 56.4117, 56.4117, 79.9383, 90, 90, 90        |
| 28 | cypD-860_57s    | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate.mtz                 | 2.86          | 83.07           | P422        | 57.185, 57.185, 87.586, 90, 90, 90           |
| 29 | cypD-860_57s    | mtz002 | PROC_1_EDNA_proc  | ep_cypD-860_57s_w1_run1_anom_truncate.mtz    | 1.14          | 84.49           | P41212      | 57.328, 57.328, 87.346, 90, 90, 90           |
| 30 | cypD-860_57s    | mtz003 | PROC_1_XDSAPP     | cypD-860_57s_w1_1_20_F.mtz                   | 1.42          | 68.54           | C2221       | 80.909, 80.921, 87.646, 90, 90, 90           |
| 31 | cypD-860_57s    | mtz004 | PROC_1_XIA2_DIALS | di_w1_run1_anom_AUTOMATIC_DEFAULT_free.mtz   | 1.27          | 91.66           | P2221       | 57.2601, 57.2601, 87.2433, 90, 90, 90        |

-creation of a csv file 'easypipe/1c\_ligands/ligands\_for\_datasets.csv' for future ligand generation with eLBOW<sup>2</sup>

<sup>2</sup> <https://www.phenix-online.org/documentation/reference/elbow.html>



|    | A               | B           | C             |
|----|-----------------|-------------|---------------|
|    | dataset         | ligand name | ligand smiles |
| 2  | cypD-134_37s    |             |               |
| 3  | cypD-172_1min20 |             |               |
| 4  | cypD-203_5min30 |             |               |
| 5  | cypD-248_5min   |             |               |
| 6  | cypD-317_2min   |             |               |
| 7  | cypD-343_5min20 |             |               |
| 8  | cypD-438_1min   |             |               |
| 9  | cypD-440_5min   |             |               |
| 10 | cypD-619_4min45 |             |               |
| 11 | cypD-860_57s    |             |               |
| 12 | cypD-861_5min30 |             |               |
| 13 | cypD-863_2min30 |             |               |
| 14 | cypD-864_1min   |             |               |
| 15 | cypD-865_5min   |             |               |
| 16 | cypD-866_6min   |             |               |
| 17 | cypD-867_5min30 |             |               |
| 18 | cypD-869_5min   |             |               |
| 19 | cypD-872_2min30 |             |               |
| 20 | cypD-874_5min30 |             |               |
| 21 | cypD-877_5min   |             |               |
| 22 | cypD-878_5min   |             |               |
| 23 | cypD-879_3min20 |             |               |
| 24 | cypD-880_1min   |             |               |
| 25 | cypD-881_2min20 |             |               |
| 26 | cypD-882_5min   |             |               |
| 27 | cypD-884_5min   |             |               |
| 28 | cypD-885_55s    |             |               |
| 29 | cypD-886_5min   |             |               |
| 30 | cypD-887_4min   |             |               |
| 31 | cypD-888_1min55 |             |               |
| 32 | cypD-889_2min   |             |               |
| 33 | cypD-890_1min30 |             |               |
| 34 | cypD-891_2min14 |             |               |

You have to fill ‘ligand name’ and ‘ligand smiles’ fields before running ‘*easYPipe ligands subcommand*’.

**Caution:** Save the modified csv file somewhere else or with another name if you don’t want to overwrite it in case you launch ‘prep’ sub-command again ...

You can also run ‘*easYPipe reindex subcommand*’ if some mtz should be in higher symmetry space group.

If you are not interested in ligand placement or reindexation, you can directly run ‘*easYPipe launch subcommand*’.

## 6.4 References



## EASYPEPIPE ‘REINDEX’

This optional step is useful when several mtz should be in higher symmetry space group.

The program try to reindex according to the space group of the reference mtz.

Example: P422 can be re-indexed to P41212.

### 7.1 Usage

easypipe.py data reindex [-h] ref\_mtz

| argu-ments        | description  |
|-------------------|--|
| -h,<br>-help      | show this help message and exit  |
| sg_ref            | space group of reference for reindexing (name or number)   |
| -s,<br>-sim-ulate | only simulate, generate a csv file listing for each process if mtz file will be reindexed or not. Give the possibility to modify the csv file to choose not to launch some reindexation, before launching again without simulation mode. |

Example:

```
$ easypipe.py PROCESSED_DATA reindex P41212
equivalent to:
$ easypipe.py PROCESSED_DATA reindex 92
```

### 7.2 What does it do ?

- try to reindex mtz file with [reflection\\_file\\_converter](https://phenix-online.org/documentation/reference/reflection_file_tools.html)<sup>1</sup> if space group is different from reference space group

---

<sup>1</sup> [https://phenix-online.org/documentation/reference/reflection\\_file\\_tools.html](https://phenix-online.org/documentation/reference/reflection_file_tools.html)



```
~~~~~
SUMMARY
~~~~~
mtz candidates for reindexing (space group different from reference file): 93

cypD-134_37s/mtz001_PROC_1_autoPROC/ap_wl_run1_anom_truncate.mtz / P422
cypD-134_37s/mtz002_PROC_1_XDSAPP/cypD-134_37s_wl_1_F.mtz / P2
cypD-172_1min20/mtz001_PROC_1_autoPROC/ap_wl_run1_anom_truncate.mtz / P1
cypD-172_1min20/mtz002_PROC_1_XDSAPP/cypD-172_1min20_wl_1_F.mtz / P1
cypD-172_1min20/mtz003_PROC_1_XIA2_DIALS/di_wl_run1_anom_AUTOMATIC_DEFAULT_free.mtz / P21
cypD-203_5min30/mtz001_PROC_1_autoPROC/ap_wl_run1_anom_truncate.mtz / P422
cypD-203_5min30/mtz002_PROC_1_XDSAPP/cypD-203_5min30_wl_1_89_F.mtz / P422
cypD-203_5min30/mtz003_PROC_1_XIA2_DIALS/di_wl_run1_anom_AUTOMATIC_DEFAULT_free.mtz / C2
cypD-248_5min/mtz003_PROC_1_XDSAPP/cypD-248_5min_wl_1_96_F.mtz / P43212
cypD-248_5min/mtz004_PROC_1_XIA2_DIALS/di_wl_run1_anom_AUTOMATIC_DEFAULT_free.mtz / P2
cypD-317_2min/mtz001_PROC_1_autoPROC/ap_wl_run1_anom_truncate.mtz / P422
cypD-317_2min/mtz002_PROC_1_EDNA_proc/ep_cypD-317_2min_wl_run1_anom_truncate.mtz / P4212
cypD-343_5min20/mtz003_PROC_1_XDSAPP/cypD-343_5min20_wl_1_96_F.mtz / P43212
cypD-343_5min20/mtz004_PROC_1_XIA2_DIALS/di_wl_run1_anom_AUTOMATIC_DEFAULT_free.mtz / C2
cypD-438_1min/mtz001_PROC_1_autoPROC/ap_wl_run1_anom_truncate.mtz / P422
cypD-438_1min/mtz002_PROC_1_XIA2_DIALS/di_wl_run1_anom_AUTOMATIC_DEFAULT_free.mtz / C2221
cypD-440_5min/mtz001_PROC_1_autoPROC/ap_wl_run1_anom_truncate.mtz / P1
cypD-619_4min45/mtz001_PROC_1_EDNA_proc/ep_cypD-619_4min45_wl_run1_anom_truncate.mtz / P422
cypD-619_4min45/mtz002_PROC_1_XDSAPP/cypD-619_4min45_wl_1_F.mtz / P422
cypD-619_4min45/mtz003_PROC_1_XIA2_DIALS/di_wl_run1_anom_AUTOMATIC_DEFAULT_free.mtz / P4212

Number of reindexed mtz: 51
cypD-134_37s/mtz001_PROC_1_autoPROC/ap_wl_run1_anom_truncate_reindexed_P41212.mtz
cypD-203_5min30/mtz001_PROC_1_autoPROC/ap_wl_run1_anom_truncate_reindexed_P41212.mtz
cypD-203_5min30/mtz002_PROC_1_XDSAPP/cypD-203_5min30_wl_1_89_F_reindexed_P41212.mtz
cypD-248_5min/mtz003_PROC_1_XDSAPP/cypD-248_5min_wl_1_96_F_reindexed_P41212.mtz
cypD-317_2min/mtz001_PROC_1_autoPROC/ap_wl_run1_anom_truncate_reindexed_P41212.mtz
cypD-317_2min/mtz002_PROC_1_EDNA_proc/ep_cypD-317_2min_wl_run1_anom_truncate_reindexed_P41212.mtz
cypD-343_5min20/mtz003_PROC_1_XDSAPP/cypD-343_5min20_wl_1_96_F_reindexed_P41212.mtz
cypD-438_1min/mtz001_PROC_1_autoPROC/ap_wl_run1_anom_truncate_reindexed_P41212.mtz
cypD-619_4min45/mtz001_PROC_1_EDNA_proc/ep_cypD-619_4min45_wl_run1_anom_truncate_reindexed_P41212.mtz
cypD-619_4min45/mtz003_PROC_1_XIA2_DIALS/di_wl_run1_anom_AUTOMATIC_DEFAULT_free_reindexed_P41212.mtz
cypD-860_57s/mtz001_PROC_1_autoPROC/ap_wl_run1_anom_truncate_reindexed_P41212.mtz
cypD-863_2min30/mtz001_PROC_1_autoPROC/ap_wl_run1_anom_truncate_reindexed_P41212.mtz
cypD-864_1min/mtz001_PROC_1_autoPROC/ap_wl_run1_anom_truncate_reindexed_P41212.mtz
cypD-864_1min/mtz002_PROC_1_EDNA_proc/ep_cypD-864_1min_wl_run1_anom_truncate_reindexed_P41212.mtz
cypD-864_1min/mtz003_PROC_1_XDSAPP/cypD-864_1min_wl_1_95_F_reindexed_P41212.mtz
cypD-865_5min/mtz003_PROC_1_XDSAPP/cypD-865_5min_wl_1_96_F_reindexed_P41212.mtz
cypD-866_6min/mtz002_PROC_1_EDNA_proc/ep_cypD-866_6min_wl_run1_anom_truncate_reindexed_P41212.mtz
```

- launch `xtriage`<sup>2</sup> for each successfully reindexed mtz to get resolution, completeness, space group and cell parameters
- write a new 'mtz\_to\_treat\_ALL\_reindexed.csv' in '/easypipe/1b\_reindex...' folder, with reindexed mtz files information

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<sup>2</sup> <https://www.phenix-online.org/documentation/reference/xtriage.html>



mtz\_to\_treat\_ALL.csv - LibreOffice Calc

Fichier Édition Affichage Insertion Format Styles Feuille Données Outils Fenêtre Aide

Libération Sans 10 G I S A

|    | A               | B      | C                 | D  | E             | F               | G           | H  |
|----|-----------------|--------|-------------------|--|---------------|-----------------|-------------|--|
| 1  | dataset         | mtz nb | process name      | mtz file                                     | resolution(A) | completeness(%) | space group | unit cell                                    |
| 2  | cypD-134_37s    | mtz001 | PROC 1 autoPROC   | ap_w1_run1_anom_truncate.mtz                 | 1.31          | 97.98           | P422        | 56.858, 56.858, 87.565, 90, 90, 90           |
| 3  | cypD-134_37s    | mtz002 | PROC 1 XDSAPP     | cypD-134_37s_w1_1_F.mtz                      | 1.64          | 42.53           | P2          | 57.0855, 57.0855, 87.787, 90, 90, 90         |
| 4  | cypD-172_1min20 | mtz001 | PROC 1 autoPROC   | ap_w1_run1_anom_truncate.mtz                 | 4.05          | 52.83           | P1          | 55.243, 55.313, 79.525, 90, 90, 90           |
| 5  | cypD-172_1min20 | mtz002 | PROC 1 XDSAPP     | cypD-172_1min20_w1_1_F.mtz                   | 3.88          | 43.0            | P1          | 55.816, 55.848, 80.31, 89.882, 89.99, 89.867 |
| 6  | cypD-172_1min20 | mtz003 | PROC 1 XIA2 DIALS | di_w1_run1_anom_AUTOMATIC_DEFAULT_free.mtz   | 3.08          | 71.63           | P21         | 55.3039, 55.3039, 79.668, 90, 90, 90         |
| 7  | cypD-203_5min30 | mtz001 | PROC 1 autoPROC   | ap_w1_run1_anom_truncate.mtz                 | 1.51          | 97.88           | P422        | 56.74, 56.74, 80.034, 90, 90, 90             |
| 8  | cypD-203_5min30 | mtz002 | PROC 1 XDSAPP     | cypD-203_5min30_w1_1_89_F.mtz                | 1.32          | 90.39           | P422        | 56.593, 56.593, 79.576, 90, 90, 90           |
| 9  | cypD-203_5min30 | mtz003 | PROC 1 XIA2 DIALS | di_w1_run1_anom_AUTOMATIC_DEFAULT_free.mtz   | 1.67          | 83.63           | C2          | 56.701, 56.701, 79.7425, 90, 90, 90          |
| 10 | cypD-248_5min   | mtz001 | PROC 1 autoPROC   | ap_w1_run1_anom_truncate.mtz                 | 1.14          | 98.49           | P41212      | 57.282, 57.282, 87.853, 90, 90, 90           |
| 11 | cypD-248_5min   | mtz002 | PROC 1 EDNA proc  | ep_cypD-248_5min_w1_run1_anom_truncate.mtz   | 1.0           | 85.05           | P41212      | 57.264, 57.264, 87.827, 90, 90, 90           |
| 12 | cypD-248_5min   | mtz003 | PROC 1 XDSAPP     | cypD-248_5min_w1_1_96_F.mtz                  | 1.03          | 85.68           | P43212      | 57.274, 57.274, 87.837, 90, 90, 90           |
| 13 | cypD-248_5min   | mtz004 | PROC 1 XIA2 DIALS | di_w1_run1_anom_AUTOMATIC_DEFAULT_free.mtz   | 1.38          | 80.19           | P2          | 57.2164, 57.2164, 87.6953, 90, 90, 90        |
| 14 | cypD-317_2min   | mtz001 | PROC 1 autoPROC   | ap_w1_run1_anom_truncate.mtz                 | 1.14          | 98.9            | P422        | 57.024, 57.024, 87.466, 90, 90, 90           |
| 15 | cypD-317_2min   | mtz002 | PROC 1 EDNA proc  | ep_cypD-317_2min_w1_run1_anom_truncate.mtz   | 1.07          | 95.13           | P4212       | 56.9836, 56.9836, 87.471, 90, 90, 90         |
| 16 | cypD-317_2min   | mtz003 | PROC 1 XDSAPP     | cypD-317_2min_w1_1_92_F.mtz                  | 1.06          | 90.43           | P41212      | 57.017, 57.017, 87.46, 90, 90, 90            |
| 17 | cypD-317_2min   | mtz001 | PROC 1 autoPROC   | ap_w1_run1_anom_truncate.mtz                 | 1.11          | 83.81           | P41212      | 57.256, 57.256, 87.603, 90, 90, 90           |
| 18 | cypD-343_5min20 | mtz002 | PROC 1 EDNA proc  | ep_cypD-343_5min20_w1_run1_anom_truncate.mtz | 1.11          | 83.97           | P41212      | 57.235, 57.235, 87.572, 90, 90, 90           |
| 19 | cypD-343_5min20 | mtz003 | PROC 1 XDSAPP     | cypD-343_5min20_w1_1_96_F.mtz                | 1.11          | 77.88           | P43212      | 57.269, 57.269, 87.62, 90, 90, 90            |
| 20 | cypD-343_5min20 | mtz004 | PROC 1 XIA2 DIALS | di_w1_run1_anom_AUTOMATIC_DEFAULT_free.mtz   | 1.44          | 83.17           | C2          | 80.585, 80.1558, 87.5141, 90, 88.1608, 90    |
| 21 | cypD-438_1min   | mtz001 | PROC 1 autoPROC   | ap_w1_run1_anom_truncate.mtz                 | 1.07          | 93.24           | P422        | 57.294, 57.294, 87.555, 90, 90, 90           |
| 22 | cypD-438_1min   | mtz002 | PROC 1 XIA2 DIALS | di_w1_run1_anom_AUTOMATIC_DEFAULT_free.mtz   | 1.05          | 82.57           | C221        | 80.7025, 80.8632, 87.4104, 90, 90, 90        |
| 23 | cypD-440_5min   | mtz001 | PROC 1 autoPROC   | ap_w1_run1_anom_truncate.mtz                 | 2.7           | 57.25           | P1          | 55.3529, 55.3529, 78.971, 90, 90, 90         |
| 24 | cypD-440_5min   | mtz002 | PROC 1 XDSAPP     | cypD-440_5min_w1_1_92_F.mtz                  | 1.62          | 96.57           | P41212      | 56.512, 56.512, 81.831, 90, 90, 90           |
| 25 | cypD-619_4min45 | mtz001 | PROC 1 EDNA proc  | ep_cypD-619_4min45_w1_run1_anom_truncate.mtz | 1.96          | 90.86           | P422        | 55.887, 55.887, 79.878, 90, 90, 90           |
| 26 | cypD-619_4min45 | mtz002 | PROC 1 XDSAPP     | cypD-619_4min45_w1_1_F.mtz                   | 1.96          | 90.86           | P422        | 55.887, 55.887, 79.878, 90, 90, 90           |
| 27 | cypD-619_4min45 | mtz003 | PROC 1 XIA2 DIALS | di_w1_run1_anom_AUTOMATIC_DEFAULT_free.mtz   | 1.69          | 97.05           | P4212       | 56.4117, 56.4117, 79.9383, 90, 90, 90        |
| 28 | cypD-860_57s    | mtz001 | PROC 1 autoPROC   | ap_w1_run1_anom_truncate.mtz                 | 2.86          | 83.07           | P422        | 57.185, 57.185, 87.586, 90, 90, 90           |
| 29 | cypD-860_57s    | mtz002 | PROC 1 EDNA proc  | ep_cypD-860_57s_w1_run1_anom_truncate.mtz    | 1.14          | 84.49           | P41212      | 57.328, 57.328, 87.346, 90, 90, 90           |
| 30 | cypD-860_57s    | mtz003 | PROC 1 XDSAPP     | cypD-860_57s_w1_1_20_F.mtz                   | 1.42          | 68.54           | C221        | 80.909, 80.921, 87.646, 90, 90, 90           |
| 31 | cypD-860_57s    | mtz004 | PROC 1 XIA2 DIALS | di_w1_run1_anom_AUTOMATIC_DEFAULT_free.mtz   | 1.27          | 91.66           | P221        | 57.2601, 57.2601, 87.2433, 90, 90, 90        |

becomes:

mtz\_to\_treat\_ALL\_reindexed.csv - LibreOffice Calc <2>

Fichier Édition Affichage Insertion Format Styles Feuille Données Outils Fenêtre Aide

Libération Sans 10 B I U T

|    | A               | B      | C                 | D   | E             | F               | G           | H  |
|----|-----------------|--------|-------------------|---|---------------|-----------------|-------------|--|
| 1  | dataset         | mtz nb | process name      | mtz file  | resolution(A) | completeness(%) | space group | unit cell                                    |
| 2  | cypD-134_37s    | mtz001 | PROC 1 autoPROC   | ap_w1_run1_anom_truncate_reindexed_P41212.mtz                 | 1.31          | 98.12           | P41212      | 56.858, 56.858, 87.565, 90, 90, 90           |
| 3  | cypD-134_37s    | mtz002 | PROC 1 XDSAPP     | cypD-134_37s_w1_1_F_plus_F_minus_reindexed_P41212.mtz         | 1.64          | 97.33           | P41212      | 57.0855, 57.0855, 87.787, 90, 90, 90         |
| 4  | cypD-172_1min20 | mtz001 | PROC 1 autoPROC   | ap_w1_run1_anom_truncate_reindexed_P41212.mtz                 | 4.05          | 96.94           | P41212      | 55.243, 55.313, 79.525, 90, 90, 90           |
| 5  | cypD-172_1min20 | mtz002 | PROC 1 XDSAPP     | cypD-172_1min20_w1_1_F_plus_F_minus_reindexed_P41212.mtz      | 3.88          | 98.4            | P41212      | 55.816, 55.848, 80.31, 89.882, 89.99, 89.867 |
| 6  | cypD-172_1min20 | mtz003 | PROC 1 XIA2 DIALS | di_w1_run1_anom_AUTOMATIC_DEFAULT_free_reindexed_P41212.mtz   | 3.08          | 76.05           | P41212      | 55.3039, 55.3039, 79.668, 90, 90, 90         |
| 7  | cypD-203_5min30 | mtz001 | PROC 1 autoPROC   | ap_w1_run1_anom_truncate_reindexed_P41212.mtz                 | 1.51          | 98.1            | P41212      | 56.74, 56.74, 80.034, 90, 90, 90             |
| 8  | cypD-203_5min30 | mtz002 | PROC 1 XDSAPP     | cypD-203_5min30_w1_1_89_F_plus_F_minus_reindexed_P41212.mtz   | 1.32          | 90.47           | P41212      | 56.593, 56.593, 79.576, 90, 90, 90           |
| 9  | cypD-203_5min30 | mtz003 | PROC 1 XIA2 DIALS | di_w1_run1_anom_AUTOMATIC_DEFAULT_free_reindexed_P41212.mtz   | 1.67          | 48.67           | P41212      | 56.701, 56.701, 79.7425, 90, 90, 90          |
| 10 | cypD-248_5min   | mtz001 | PROC 1 autoPROC   | ap_w1_run1_anom_truncate.mtz                                  | 1.14          | 98.49           | P41212      | 57.282, 57.282, 87.853, 90, 90, 90           |
| 11 | cypD-248_5min   | mtz002 | PROC 1 EDNA proc  | ep_cypD-248_5min_w1_run1_anom_truncate.mtz                    | 1.0           | 85.05           | P41212      | 57.264, 57.264, 87.827, 90, 90, 90           |
| 12 | cypD-248_5min   | mtz003 | PROC 1 XDSAPP     | cypD-248_5min_w1_1_92_F_plus_F_minus.mtz                      | 1.03          | 91.47           | P41212      | 57.274, 57.274, 87.837, 90, 90, 90           |
| 13 | cypD-248_5min   | mtz004 | PROC 1 XIA2 DIALS | di_w1_run1_anom_AUTOMATIC_DEFAULT_free_reindexed_P41212.mtz   | 1.38          | 97.92           | P41212      | 57.2164, 57.2164, 87.6953, 90, 90, 90        |
| 14 | cypD-317_2min   | mtz001 | PROC 1 autoPROC   | ap_w1_run1_anom_truncate_reindexed_P41212.mtz                 | 1.14          | 98.99           | P41212      | 57.024, 57.024, 87.466, 90, 90, 90           |
| 15 | cypD-317_2min   | mtz002 | PROC 1 EDNA proc  | ep_cypD-317_2min_w1_run1_anom_truncate_reindexed_P41212.mtz   | 1.07          | 90.05           | P41212      | 56.9836, 56.9836, 87.471, 90, 90, 90         |
| 16 | cypD-317_2min   | mtz003 | PROC 1 XDSAPP     | cypD-317_2min_w1_1_96_F_plus_F_minus_reindexed_P41212.mtz     | 1.06          | 90.42           | P41212      | 57.017, 57.017, 87.46, 90, 90, 90            |
| 17 | cypD-317_2min   | mtz001 | PROC 1 autoPROC   | ap_w1_run1_anom_truncate.mtz                                  | 1.11          | 83.81           | P41212      | 57.256, 57.256, 87.603, 90, 90, 90           |
| 18 | cypD-343_5min20 | mtz002 | PROC 1 EDNA proc  | ep_cypD-343_5min20_w1_run1_anom_truncate.mtz                  | 1.11          | 83.97           | P41212      | 57.235, 57.235, 87.572, 90, 90, 90           |
| 19 | cypD-343_5min20 | mtz003 | PROC 1 XDSAPP     | cypD-343_5min20_w1_1_96_F_plus_F_minus_reindexed_P41212.mtz   | 1.11          | 77.88           | P41212      | 57.269, 57.269, 87.62, 90, 90, 90            |
| 20 | cypD-343_5min20 | mtz004 | PROC 1 XIA2 DIALS | di_w1_run1_anom_AUTOMATIC_DEFAULT_free_reindexed_P41212.mtz   | 1.44          | 48.32           | P41212      | 80.585, 80.1558, 87.5141, 90, 88.1608, 90    |
| 21 | cypD-438_1min   | mtz001 | PROC 1 autoPROC   | ap_w1_run1_anom_truncate_reindexed_P41212.mtz                 | 1.07          | 93.27           | P41212      | 57.294, 57.294, 87.555, 90, 90, 90           |
| 22 | cypD-438_1min   | mtz002 | PROC 1 XIA2 DIALS | di_w1_run1_anom_AUTOMATIC_DEFAULT_free_reindexed_P41212.mtz   | 1.05          | 44.52           | P41212      | 80.7025, 80.8632, 87.4104, 90, 90, 90        |
| 23 | cypD-440_5min   | mtz001 | PROC 1 autoPROC   | ap_w1_run1_anom_truncate_reindexed_P41212.mtz                 | 2.7           | 94.39           | P41212      | 55.3529, 55.3529, 78.971, 90, 90, 90         |
| 24 | cypD-440_5min   | mtz002 | PROC 1 XDSAPP     | cypD-440_5min_w1_1_92_F_plus_F_minus.mtz                      | 1.62          | 97.1            | P41212      | 56.512, 56.512, 81.831, 90, 90, 90           |
| 25 | cypD-619_4min45 | mtz001 | PROC 1 EDNA proc  | ep_cypD-619_4min45_w1_run1_anom_truncate_reindexed_P41212.mtz | 1.96          | 89.87           | P41212      | 55.887, 55.887, 79.878, 90, 90, 90           |
| 26 | cypD-619_4min45 | mtz002 | PROC 1 XDSAPP     | cypD-619_4min45_w1_1_F_plus_F_minus.mtz                       | 1.96          | 90.86           | P422        | 55.887, 55.887, 79.878, 90, 90, 90           |
| 27 | cypD-619_4min45 | mtz003 | PROC 1 XIA2 DIALS | di_w1_run1_anom_AUTOMATIC_DEFAULT_free_reindexed_P41212.mtz   | 1.69          | 96.62           | P41212      | 56.4117, 56.4117, 79.9383, 90, 90, 90        |
| 28 | cypD-860_57s    | mtz001 | PROC 1 autoPROC   | ap_w1_run1_anom_truncate_reindexed_P41212.mtz                 | 2.86          | 83.76           | P41212      | 57.185, 57.185, 87.586, 90, 90, 90           |
| 29 | cypD-860_57s    | mtz002 | PROC 1 EDNA proc  | ep_cypD-860_57s_w1_run1_anom_truncate.mtz                     | 1.14          | 84.49           | P41212      | 57.328, 57.328, 87.346, 90, 90, 90           |

where P422, P41212 processed data have been successfully reindexed to P41212 space group.

## 7.3 Reindex simulation mode

Simulation mode allows to generate the csv file “reindex\_mtz\_<sg\_ref>.csv” listing processes to be reindexed, but without launching reindexation. Then, you can modify the ‘to treat’ column to turn ‘yes’ to ‘no’ for some processes you don’t want to reindex .

reindex\_mtz\_P41212.csv - LibreOffice Calc

Fichier Édition Affichage Insertion Format Styles Feuille Données Outils Fenêtre Aide

Libération Sans 10 pt G I S A

|    | A               | B      | C                 | D  | E             | F               | G           | H  | I        |
|----|-----------------|--------|-------------------|--|---------------|-----------------|-------------|--|----------|
|    | dataset         | mtz nb | process name      | mtz file                                     | resolution(A) | completeness(%) | space group | unit cell                                    | to treat |
| 1  | cypD-134_37s    | mtz001 | PROC 1 autoPROC   | ap_w1_run1_anom_staraniso_alldata-unique.mtz | 1.18          | 86.7            | P422        | 56.858, 56.858, 87.565, 90, 90, 90           | yes      |
| 2  | cypD-134_37s    | mtz002 | PROC 1 autoPROC   | ap_w1_run1_anom_truncate.mtz                 | 1.31          | 97.98           | P422        | 56.858, 56.858, 87.565, 90, 90, 90           | yes      |
| 3  | cypD-134_37s    | mtz003 | PROC 1 XDSAPP     | cypD-134_37s_w1_1_F_plus_F_minus.mtz         | 1.64          | 49.24           | P2          | 57.0855, 57.0855, 87.787, 90, 90, 90         | yes      |
| 4  | cypD-172_1min20 | mtz001 | PROC 1 autoPROC   | ap_w1_run1_anom_staraniso_alldata-unique.mtz | 1.68          | 26.58           | P1          | 55.243, 55.313, 79.525, 90, 90, 90           | yes      |
| 5  | cypD-172_1min20 | mtz002 | PROC 1 autoPROC   | ap_w1_run1_anom_truncate.mtz                 | 4.05          | 52.83           | P1          | 55.243, 55.313, 79.525, 90, 90, 90           | yes      |
| 6  | cypD-172_1min20 | mtz003 | PROC 1 XDSAPP     | cypD-172_1min20_w1_1_F_plus_F_minus.mtz      | 3.88          | 54.07           | P1          | 55.816, 55.848, 80.31, 89.882, 89.99, 89.867 | yes      |
| 7  | cypD-172_1min20 | mtz004 | PROC 1 XIA2 DIALS | di_w1_run1_anom_AUTOMATIC_DEFAULT_free.mtz   | 3.08          | 71.63           | P21         | 55.3039, 55.3039, 79.668, 90, 90, 90         | yes      |
| 8  | cypD-203_5min30 | mtz001 | PROC 1 autoPROC   | ap_w1_run1_anom_staraniso_alldata-unique.mtz | 1.32          | 78.97           | P422        | 56.74, 56.74, 80.034, 90, 90, 90             | yes      |
| 9  | cypD-203_5min30 | mtz002 | PROC 1 autoPROC   | ap_w1_run1_anom_truncate.mtz                 | 1.51          | 97.88           | P422        | 56.74, 56.74, 80.034, 90, 90, 90             | yes      |
| 10 | cypD-203_5min30 | mtz003 | PROC 1 XDSAPP     | cypD-203_5min30_w1_1_89_F_plus_F_minus.mtz   | 1.32          | 94.87           | P422        | 56.593, 56.593, 79.576, 90, 90, 90           | yes      |
| 11 | cypD-203_5min30 | mtz004 | PROC 1 XIA2 DIALS | di_w1_run1_anom_AUTOMATIC_DEFAULT_free.mtz   | 1.67          | 83.63           | C2          | 56.701, 56.701, 79.7425, 90, 90, 90          | yes      |
| 12 | cypD-248_5min   | mtz001 | PROC 1 autoPROC   | ap_w1_run1_anom_staraniso_alldata-unique.mtz | 1.08          | 90.28           | P41212      | 57.282, 57.282, 87.853, 90, 90, 90           | no       |
| 13 | cypD-248_5min   | mtz002 | PROC 1 autoPROC   | ap_w1_run1_anom_truncate.mtz                 | 1.14          | 98.49           | P41212      | 57.282, 57.282, 87.853, 90, 90, 90           | no       |
| 14 | cypD-248_5min   | mtz003 | PROC 1 EDNA proc  | ep_cypD-248_5min_w1_run1_anom_truncate.mtz   | 1.0           | 85.05           | P41212      | 57.264, 57.264, 87.827, 90, 90, 90           | no       |
| 15 | cypD-248_5min   | mtz004 | PROC 1 XDSAPP     | cypD-248_5min_w1_1_92_F_plus_F_minus.mtz     | 1.03          | 91.47           | P41212      | 57.274, 57.274, 87.837, 90, 90, 90           | no       |
| 16 | cypD-248_5min   | mtz005 | PROC 1 XIA2 DIALS | di_w1_run1_anom_AUTOMATIC_DEFAULT_free.mtz   | 1.38          | 80.19           | P2          | 57.2164, 57.2164, 87.6953, 90, 90, 90        | yes      |
| 17 | cypD-317_2min   | mtz001 | PROC 1 autoPROC   | ap_w1_run1_anom_staraniso_alldata-unique.mtz | 1.06          | 89.49           | P422        | 57.024, 57.024, 87.466, 90, 90, 90           | yes      |
| 18 | cypD-317_2min   | mtz002 | PROC 1 autoPROC   | ap_w1_run1_anom_truncate.mtz                 | 1.14          | 98.9            | P422        | 57.024, 57.024, 87.466, 90, 90, 90           | yes      |
| 19 | cypD-317_2min   | mtz003 | PROC 1 EDNA proc  | ep_cypD-317_2min_w1_run1_anom_truncate.mtz   | 1.07          | 95.13           | P4212       | 56.9836, 56.9836, 87.471, 90, 90, 90         | yes      |
| 20 | cypD-317_2min   | mtz004 | PROC 1 XDSAPP     | cypD-317_2min_w1_1_92_F_plus_F_minus.mtz     | 1.06          | 95.29           | P41212      | 57.017, 57.017, 87.46, 90, 90, 90            | no       |
| 21 | cypD-317_2min   | mtz005 | PROC 1 autoPROC   | ap_w1_run1_anom_staraniso_alldata-unique.mtz | 1.15          | 91.59           | P41212      | 57.256, 57.256, 87.603, 90, 90, 90           | no       |
| 22 | cypD-343_5min20 | mtz001 | PROC 1 autoPROC   | ap_w1_run1_anom_truncate.mtz                 | 1.11          | 83.81           | P41212      | 57.256, 57.256, 87.603, 90, 90, 90           | no       |
| 23 | cypD-343_5min20 | mtz002 | PROC 1 EDNA proc  | ep_cypD-343_5min20_w1_run1_anom_truncate.mtz | 1.11          | 83.97           | P41212      | 57.235, 57.235, 87.572, 90, 90, 90           | no       |
| 24 | cypD-343_5min20 | mtz003 | PROC 1 XDSAPP     | cypD-343_5min20_w1_1_96_F_plus_F_minus.mtz   | 1.11          | 83.8            | P43212      | 57.269, 57.269, 87.62, 90, 90, 90            | yes      |
| 25 | cypD-343_5min20 | mtz004 | PROC 1 XIA2 DIALS | di_w1_run1_anom_AUTOMATIC_DEFAULT_free.mtz   | 1.44          | 83.17           | C2          | 80.585, 80.1558, 87.5141, 90, 88.1608, 90    | yes      |
| 26 | cypD-438_1min   | mtz001 | PROC 1 autoPROC   | ap_w1_run1_anom_staraniso_alldata-unique.mtz | 1.04          | 90.13           | P422        | 57.294, 57.294, 87.555, 90, 90, 90           | yes      |
| 27 | cypD-438_1min   | mtz002 | PROC 1 autoPROC   | ap_w1_run1_anom_truncate.mtz                 | 1.07          | 93.24           | P422        | 57.294, 57.294, 87.555, 90, 90, 90           | yes      |
| 28 | cypD-438_1min   | mtz003 | PROC 1 XIA2 DIALS | di_w1_run1_anom_AUTOMATIC_DEFAULT_free.mtz   | 1.05          | 82.57           | C2221       | 80.7025, 80.8632, 87.4104, 90, 90, 90        | yes      |
| 29 | cypD-440_5min   | mtz001 | PROC 1 autoPROC   | ap_w1_run1_anom_staraniso_alldata-unique.mtz | 1.99          | 32.68           | P1          | 55.3529, 55.3529, 78.971, 90, 90, 90         | yes      |
| 30 | cypD-440_5min   | mtz002 | PROC 1 autoPROC   | ap_w1_run1_anom_truncate.mtz                 | 2.7           | 57.25           | P1          | 55.3529, 55.3529, 78.971, 90, 90, 90         | yes      |
| 31 | cypD-440_5min   | mtz003 | PROC 1 XDSAPP     | cypD-440_5min_w1_1_92_F_plus_F_minus.mtz     | 1.62          | 97.1            | P41212      | 56.512, 56.512, 81.831, 90, 90, 90           | no       |
| 32 | cypD-619_4min45 | mtz001 | PROC 1 EDNA proc  | ep_cypD-619_4min45_w1_run1_anom_truncate.mtz | 1.96          | 90.86           | P422        | 55.887, 55.887, 79.878, 90, 90, 90           | yes      |

Example:

```
$ easypipe.py PROCESSED_DATA reindex P41212 --simulate
```

**Warning:** If you run again ‘prep’ step for any reason like adding new datasets, you will have to run again this ‘reindex’ step. Even if they don’t need to be reindexed, you have to run ‘reindex’ step to have the right reindexed csv file including these new datasets. For this, launch reindex again with simulate option to re-generate the csv file with new processes to treat, then launch again reindex.

## 7.4 References

## EASYPEPIPE 'LIGANDS'

This step is mandatory if you want Phenix to search ligand, else it is optional.

'ligands' subcommand generates pdb and cif from smiles with [eLBOW<sup>2</sup>](#).

---

**Important:** First, template csv file generated with 'prep' subcommand have to be completed with ligands names and smiles.

---

### 8.1 Usage

easypipe.py data ligands [-h] ligands\_csv

| arguments   | description   |
|-------------|---|
| -h, -help   | show this help message and exit   |
| ligands_csv | ligands_for_datasets.csv file from 'prep' with ligands names and smiles completed (mandatory) |

Example:

```
$ easypipe.py PROCESSED_DATA ligands easyPipe/1c_ligands/ligands_for_datasets_OK.csv
```

### 8.2 What does it do ?

- First, you have to fill in the fields 'ligand name' and 'ligand smiles' of 1c\_ligands/ligands\_for\_datasets.csv file, then save the csv file somewhere else or with another name if you don't want to overwrite it in case you run 'prep' subcommand again ...

---

<sup>2</sup> <https://www.phenix-online.org/documentation/reference/elbow.html>



ligands\_for\_datasets\_OK.csv - LibreOffice Calc

Fichier Édition Affichage Insertion Format Styles Feuille Données Outils Fenêtre Aide

Libération Sans 10 G I S A

L34 fx Σ =

|   | A               | B           | C                               |
|---|-----------------|-------------|---------------------------------|
| 1 | dataset         | ligand name | ligand smiles                   |
| 2 | cypD-134_37s    |             |                                 |
| 3 | cypD-172_1min20 | 172         | <chem>Nc1cccc(c1)C(O)=O</chem>  |
| 4 | cypD-203_5min30 |             |                                 |
| 5 | cypD-317_2min   | 317         | <chem>c1cc2cccnc2[nH]1</chem>   |
| 6 | cypD-343_5min20 | 343         | <chem>NS(=O)(=O)c1ccccc1</chem> |
| 7 | cypD-438_1min   | 438         | <chem>c1n[nH]c2ccccc12</chem>   |
| 8 | cypD-440_5min   | 440         | <chem>C1Cc2ccccc2N1</chem>      |
| 9 | cypD-619_4min45 | 619         | <chem>OB(O)c1ccsc1</chem>       |

- ‘ligands’ subcommand generates pdb and cif of ligands and copies them in corresponding processed dataset folders, in a ‘ligand’ folder. It first creates a smiles file accordingly to the ligands\_csv input, canonizes it thanks to [Open Babel](http://openbabel.org/wiki/Main_Page)<sup>1</sup> and converts it with [eLBOW](#)<sup>2</sup> to pdb and cif.

<sup>1</sup> [http://openbabel.org/wiki/Main\\_Page](http://openbabel.org/wiki/Main_Page)

```

0_processed_datasets/
├── cypD-134_37s
│   ├── data
│   │   ├── mtz001_PROC_1_autoPROC
│   │   │   ├── ap_wl_run1_anom_truncate.mtz
│   │   │   ├── ap_wl_run1_anom_truncate.mtz.old
│   │   │   ├── ap_wl_run1_anom_truncate_reindexed_P41212.mtz
│   │   │   ├── xtrriage_ap_wl_run1_anom_truncate.log
│   │   │   ├── xtrriage-verbose_labels.log
│   │   │   └── xtrriage-verbose.log
│   │   └── mtz002_PROC_1_XDSAPP
│   │       ├── cypD-134_37s_wl_1_F_plus_F_minus.mtz
│   │       ├── xtrriage_cypD-134_37s_wl_1_F_plus_F_minus.log
│   │       ├── xtrriage-verbose_labels.log
│   │       └── xtrriage-verbose.log
│   └── ligand
├── cypD-172_1min20
│   ├── data
│   │   ├── mtz001_PROC_1_autoPROC
│   │   │   ├── ap_wl_run1_anom_truncate.mtz
│   │   │   ├── xtrriage_ap_wl_run1_anom_truncate.log
│   │   │   ├── xtrriage-verbose_labels.log
│   │   │   └── xtrriage-verbose.log
│   │   ├── mtz002_PROC_1_XDSAPP
│   │   │   ├── cypD-172_1min20_wl_1_F_plus_F_minus.mtz
│   │   │   ├── xtrriage_cypD-172_1min20_wl_1_F_plus_F_minus.log
│   │   │   ├── xtrriage-verbose_labels.log
│   │   │   └── xtrriage-verbose.log
│   │   └── mtz003_PROC_1_XIA2_DIALS
│   │       ├── di_wl_run1_anom_AUTOMATIC_DEFAULT_free.mtz
│   │       ├── xtrriage_di_wl_run1_anom_AUTOMATIC_DEFAULT_free.log
│   │       ├── xtrriage-verbose_labels.log
│   │       └── xtrriage-verbose.log
│   └── ligand
│       ├── 172.cif
│       ├── 172.elbow_opt.xyz
│       ├── 172.options.pickle
│       ├── 172.pdb
│       ├── 172.pickle
│       └── 172.smi
└── cypD-203_5min30

```

---

**Important:** If eLBOW<sup>2</sup> fails to generate pdb and cif from smiles, you can copy your own cif in ligand sub-folder of the corresponding dataset, eLBOW<sup>2</sup> will generate pdb from this cif.

---

## 8.3 References



## EASYPEPIPE ‘LAUNCH’

‘launch’ subcommand runs [phenix.ligand\\_pipeline](https://www.phenix-online.org/documentation/reference/ligand_pipeline.html)<sup>1</sup> on all the mtz (several processed data, several datasets) according to options and information in ‘mtz\_to\_treat\_ALL.csv’ file.

### 9.1 Usage

easypipe.py data launch [-h] [-m {fast,full,allsg}] [-l] [-n NUMBER] [-c NUMBER] [-b NUMBER | -a] [-s] [-t TEMPLATE] ref

| arguments | description   |
|-----------|---|
| ref       | folder with fasta file and pdb file for replacement, and cif(s) if ligand(s) in the model |

**Warning:** reference pdb files should include the row starting with ‘CRYST1’ containing information on space group

<sup>1</sup> [https://www.phenix-online.org/documentation/reference/ligand\\_pipeline.html](https://www.phenix-online.org/documentation/reference/ligand_pipeline.html)

| optional arguments                                | description  |
|---|--|
| -h, --help  | show this help message and exit  |
| -m {fast,full,allsg},<br>--mode {fast,full,allsg} | running mode: fast, full, or allsg (default = fast)  |
| -l, --lig   | for ligand search and placement  |
| -n NUMBER,<br>--nblig NUMBER                      | number of ligand copies to be searched (default = 1, max 9 for the moment).  |
| -c NUMBER,<br>--cclig NUMBER                      | minimum CC to consider a ligand placement correct (default = 0.7). Ligands with at least this CC will be incorporated into the current model for refinement.   |
| -b NUMBER,<br>--best NUMBER                       | launch only for mtz with best completeness, NUMBER indicates how many mtz to treat (default 1), ex: --best 2   |
| -a, --autoproc                                    | launch only for mtz from autoPROC, or if none launch for mtz with best completeness  |
| -w, --whole                                       | launch for the whole mtz processes   |
| -s, --simulate                                    | only simulate, generate a csv file according to the future launch options. Give the possibility to modify the csv file to choose not to launch certain treatments, before launching again without simulation mode.           |
| -t TEMPLATE,<br>--template TEMPLATE               | optional template name for log files and result folders, in case re-launching with different reference pdb of the same space group (else will be treated in existing folder and not launched again since it already exists). |

Example:

```
$ easypipe.py PROCESSED_DATA launch my_ref_folder --mode full --lig --best 2 --cclig 0.6
equivalent to:
$ easypipe.py PROCESSED_DATA launch my_ref_folder -m full -l -b 2 -c 0.6
```

## 9.2 What does it do ?

### 9.2.1 1. Sort mtz files according to space group in reference pdb, and decreasing completeness

| dataset         | mtz nb | process name      | mtz file  | resolution(A) | completeness(%) | space group | unit cell                             |
|-----------------|--------|-------------------|---|---------------|-----------------|-------------|---------------------------------------|
| cypD-134_37s    | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate_reindexed_P41212.mtz                 | 1.31          | 98.12           | P41212      | 56.858, 56.858, 87.565, 90, 90, 90    |
| cypD-203_5min30 | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate_reindexed_P41212.mtz                 | 1.51          | 98.1            | P41212      | 56.74, 56.74, 80.034, 90, 90, 90      |
| cypD-203_5min30 | mtz002 | PROC_1_XDSAPP     | cypD-203_5min30_w1_1_89_F_reindexed_P41212.mtz                | 1.32          | 90.47           | P41212      | 56.593, 56.593, 79.576, 90, 90, 90    |
| cypD-248_5min   | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate.mtz                                  | 1.14          | 98.49           | P41212      | 57.282, 57.282, 87.853, 90, 90, 90    |
| cypD-248_5min   | mtz003 | PROC_1_XDSAPP     | cypD-248_5min_w1_1_96_F_reindexed_P41212.mtz                  | 1.03          | 85.68           | P41212      | 57.274, 57.274, 87.837, 90, 90, 90    |
| cypD-248_5min   | mtz002 | PROC_1_EDNA_proc  | ep_cypD-248_5min_w1_run1_anom_truncate.mtz                    | 1.0           | 85.05           | P41212      | 57.264, 57.264, 87.827, 90, 90, 90    |
| cypD-317_2min   | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate_reindexed_P41212.mtz                 | 1.14          | 98.99           | P41212      | 57.024, 57.024, 87.466, 90, 90, 90    |
| cypD-317_2min   | mtz002 | PROC_1_EDNA_proc  | ep_cypD-317_2min_w1_run1_anom_truncate_reindexed_P41212.mtz   | 1.07          | 95.21           | P41212      | 56.9836, 56.9836, 87.471, 90, 90, 90  |
| cypD-317_2min   | mtz003 | PROC_1_XDSAPP     | cypD-317_2min_w1_1_92_F.mtz                                   | 1.06          | 90.43           | P41212      | 57.017, 57.017, 87.46, 90, 90, 90     |
| cypD-343_5min20 | mtz002 | PROC_1_EDNA_proc  | ep_cypD-343_5min20_w1_run1_anom_truncate.mtz                  | 1.11          | 83.97           | P41212      | 57.235, 57.235, 87.572, 90, 90, 90    |
| cypD-343_5min20 | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate.mtz                                  | 1.11          | 83.81           | P41212      | 57.256, 57.256, 87.603, 90, 90, 90    |
| cypD-343_5min20 | mtz003 | PROC_1_XDSAPP     | cypD-343_5min20_w1_1_96_F_reindexed_P41212.mtz                | 1.11          | 77.88           | P41212      | 57.269, 57.269, 87.62, 90, 90, 90     |
| cypD-438_1min   | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate_reindexed_P41212.mtz                 | 1.07          | 93.27           | P41212      | 57.294, 57.294, 87.555, 90, 90, 90    |
| cypD-440_5min   | mtz002 | PROC_1_XDSAPP     | cypD-440_5min_w1_1_92_F.mtz                                   | 1.62          | 96.57           | P41212      | 56.512, 56.512, 81.831, 90, 90, 90    |
| cypD-619_4min45 | mtz003 | PROC_1_XIA2_DIALS | dl_w1_run1_anom_AUTOMATIC_DEFAULT_free_reindexed_P41212.mtz   | 1.69          | 97.29           | P41212      | 56.4117, 56.4117, 79.9383, 90, 90, 90 |
| cypD-619_4min45 | mtz001 | PROC_1_EDNA_proc  | ep_cypD-619_4min45_w1_run1_anom_truncate_reindexed_P41212.mtz | 1.96          | 91.14           | P41212      | 55.887, 55.887, 79.878, 90, 90, 90    |
| cypD-619_4min45 | mtz002 | PROC_1_EDNA_proc  | ep_cypD-619_4min45_w1_run1_anom_truncate.mtz                  | 1.14          | 84.40           | P41212      | 57.328, 57.328, 87.346, 90, 90, 90    |

If there are datasets without any mtz to treat according to space group, these datasets are listed in another csv file (“datasets\_without\_mtz\_<sg\_ref>.csv”).



## 9.2.2 2. List mtz files according to option ‘best’, ‘autoproc’ or ‘whole’

- Option example: –best 1 (default)

List only mtz with best completeness for each dataset.

mtz\_to\_treat\_P41212\_best1.csv - LibreOffice Calc

|    | A               | B      | C                 | D   | E             | F               | G           | H                                     |
|----|-----------------|--------|-------------------|---|---------------|-----------------|-------------|---------------------------------------|
| 1  | dataset         | mtz nb | process name      | mtz file  | resolution(A) | completeness(%) | space group | unit cell                             |
| 2  | cypD-134_37s    | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate_reindexed_P41212.mtz                 | 1.31          | 98.12           | P41212      | 56.858, 56.858, 87.565, 90, 90, 90    |
| 3  | cypD-203_5min30 | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate_reindexed_P41212.mtz                 | 1.51          | 98.1            | P41212      | 56.74, 56.74, 80.034, 90, 90, 90      |
| 4  | cypD-248_5min   | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate.mtz                                  | 1.14          | 98.49           | P41212      | 57.282, 57.282, 87.853, 90, 90, 90    |
| 5  | cypD-317_2min   | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate_reindexed_P41212.mtz                 | 1.14          | 98.99           | P41212      | 57.024, 57.024, 87.466, 90, 90, 90    |
| 6  | cypD-343_5min20 | mtz002 | PROC_1_EDNA_proc  | ep_cypD-343_5min20_w1_run1_anom_truncate.mtz                  | 1.11          | 83.97           | P41212      | 57.235, 57.235, 87.572, 90, 90, 90    |
| 7  | cypD-438_1min   | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate_reindexed_P41212.mtz                 | 1.07          | 93.27           | P41212      | 57.294, 57.294, 87.555, 90, 90, 90    |
| 8  | cypD-440_5min   | mtz002 | PROC_1_XDSAPP     | cypD-440_5min_w1_1_92_F_plus_F_minus.mtz                      | 1.62          | 97.1            | P41212      | 56.512, 56.512, 81.831, 90, 90, 90    |
| 9  | cypD-619_4min45 | mtz003 | PROC_1_XIA2_DIALS | di_w1_run1_anom_AUTOMATIC_DEFAULT_free_reindexed_P41212.mtz   | 1.69          | 97.29           | P41212      | 56.4117, 56.4117, 79.9383, 90, 90, 90 |
| 10 | cypD-860_57s    | mtz002 | PROC_1_EDNA_proc  | ep_cypD-860_57s_w1_run1_anom_truncate.mtz                     | 1.14          | 84.49           | P41212      | 57.328, 57.328, 87.346, 90, 90, 90    |
| 11 | cypD-862_5min   | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate_reindexed_P41212.mtz                 | 1.89          | 99.95           | P41212      | 57.402, 57.402, 88.423, 90, 90, 90    |
| 12 | cypD-863_2min30 | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate_reindexed_P41212.mtz                 | 1.24          | 94.96           | P41212      | 56.917, 56.917, 86.828, 90, 90, 90    |
| 13 | cypD-864_1min   | mtz003 | PROC_1_XDSAPP     | cypD-864_1min_w1_1_95_F_plus_F_minus_reindexed_P41212.mtz     | 1.36          | 97.99           | P41212      | 55.835, 55.835, 80.146, 90, 90, 90    |
| 14 | cypD-865_5min   | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate.mtz                                  | 1.1           | 97.94           | P41212      | 57.319, 57.319, 87.742, 90, 90, 90    |
| 15 | cypD-866_6min   | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate.mtz                                  | 1.05          | 81.21           | P41212      | 57.231, 57.231, 87.54, 90, 90, 90     |
| 16 | cypD-867_5min30 | mtz003 | PROC_1_XDSAPP     | cypD-867_5min30_w1_1_92_F_plus_F_minus.mtz                    | 1.06          | 95.51           | P41212      | 57.312, 57.312, 87.716, 90, 90, 90    |
| 17 | cypD-869_5min   | mtz004 | PROC_1_XIA2_DIALS | di_w1_run1_anom_AUTOMATIC_DEFAULT_free_reindexed_P41212.mtz   | 1.42          | 97.96           | P41212      | 56.909, 56.909, 87.2498, 90, 90, 90   |
| 18 | cypD-872_2min30 | mtz002 | PROC_1_EDNA_proc  | ep_cypD-872_2min30_w1_run1_anom_truncate_reindexed_P41212.mtz | 2.32          | 95.81           | P41212      | 55.673, 55.673, 80.398, 90, 90, 90    |
| 19 | cypD-875_4min30 | mtz002 | PROC_1_XDSAPP     | cypD-875_4min30_w1_1_92_F_plus_F_minus.mtz                    | 1.42          | 96.72           | P41212      | 55.502, 55.502, 85.63, 90, 90, 90     |

- Option example: –best 2

List only 2 first mtz, when exist, with best completeness, for each dataset.

mtz\_to\_treat\_P41212\_best2.csv - LibreOffice Calc

|    | A               | B      | C                 | D   | E             | F               | G           | H                                     |
|----|-----------------|--------|-------------------|---|---------------|-----------------|-------------|---------------------------------------|
| 1  | dataset         | mtz nb | process name      | mtz file  | resolution(A) | completeness(%) | space group | unit cell                             |
| 2  | cypD-134_37s    | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate_reindexed_P41212.mtz                 | 1.31          | 98.12           | P41212      | 56.858, 56.858, 87.565, 90, 90, 90    |
| 3  | cypD-203_5min30 | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate_reindexed_P41212.mtz                 | 1.51          | 98.1            | P41212      | 56.74, 56.74, 80.034, 90, 90, 90      |
| 4  | cypD-203_5min30 | mtz002 | PROC_1_XDSAPP     | cypD-203_5min30_w1_1_89_F_reindexed_P41212.mtz                | 1.32          | 90.47           | P41212      | 56.593, 56.593, 79.576, 90, 90, 90    |
| 5  | cypD-248_5min   | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate.mtz                                  | 1.14          | 98.49           | P41212      | 57.282, 57.282, 87.853, 90, 90, 90    |
| 6  | cypD-248_5min   | mtz003 | PROC_1_XDSAPP     | cypD-248_5min_w1_1_96_F_reindexed_P41212.mtz                  | 1.03          | 85.68           | P41212      | 57.274, 57.274, 87.837, 90, 90, 90    |
| 7  | cypD-317_2min   | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate_reindexed_P41212.mtz                 | 1.14          | 98.99           | P41212      | 57.024, 57.024, 87.466, 90, 90, 90    |
| 8  | cypD-317_2min   | mtz002 | PROC_1_EDNA_proc  | ep_cypD-317_2min_w1_run1_anom_truncate_reindexed_P41212.mtz   | 1.07          | 95.21           | P41212      | 56.9836, 56.9836, 87.471, 90, 90, 90  |
| 9  | cypD-343_5min20 | mtz002 | PROC_1_EDNA_proc  | ep_cypD-343_5min20_w1_run1_anom_truncate.mtz                  | 1.11          | 83.97           | P41212      | 57.235, 57.235, 87.572, 90, 90, 90    |
| 10 | cypD-343_5min20 | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate.mtz                                  | 1.11          | 83.81           | P41212      | 57.256, 57.256, 87.603, 90, 90, 90    |
| 11 | cypD-438_1min   | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate_reindexed_P41212.mtz                 | 1.07          | 93.27           | P41212      | 57.294, 57.294, 87.555, 90, 90, 90    |
| 12 | cypD-440_5min   | mtz002 | PROC_1_XDSAPP     | cypD-440_5min_w1_1_92_F.mtz                                   | 1.62          | 96.57           | P41212      | 56.512, 56.512, 81.831, 90, 90, 90    |
| 13 | cypD-619_4min45 | mtz003 | PROC_1_XIA2_DIALS | di_w1_run1_anom_AUTOMATIC_DEFAULT_free_reindexed_P41212.mtz   | 1.69          | 97.29           | P41212      | 56.4117, 56.4117, 79.9383, 90, 90, 90 |
| 14 | cypD-619_4min45 | mtz001 | PROC_1_EDNA_proc  | ep_cypD-619_4min45_w1_run1_anom_truncate_reindexed_P41212.mtz | 1.96          | 91.14           | P41212      | 55.887, 55.887, 79.878, 90, 90, 90    |
| 15 | cypD-860_57s    | mtz002 | PROC_1_EDNA_proc  | ep_cypD-860_57s_w1_run1_anom_truncate.mtz                     | 1.14          | 84.49           | P41212      | 57.328, 57.328, 87.346, 90, 90, 90    |
| 16 | cypD-860_57s    | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate_reindexed_P41212.mtz                 | 2.86          | 83.76           | P41212      | 57.185, 57.185, 87.586, 90, 90, 90    |
| 17 | cypD-863_2min30 | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate_reindexed_P41212.mtz                 | 1.24          | 94.96           | P41212      | 56.917, 56.917, 86.828, 90, 90, 90    |
| 18 | cypD-864_1min   | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate_reindexed_P41212.mtz                 | 1.67          | 97.56           | P41212      | 55.904, 55.904, 79.982, 90, 90, 90    |
| 19 | cypD-864_1min   | mtz003 | PROC_1_XDSAPP     | cypD-864_1min_w1_1_95_F_reindexed_P41212.mtz                  | 1.36          | 96.05           | P41212      | 55.835, 55.835, 80.146, 90, 90, 90    |
| 20 | cypD-865_5min   | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate.mtz                                  | 1.1           | 97.94           | P41212      | 57.319, 57.319, 87.742, 90, 90, 90    |
| 21 | cypD-865_5min   | mtz004 | PROC_1_XIA2_DIALS | di_w1_run1_anom_AUTOMATIC_DEFAULT_free.mtz                    | 1.01          | 87.2            | P41212      | 57.2763, 57.2763, 87.709, 90, 90, 90  |
| 22 | cypD-866_6min   | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate.mtz                                  | 1.05          | 81.21           | P41212      | 57.231, 57.231, 87.54, 90, 90, 90     |

- Option example: –autoproc

List only mtz from autoPROC, or if none list mtz with best completeness, for each dataset.

mtz\_to\_treat\_P41212\_autoPROC.csv - LibreOffice Calc

|    | A               | B      | C                 | D   | E             | F               | G           | H                             |
|----|-----------------|--------|-------------------|---|---------------|-----------------|-------------|-------------------------------|
| 1  | dataset         | mtz nb | process name      | mtz file  | resolution(A) | completeness(%) | space group | unit cell                     |
| 2  | cypD-134_37s    | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate_reindexed_P41212.mtz               | 1.31          | 98.12           | P41212      | 56.858, 56.858, 87.565, 90, 9 |
| 3  | cypD-203_5min30 | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate_reindexed_P41212.mtz               | 1.51          | 98.1            | P41212      | 56.74, 56.74, 80.034, 90, 90  |
| 4  | cypD-248_5min   | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate.mtz                                | 1.14          | 98.49           | P41212      | 57.282, 57.282, 87.853, 90, 9 |
| 5  | cypD-317_2min   | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate_reindexed_P41212.mtz               | 1.14          | 98.99           | P41212      | 57.024, 57.024, 87.466, 90, 9 |
| 6  | cypD-343_5min20 | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate.mtz                                | 1.11          | 83.81           | P41212      | 57.256, 57.256, 87.603, 90, 9 |
| 7  | cypD-438_1min   | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate_reindexed_P41212.mtz               | 1.07          | 93.27           | P41212      | 57.294, 57.294, 87.555, 90, 9 |
| 8  | cypD-440_5min   | mtz002 | PROC_1_XDSAPP     | cypD-440_5min_w1_1_92_F.mtz                                 | 1.62          | 96.57           | P41212      | 56.512, 56.512, 81.831, 90, 9 |
| 9  | cypD-619_4min45 | mtz003 | PROC_1_XIA2_DIALS | di_w1_run1_anom_AUTOMATIC_DEFAULT_free_reindexed_P41212.mtz | 1.69          | 97.29           | P41212      | 56.4117, 56.4117, 79.9383, 9  |
| 10 | cypD-860_57s    | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate_reindexed_P41212.mtz               | 2.86          | 83.76           | P41212      | 57.185, 57.185, 87.586, 90, 9 |
| 11 | cypD-863_2min30 | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate_reindexed_P41212.mtz               | 1.24          | 94.96           | P41212      | 56.917, 56.917, 86.828, 90, 9 |
| 12 | cypD-864_1min   | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate_reindexed_P41212.mtz               | 1.67          | 97.56           | P41212      | 55.904, 55.904, 79.982, 90, 9 |
| 13 | cypD-865_5min   | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate.mtz                                | 1.1           | 97.94           | P41212      | 57.319, 57.319, 87.742, 90, 9 |
| 14 | cypD-866_6min   | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate.mtz                                | 1.05          | 81.21           | P41212      | 57.231, 57.231, 87.54, 90, 90 |
| 15 | cypD-867_5min30 | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate.mtz                                | 1.05          | 94.77           | P41212      | 57.317, 57.317, 87.721, 90, 9 |
| 16 | cypD-869_5min   | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate_reindexed_P41212.mtz               | 1.36          | 95.66           | P41212      | 56.773, 56.773, 86.916, 90, 9 |
| 17 | cypD-872_2min30 | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate_reindexed_P41212.mtz               | 2.34          | 94.25           | P41212      | 56.569, 56.569, 81.405, 90, 9 |
| 18 | cypD-877_5min   | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate_reindexed_P41212.mtz               | 1.87          | 98.84           | P41212      | 55.929, 55.929, 80.734, 90, 9 |
| 19 | cypD-879_3min20 | mtz001 | PROC_1_EDNA_proc  | ep_cypD-879_3min20_w1_run1_anom_truncate.mtz                | 1.82          | 98.41           | P41212      | 55.7825, 55.7825, 80.083, 90  |
| 20 | cypD-880_1min   | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate.mtz                                | 1.39          | 98.99           | P41212      | 55.782, 55.782, 79.804, 90, 9 |
| 21 | cypD-881_2min20 | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate_reindexed_P41212.mtz               | 1.17          | 98.24           | P41212      | 57.197, 57.197, 87.073, 90, 9 |
| 22 | cypD-882_5min   | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate.mtz                                | 1.25          | 94.38           | P41212      | 56.948, 56.948, 87.535, 90, 9 |
| 23 | cypD-885_55s    | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate_reindexed_P41212.mtz               | 1.25          | 96.67           | P41212      | 57.112, 57.112, 87.45, 90, 90 |
| 24 | cypD-886_5min   | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate.mtz                                | 1.26          | 96.91           | P41212      | 57.004, 57.004, 87.437, 90, 9 |

- Option example: `–whole`

Whereas it is not recommended because it is time demanding, for problematic data it could be useful to treat the whole mtz processed. You also can launch `–whole` option in *simulate mode*, and choose for processes to be treated or not, before launching again.

mtz\_to\_treat\_P41212\_whole.csv - LibreOffice Calc

|    | A               | B      | C                 | D   | E             | F               | G           | H  |
|----|-----------------|--------|-------------------|---|---------------|-----------------|-------------|--|
| 1  | dataset         | mtz nb | process name      | mtz file  | resolution(A) | completeness(%) | space group | unit cell                                    |
| 2  | cypD-134_37s    | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate_reindexed_P41212.mtz                 | 1.31          | 98.12           | P41212      | 56.858, 56.858, 87.565, 90, 90, 90           |
| 3  | cypD-134_37s    | mtz002 | PROC_1_XDSAPP     | cypD-134_37s_w1_1_F_plus_F_minus_reindexed_P41212.mtz         | 1.64          | 97.33           | P41212      | 57.0855, 57.0855, 87.787, 90, 90, 90         |
| 4  | cypD-172_1min20 | mtz002 | PROC_1_XDSAPP     | cypD-172_1min20_w1_1_F_plus_F_minus_reindexed_P41212.mtz      | 3.88          | 98.4            | P41212      | 55.816, 55.848, 80.31, 89.882, 89.99, 89.867 |
| 5  | cypD-172_1min20 | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate_reindexed_P41212.mtz                 | 4.05          | 96.94           | P41212      | 55.243, 55.313, 79.525, 90, 90, 90           |
| 6  | cypD-172_1min20 | mtz003 | PROC_1_XIA2_DIALS | di_w1_run1_anom_AUTOMATIC_DEFAULT_free_reindexed_P41212.mtz   | 3.08          | 76.05           | P41212      | 55.3039, 55.3039, 79.668, 90, 90, 90         |
| 7  | cypD-203_5min30 | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate_reindexed_P41212.mtz                 | 1.51          | 98.1            | P41212      | 56.74, 56.74, 80.034, 90, 90, 90             |
| 8  | cypD-203_5min30 | mtz002 | PROC_1_XDSAPP     | cypD-203_5min30_w1_1_89_F_plus_F_minus_reindexed_P41212.mtz   | 1.32          | 90.47           | P41212      | 56.593, 56.593, 79.576, 90, 90, 90           |
| 9  | cypD-203_5min30 | mtz003 | PROC_1_XIA2_DIALS | di_w1_run1_anom_AUTOMATIC_DEFAULT_free_reindexed_P41212.mtz   | 1.67          | 48.67           | P41212      | 56.701, 56.701, 79.7425, 90, 90, 90          |
| 10 | cypD-248_5min   | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate.mtz                                  | 1.14          | 98.49           | P41212      | 57.282, 57.282, 87.853, 90, 90, 90           |
| 11 | cypD-248_5min   | mtz004 | PROC_1_XIA2_DIALS | di_w1_run1_anom_AUTOMATIC_DEFAULT_free_reindexed_P41212.mtz   | 1.38          | 97.92           | P41212      | 57.2164, 57.2164, 87.6953, 90, 90, 90        |
| 12 | cypD-248_5min   | mtz003 | PROC_1_XDSAPP     | cypD-248_5min_w1_1_92_F_plus_F_minus.mtz                      | 1.03          | 91.47           | P41212      | 57.274, 57.274, 87.837, 90, 90, 90           |
| 13 | cypD-248_5min   | mtz002 | PROC_1_EDNA_proc  | ep_cypD-248_5min_w1_run1_anom_truncate.mtz                    | 1.0           | 85.05           | P41212      | 57.264, 57.264, 87.827, 90, 90, 90           |
| 14 | cypD-317_2min   | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate_reindexed_P41212.mtz                 | 1.14          | 98.99           | P41212      | 57.024, 57.024, 87.466, 90, 90, 90           |
| 15 | cypD-317_2min   | mtz003 | PROC_1_XDSAPP     | cypD-317_2min_w1_1_96_F_plus_F_minus_reindexed_P41212.mtz     | 1.06          | 90.42           | P41212      | 57.017, 57.017, 87.46, 90, 90, 90            |
| 16 | cypD-317_2min   | mtz002 | PROC_1_EDNA_proc  | ep_cypD-317_2min_w1_run1_anom_truncate_reindexed_P41212.mtz   | 1.07          | 90.05           | P41212      | 56.9836, 56.9836, 87.471, 90, 90, 90         |
| 17 | cypD-343_5min20 | mtz002 | PROC_1_EDNA_proc  | ep_cypD-343_5min20_w1_run1_anom_truncate.mtz                  | 1.11          | 83.97           | P41212      | 57.235, 57.235, 87.572, 90, 90, 90           |
| 18 | cypD-343_5min20 | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate.mtz                                  | 1.11          | 83.81           | P41212      | 57.256, 57.256, 87.603, 90, 90, 90           |
| 19 | cypD-343_5min20 | mtz003 | PROC_1_XDSAPP     | cypD-343_5min20_w1_1_96_F_plus_F_minus_reindexed_P41212.mtz   | 1.11          | 77.88           | P41212      | 57.269, 57.269, 87.62, 90, 90, 90            |
| 20 | cypD-343_5min20 | mtz004 | PROC_1_XIA2_DIALS | di_w1_run1_anom_AUTOMATIC_DEFAULT_free_reindexed_P41212.mtz   | 1.44          | 48.32           | P41212      | 80.585, 80.1558, 87.5141, 90, 88.1608, 90    |
| 21 | cypD-438_1min   | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate_reindexed_P41212.mtz                 | 1.07          | 93.27           | P41212      | 57.294, 57.294, 87.555, 90, 90, 90           |
| 22 | cypD-438_1min   | mtz002 | PROC_1_XIA2_DIALS | di_w1_run1_anom_AUTOMATIC_DEFAULT_free_reindexed_P41212.mtz   | 1.05          | 44.52           | P41212      | 80.7025, 80.8632, 87.4104, 90, 90, 90        |
| 23 | cypD-440_5min   | mtz002 | PROC_1_XDSAPP     | cypD-440_5min_w1_1_92_F_plus_F_minus.mtz                      | 1.62          | 97.1            | P41212      | 56.512, 56.512, 81.831, 90, 90, 90           |
| 24 | cypD-440_5min   | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate_reindexed_P41212.mtz                 | 2.7           | 94.39           | P41212      | 55.3529, 55.3529, 78.971, 90, 90, 90         |
| 25 | cypD-619_4min45 | mtz003 | PROC_1_XIA2_DIALS | di_w1_run1_anom_AUTOMATIC_DEFAULT_free_reindexed_P41212.mtz   | 1.69          | 96.62           | P41212      | 56.4117, 56.4117, 79.9383, 90, 90, 90        |
| 26 | cypD-619_4min45 | mtz001 | PROC_1_EDNA_proc  | ep_cypD-619_4min45_w1_run1_anom_truncate_reindexed_P41212.mtz | 1.96          | 89.87           | P41212      | 55.887, 55.887, 79.878, 90, 90, 90           |
| 27 | cypD-860_57s    | mtz002 | PROC_1_EDNA_proc  | ep_cypD-860_57s_w1_run1_anom_truncate.mtz                     | 1.14          | 84.49           | P41212      | 57.328, 57.328, 87.346, 90, 90, 90           |
| 28 | cypD-860_57s    | mtz001 | PROC_1_autoPROC   | ap_w1_run1_anom_truncate_reindexed_P41212.mtz                 | 2.86          | 83.76           | P41212      | 57.185, 57.185, 87.586, 90, 90, 90           |
| 29 | cypD-860_57s    | mtz004 | PROC_1_XIA2_DIALS | di_w1_run1_anom_AUTOMATIC_DEFAULT_free_reindexed_P41212.mtz   | 1.27          | 60.4            | P41212      | 57.2601, 57.2601, 87.2433, 90, 90, 90        |
| 30 | cypD-860_57s    | mtz003 | PROC_1_XDSAPP     | cypD-860_57s_w1_1_21_F_plus_F_minus_reindexed_P41212.mtz      | 1.42          | 43.28           | P41212      | 80.909, 80.921, 87.646, 90, 90, 90           |
| 31 | cypD-861_5min30 | mtz001 | PROC_1_XIA2_DIALS | di_w1_run1_anom_AUTOMATIC_DEFAULT_free_reindexed_P41212.mtz   | 1.72          | 93.56           | P41212      | 56.737, 56.737, 82.376, 90, 90, 90           |

### 9.2.3 3. List mtz files with mode and ligand information for running Phenix

**Note:** Phenix options for the different modes are specified *hereafter*.

For each dataset, write in a ‘launch csv’ file:

- if ligand cif file is present for search when asked
- mode that will be launched depending on mode asked, the presence (or not) of ligand cif file and data quality



- information in case mode is different from mode asked
- result folder name

**Limits for poor data:** There are minimum limits to process in ‘full’ or ‘allsg’ modes. These limits can be modified in config.py file (after what easypipe should be reinstalled).

- minimum completeness (default = 70%)
- minimum resolution (default = 3.75)

Poor data will be treated in ‘fast’ mode.

Option examples:

- Option example: `--mode fast` (default)

Phenix uses a simple rigid-body refinement for model placement, which is faster and most of the time sufficient if the input model is already close enough to the target structure.

launch\_mtz\_P41212\_FAST\_best1.csv - LibreOffice Calc

|    | A               | B      | I    | J             | K  | L          | M      | N           | O        |
|----|-----------------|--------|------|---------------|----|------------|--------|-------------|----------|
| 1  | dataset         | mtz nb | mode | ligand search | CC | nb ligands | ligand | information | to treat |
| 2  | cypD-134_37s    | mtz001 | fast | no            |    |            |        |             | yes      |
| 3  | cypD-203_5min30 | mtz001 | fast | no            |    |            |        |             | yes      |
| 4  | cypD-248_5min   | mtz001 | fast | no            |    |            |        |             | yes      |
| 5  | cypD-317_2min   | mtz001 | fast | no            |    |            |        |             | yes      |
| 6  | cypD-343_5min20 | mtz002 | fast | no            |    |            |        |             | yes      |
| 7  | cypD-438_1min   | mtz001 | fast | no            |    |            |        |             | yes      |
| 8  | cypD-440_5min   | mtz002 | fast | no            |    |            |        |             | yes      |
| 9  | cypD-619_4min45 | mtz003 | fast | no            |    |            |        |             | yes      |
| 10 | cypD-860_57s    | mtz004 | fast | no            |    |            |        |             | yes      |
| 11 | cypD-862_5min   | mtz001 | fast | no            |    |            |        |             | yes      |
| 12 | cypD-863_2min30 | mtz004 | fast | no            |    |            |        |             | yes      |
| 13 | cypD-864_1min   | mtz003 | fast | no            |    |            |        |             | yes      |
| 14 | cypD-865_5min   | mtz001 | fast | no            |    |            |        |             | yes      |
| 15 | cypD-866_6min   | mtz001 | fast | no            |    |            |        |             | yes      |
| 16 | cypD-867_5min30 | mtz003 | fast | no            |    |            |        |             | yes      |
| 17 | cypD-869_5min   | mtz004 | fast | no            |    |            |        |             | yes      |
| 18 | cypD-872_2min30 | mtz002 | fast | no            |    |            |        |             | yes      |
| 19 | cypD-875_4min30 | mtz002 | fast | no            |    |            |        |             | yes      |
| 20 | cypD-877_5min   | mtz003 | fast | no            |    |            |        |             | yes      |
| 21 | cypD-879_3min20 | mtz001 | fast | no            |    |            |        |             | yes      |
| 22 | cypD-880_1min   | mtz001 | fast | no            |    |            |        |             | yes      |
| 23 | cypD-881_2min20 | mtz001 | fast | no            |    |            |        |             | yes      |
| 24 | cypD-882_5min   | mtz001 | fast | no            |    |            |        |             | yes      |
| 25 | cypD-885_55s    | mtz001 | fast | no            |    |            |        |             | yes      |
| 26 | cypD-886_5min   | mtz001 | fast | no            |    |            |        |             | yes      |
| 27 | cypD-887_4min   | mtz001 | fast | no            |    |            |        |             | yes      |
| 28 | cypD-888_1min55 | mtz001 | fast | no            |    |            |        |             | yes      |
| 29 | cypD-890_1min30 | mtz004 | fast | no            |    |            |        |             | yes      |
| 30 | cypD-895_1min   | mtz004 | fast | no            |    |            |        |             | yes      |

- Option example: `--mode full`

Phenix will try rigid-body refinement first, then run Phaser if the R-free is too high (>0.4), it will run AutoBuild after initial refinement only if R-free is greater than the max\_r\_free cutoff = 0.3.

launch\_mtz\_P41212\_FULL\_best1.csv - LibreOffice Calc

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Libération Sans 10 G I S A

Y49:Y50

|    | A               | B      | I    | J             | K  | L          | M      | N           | O        |
|----|-----------------|--------|------|---------------|----|------------|--------|-------------|----------|
| 1  | dataset         | mtz_nb | mode | ligand search | CC | nb ligands | ligand | information | to treat |
| 2  | cypD-134_37s    | mtz001 | full | no            |    |            |        |             | yes      |
| 3  | cypD-203_5min30 | mtz001 | full | no            |    |            |        |             | yes      |
| 4  | cypD-248_5min   | mtz001 | full | no            |    |            |        |             | yes      |
| 5  | cypD-317_2min   | mtz001 | full | no            |    |            |        |             | yes      |
| 6  | cypD-343_5min20 | mtz002 | full | no            |    |            |        |             | yes      |
| 7  | cypD-438_1min   | mtz001 | full | no            |    |            |        |             | yes      |
| 8  | cypD-440_5min   | mtz002 | full | no            |    |            |        |             | yes      |
| 9  | cypD-619_4min45 | mtz003 | full | no            |    |            |        |             | yes      |
| 10 | cypD-860_57s    | mtz004 | full | no            |    |            |        |             | yes      |
| 11 | cypD-862_5min   | mtz001 | full | no            |    |            |        |             | yes      |
| 12 | cypD-863_2min30 | mtz004 | full | no            |    |            |        |             | yes      |
| 13 | cypD-864_1min   | mtz003 | full | no            |    |            |        |             | yes      |
| 14 | cypD-865_5min   | mtz001 | full | no            |    |            |        |             | yes      |
| 15 | cypD-866_6min   | mtz001 | full | no            |    |            |        |             | yes      |
| 16 | cypD-867_5min30 | mtz003 | full | no            |    |            |        |             | yes      |
| 17 | cypD-869_5min   | mtz004 | full | no            |    |            |        |             | yes      |
| 18 | cypD-872_2min30 | mtz002 | full | no            |    |            |        |             | yes      |
| 19 | cypD-875_4min30 | mtz002 | full | no            |    |            |        |             | yes      |
| 20 | cypD-877_5min   | mtz003 | full | no            |    |            |        |             | yes      |
| 21 | cypD-879_3min20 | mtz001 | full | no            |    |            |        |             | yes      |
| 22 | cypD-880_1min   | mtz001 | full | no            |    |            |        |             | yes      |
| 23 | cypD-881_2min20 | mtz001 | full | no            |    |            |        |             | yes      |
| 24 | cypD-882_5min   | mtz001 | full | no            |    |            |        |             | yes      |
| 25 | cypD-885_55s    | mtz001 | full | no            |    |            |        |             | yes      |
| 26 | cypD-886_5min   | mtz001 | full | no            |    |            |        |             | yes      |
| 27 | cypD-887_4min   | mtz001 | full | no            |    |            |        |             | yes      |
| 28 | cypD-888_1min55 | mtz001 | full | no            |    |            |        |             | yes      |
| 29 | cypD-890_1min30 | mtz004 | full | no            |    |            |        |             | yes      |
| 30 | cypD-895_1min   | mtz004 | full | no            |    |            |        |             | yes      |

- Option example: `--mode allsg`

In this mode, mtz will be treated regardless of the space group. Phenix will run Phaser, then run AutoBuild after initial refinement only if R-free is greater than the `max_r_free` cutoff = 0.3.

launch\_mtz\_allsg\_ALLSG\_best1.csv - LibreOffice Calc

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W44

|    | A               | B      | I     | J             | K  | L          | M      | N                  | O        |
|----|-----------------|--------|-------|---------------|----|------------|--------|--------------------|----------|
| 1  | dataset         | mtz nb | mode  | ligand search | CC | nb ligands | ligand | information        | to treat |
| 2  | cypD-134_37s    | mtz001 | allsg | no            |    |            |        |                    | yes      |
| 3  | cypD-172_1min20 | mtz003 | allsg | no            |    |            |        |                    | yes      |
| 4  | cypD-203_5min30 | mtz001 | allsg | no            |    |            |        |                    | yes      |
| 5  | cypD-248_5min   | mtz001 | allsg | no            |    |            |        |                    | yes      |
| 6  | cypD-317_2min   | mtz001 | allsg | no            |    |            |        |                    | yes      |
| 7  | cypD-343_5min20 | mtz002 | allsg | no            |    |            |        |                    | yes      |
| 8  | cypD-438_1min   | mtz001 | allsg | no            |    |            |        |                    | yes      |
| 9  | cypD-440_5min   | mtz001 | allsg | no            |    |            |        |                    | yes      |
| 10 | cypD-619_4min45 | mtz003 | allsg | no            |    |            |        |                    | yes      |
| 11 | cypD-860_57s    | mtz004 | allsg | no            |    |            |        |                    | yes      |
| 12 | cypD-861_5min30 | mtz001 | fast  | no            |    |            |        | resolution > 3.75Å | yes      |
| 13 | cypD-862_5min   | mtz001 | allsg | no            |    |            |        |                    | yes      |
| 14 | cypD-863_2min30 | mtz004 | allsg | no            |    |            |        |                    | yes      |
| 15 | cypD-864_1min   | mtz003 | allsg | no            |    |            |        |                    | yes      |
| 16 | cypD-865_5min   | mtz001 | allsg | no            |    |            |        |                    | yes      |
| 17 | cypD-866_6min   | mtz001 | allsg | no            |    |            |        |                    | yes      |
| 18 | cypD-867_5min30 | mtz003 | allsg | no            |    |            |        |                    | yes      |
| 19 | cypD-869_5min   | mtz004 | allsg | no            |    |            |        |                    | yes      |
| 20 | cypD-872_2min30 | mtz002 | allsg | no            |    |            |        |                    | yes      |
| 21 | cypD-874_5min30 | mtz001 | allsg | no            |    |            |        |                    | yes      |
| 22 | cypD-875_4min30 | mtz002 | allsg | no            |    |            |        |                    | yes      |
| 23 | cypD-877_5min   | mtz003 | allsg | no            |    |            |        |                    | yes      |
| 24 | cypD-878_5min   | mtz002 | allsg | no            |    |            |        |                    | yes      |
| 25 | cypD-879_3min20 | mtz001 | allsg | no            |    |            |        |                    | yes      |
| 26 | cypD-880_1min   | mtz001 | allsg | no            |    |            |        |                    | yes      |
| 27 | cypD-881_2min20 | mtz001 | allsg | no            |    |            |        |                    | yes      |
| 28 | cypD-882_5min   | mtz001 | allsg | no            |    |            |        |                    | yes      |
| 29 | cypD-884_5min   | mtz002 | allsg | no            |    |            |        |                    | yes      |
| 30 | cypD-885_55s    | mtz001 | allsg | no            |    |            |        |                    | yes      |
| 31 | cypD-886_5min   | mtz001 | allsg | no            |    |            |        |                    | yes      |
| 32 | cypD-887_4min   | mtz001 | allsg | no            |    |            |        |                    | yes      |
| 33 | cypD-888_1min55 | mtz001 | allsg | no            |    |            |        |                    | yes      |
| 34 | cypD-889_2min   | mtz001 | allsg | no            |    |            |        |                    | yes      |

- Option example: `--mode full --lig`

Phenix will be run in ‘full’ mode. Then ligand will be searched with [LigandFit<sup>2</sup>](https://www.phenix-online.org/documentation/reference/ligandfit.html) and placed if cutoff model-to-map CC is more than 0.7 (default). This cutoff can be changed with ‘`--cclig`’ option. The number of ligands to be placed (default=1) can be changed with ‘`--nblig`’ option.

<sup>2</sup> <https://www.phenix-online.org/documentation/reference/ligandfit.html>



launch\_mtz\_P41212\_FULL-LIG\_best1.csv - LibreOffice Calc

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Y46

|    | A               | B      | I    | J             | K   | L          | M      | N           | O        |
|----|-----------------|--------|------|---------------|-----|------------|--------|-------------|----------|
| 1  | dataset         | mtz nb | mode | ligand search | CC  | nb ligands | ligand | information | to treat |
| 2  | cypD-134_37s    | mtz001 | full | yes           | 0.7 | 1          | 134    |             | yes      |
| 3  | cypD-203_5min30 | mtz001 | full | yes           | 0.7 | 1          | 203    |             | yes      |
| 4  | cypD-248_5min   | mtz001 | full | yes           | 0.7 | 1          | 248    |             | yes      |
| 5  | cypD-317_2min   | mtz001 | full | yes           | 0.7 | 1          | 317    |             | yes      |
| 6  | cypD-343_5min20 | mtz002 | full | yes           | 0.7 | 1          | 343    |             | yes      |
| 7  | cypD-438_1min   | mtz001 | full | yes           | 0.7 | 1          | 438    |             | yes      |
| 8  | cypD-440_5min   | mtz002 | full | yes           | 0.7 | 1          | 440    |             | yes      |
| 9  | cypD-619_4min45 | mtz003 | full | yes           | 0.7 | 1          | 619    |             | yes      |
| 10 | cypD-860_57s    | mtz004 | full | yes           | 0.7 | 1          | 860    |             | yes      |
| 11 | cypD-862_5min   | mtz001 | full | yes           | 0.7 | 1          | 862    |             | yes      |
| 12 | cypD-863_2min30 | mtz004 | full | yes           | 0.7 | 1          | 863    |             | yes      |
| 13 | cypD-864_1min   | mtz003 | full | yes           | 0.7 | 1          | 864    |             | yes      |
| 14 | cypD-865_5min   | mtz001 | full | yes           | 0.7 | 1          | 865    |             | yes      |
| 15 | cypD-866_6min   | mtz001 | full | yes           | 0.7 | 1          | 866    |             | yes      |
| 16 | cypD-867_5min30 | mtz003 | full | yes           | 0.7 | 1          | 867    |             | yes      |
| 17 | cypD-869_5min   | mtz004 | full | yes           | 0.7 | 1          | 869    |             | yes      |
| 18 | cypD-872_2min30 | mtz002 | full | yes           | 0.7 | 1          | 872    |             | yes      |
| 19 | cypD-875_4min30 | mtz002 | full | yes           | 0.7 | 1          | 875    |             | yes      |
| 20 | cypD-877_5min   | mtz003 | full | yes           | 0.7 | 1          | 877    |             | yes      |
| 21 | cypD-879_3min20 | mtz001 | full | yes           | 0.7 | 1          | 879    |             | yes      |
| 22 | cypD-880_1min   | mtz001 | full | yes           | 0.7 | 1          | 880    |             | yes      |
| 23 | cypD-881_2min20 | mtz001 | full | yes           | 0.7 | 1          | 881    |             | yes      |
| 24 | cypD-882_5min   | mtz001 | full | yes           | 0.7 | 1          | 882    |             | yes      |
| 25 | cypD-885_55s    | mtz001 | full | yes           | 0.7 | 1          | 885    |             | yes      |
| 26 | cypD-886_5min   | mtz001 | full | yes           | 0.7 | 1          | 886    |             | yes      |
| 27 | cypD-887_4min   | mtz001 | full | yes           | 0.7 | 1          | 887    |             | yes      |
| 28 | cypD-888_1min55 | mtz001 | full | yes           | 0.7 | 1          | 888    |             | yes      |
| 29 | cypD-890_1min30 | mtz004 | full | yes           | 0.7 | 1          | 890    |             | yes      |
| 30 | cypD-895_1min   | mtz004 | full | yes           | 0.7 | 1          | 895    |             | yes      |

## 9.2.4 4. Launch Phenix according to chosen mode and options - Simulation mode

`phenix.ligand_pipeline`<sup>1</sup> is launched for each mtz file according to chosen mode and options, as listed in the ‘launch csv’ file (see 3. above).

If this ‘launch csv’ exists and you have modified something like adding a ligand cif for example, ‘launch’ mode should be run again, but in simulation mode so as it generates a new correct launch csv file instead of using existing one. When a new ‘launch csv’ file has been generated, just run the same command without simulation mode.

Example:

```
$ easypipe.py PROCESSED_DATA launch my_ref_folder --mode full --lig --autoproc --
→simulate
then:
$ easypipe.py PROCESSED_DATA launch my_ref_folder --mode full --lig --autoproc
```

Simulation mode also allows to modify the ‘to treat’ column of the ‘launch csv’ file (replacing ‘yes’ by ‘no’). Useful if you want to run some options only on some mtz. Then just run the same command without simulation mode. You can also modify the following columns: ‘mode’, ‘ligand search’, ‘CC’, ‘nb ligands’, as long as you know what you are doing.

## 9.2.5 5. Write results

At the end of each ‘launch’ subcommand, results are copied in a ‘RESULT’ folder.

In datasets folders, copy of:

- corresponding processed data and logs (useful for deposition at the PDB)
- pdb and mtz result files
- phenix cif file if ligand found
- ligand folder, if exists
- pdb of ligand(s) placed by LigandFit (all CC)

```
RESULTS_P41212/
├── cypD-134_37s
│   ├── cypD-134_37s_mtz001_CC0.7_nblig1_fast-lig.mtz
│   ├── cypD-134_37s_mtz001_CC0.7_nblig1_fast-lig.pdb
│   ├── cypD-134_37s_mtz001_CC0.7_nblig1_full-lig.mtz
│   ├── cypD-134_37s_mtz001_CC0.7_nblig1_full-lig.pdb
│   ├── cypD-134_37s_mtz001_fast.mtz
│   ├── cypD-134_37s_mtz001_fast.pdb
│   ├── cypD-134_37s_mtz001_full.mtz
│   ├── cypD-134_37s_mtz001_full.pdb
│   ├── cypD-134_37s_mtz002_fast.mtz
│   ├── cypD-134_37s_mtz002_fast.pdb
│   ├── data_mtz001
│   │   ├── ap_w1_run1_anom_autoPROC.log
│   │   ├── ap_w1_run1_anom_truncate.mtz
│   │   ├── ap_w1_run1_anom_truncate_reindexed_P41212.mtz
│   │   ├── ap_w1_run1_anom_XDS_ASCII.HKL.gz
│   │   ├── xtriage_ap_w1_run1_anom_truncate.log
│   ├── data_mtz002
│   │   ├── CORRECT.LP
│   │   ├── cypD-134_37s_w1_1_F_plus_F_minus.mtz
│   │   ├── cypD-134_37s_w1_1_F_plus_F_minus_reindexed_P41212.mtz
│   │   ├── phenix_xtriage.log
│   │   ├── pointless.log
│   │   ├── XDS_ASCII.HKL
│   │   └── xtriage_cypD-134_37s_w1_1_F_plus_F_minus.log
│   └── ligand
│       ├── 134.cif
│       ├── 134.pdb
│       ├── ligand_fit_mtz001_CC0.7_nblig1_fast-lig_1_1.pdb
│       ├── ligand_fit_mtz001_CC0.7_nblig1_fast-lig_1.pdb
│       ├── ligand_fit_mtz001_CC0.7_nblig1_full-lig_1_1.pdb
│       └── ligand_fit_mtz001_CC0.7_nblig1_full-lig_1.pdb
├── cypD-172_1min20
│   ├── cypD-172_1min20_mtz001_fast.mtz
│   ├── cypD-172_1min20_mtz001_fast.pdb
│   ├── cypD-172_1min20_mtz002_fast.mtz
│   ├── cypD-172_1min20_mtz002_fast.pdb
│   ├── data_mtz001
│   │   ├── ap_w1_run1_anom_autoPROC.log
│   │   ├── ap_w1_run1_anom_truncate.mtz
│   │   ├── ap_w1_run1_anom_truncate_reindexed_P41212.mtz
│   │   ├── ap_w1_run1_anom_XDS_ASCII.HKL.gz
│   │   ├── xtriage_ap_w1_run1_anom_truncate.log
│   ├── data_mtz002
│   │   ├── CORRECT.LP
│   │   ├── cypD-172_1min20_w1_1_F_plus_F_minus.mtz
│   │   ├── cypD-172_1min20_w1_1_F_plus_F_minus_reindexed_P41212.mtz
│   │   ├── phenix_xtriage.log
│   │   ├── pointless.log
│   │   ├── XDS_ASCII.HKL
│   │   └── xtriage_cypD-172_1min20_w1_1_F_plus_F_minus.log
│   └── ligand
│       ├── 172.cif
│       └── 172.pdb
├── cypD-203_5min30
│   ├── cypD-203_5min30_mtz001_CC0.7_nblig1_fast-lig.mtz
│   ├── cypD-203_5min30_mtz001_CC0.7_nblig1_fast-lig.pdb
│   ├── cypD-203_5min30_mtz001_CC0.7_nblig1_full-lig.mtz
│   ├── cypD-203_5min30_mtz001_CC0.7_nblig1_full-lig.pdb
│   ├── cypD-203_5min30_mtz001_fast.mtz
│   ├── cypD-203_5min30_mtz001_fast.pdb
│   ├── cypD-203_5min30_mtz001_full.mtz
│   ├── cypD-203_5min30_mtz001_full.pdb
│   ├── cypD-203_5min30_mtz002_fast.mtz
│   ├── cypD-203_5min30_mtz002_fast.pdb
│   ├── data_mtz001
│   │   ├── ap_w1_run1_anom_autoPROC.log
│   │   ├── ap_w1_run1_anom_truncate.mtz
│   │   ├── ap_w1_run1_anom_truncate_reindexed_P41212.mtz
│   │   ├── ap_w1_run1_anom_XDS_ASCII.HKL.gz
│   │   └── xtriage_ap_w1_run1_anom_truncate.log
```

In a ‘\_mtz\_treated’ folder, copy of:

- csv listing datasets without mtz file
- csv with mtz list
- csv with mtz list after reindexing
- csv with mtz list sorted according to reference space group
- all ‘launch’ csv files, with a counter at the end of the names in case of several launches (with handmade modifications of launch csv file for example)

```
mtz_treated/
— launch_mtz_P41212_FAST_autoPROC_1.csv
— launch_mtz_P41212_FAST_best1_1.csv
— launch_mtz_P41212_FAST_best2_1.csv
— launch_mtz_P41212_FAST-LIG_best1_1.csv
— launch_mtz_P41212_FAST-LIG_best1_2.csv
— launch_mtz_P41212_FULL_autoPROC_1.csv
— launch_mtz_P41212_FULL_best1_1.csv
— launch_mtz_P41212_FULL-LIG_9_CC0.6_autoPROC_1.csv
— launch_mtz_P41212_FULL-LIG_9_CC0.6_autoPROC_2.csv
— launch_mtz_P41212_FULL-LIG_9_CC0.6_autoPROC_3.csv
— launch_mtz_P41212_FULL-LIG_9_CC0.6_best1_1.csv
— launch_mtz_P41212_FULL-LIG_9_CC0.6_best1_2.csv
— launch_mtz_P41212_FULL-LIG_best1_1.csv
— launch_mtz_P41212_FULL-LIG_best1_2.csv
— mtz_to_treat_ALL.csv
— mtz_to_treat_ALL_reindexed.csv
— mtz_to_treat_ALL_reindexed_sorted_P41212.csv
```

For each ‘launch’ subcommand, a csv file is created that summarizes the corresponding results for each dataset, with information on:

- success of Phenix
- failing step (in case success = no)
- resolution (from pdb file, if failed from mtz data file)
- completeness (from pdb file, if failed from mtz data file)
- Rwork / Rfree
- space group (from pdb file, if failed from mtz data file)
- unit cell (from pdb file, if failed from mtz data file)
- if ligand has been placed, number of ligands found, corresponding CC

```
— RESULTS_P41212_FAST_autoPROC_1.csv
— RESULTS_P41212_FAST_best1_1.csv
— RESULTS_P41212_FAST_best2_1.csv
— RESULTS_P41212_FAST-LIG_best1_1.csv
— RESULTS_P41212_FAST-LIG_best1_2.csv
— RESULTS_P41212_FULL_autoPROC_1.csv
— RESULTS_P41212_FULL_best1_1.csv
— RESULTS_P41212_FULL-LIG_9_CC0.6_autoPROC_1.csv
— RESULTS_P41212_FULL-LIG_9_CC0.6_autoPROC_2.csv
— RESULTS_P41212_FULL-LIG_9_CC0.6_autoPROC_3.csv
— RESULTS_P41212_FULL-LIG_9_CC0.6_best1_1.csv
— RESULTS_P41212_FULL-LIG_9_CC0.6_best1_2.csv
— RESULTS_P41212_FULL-LIG_best1_1.csv
— RESULTS_P41212_FULL-LIG_best1_2.csv
```

Option example: -a -mode full -lig -nblig 9 -cclig 0.6



| dataset        | mtz nb | reated mode | ligand search | ligand | ligand smiles | CC                  | nb ligands | SUCCESS | failing step                  | Resolution(Å)                 | Completeness    | Rwork  | Rfree        | space group (pdb)                          | unit cell (pdb)                             | Ligand    | Nb of ligands found | LigandFit best CC | LigandFit individual CCs                       |
|----------------|--------|-------------|---------------|--------|---------------|---------------------|------------|---------|-------------------------------|-------------------------------|-----------------|--------|--------------|--|---|-----------|---------------------|-------------------|--|
| cypd-134_37s   | mtz001 | yes         | full          | yes    | 134           | OB(c1ccccc1)O       | 9          | no      | Fitting ligand to d1.31 (mtz) | 98.12 (mtz)                   | 96.86% (95.90%) | 0.2377 | 0.4563       | P41212 (mtz)                               | 56.858, 56.858, 87.565, 90, 90, 90 (mtz)    |           |                     |                   |  |
| cypd-172_1mn20 | mtz001 | yes         | last          | no     |               |                     |            | yes     |                               | 4.04                          | 96.86% (95.90%) | 0.2377 | 0.4563       | P41212 (mtz)                               | 55.278, 55.278, 79.525, 90, 90, 90 (mtz)    | No search |                     |                   |  |
| cypd-203_5mn30 | mtz001 | yes         | full          | yes    | 203           | OC1COCN             | 6          | 9       | yes                           | 1.51                          | 98.08% (99.41%) | 0.1366 | 0.2162       | P41212 (mtz)                               | 56.740, 56.740, 80.034, 90, 90, 90 (mtz)    | FOUND     | 1/9                 | 0.6670            | 0.6670, 0.5400, 0.5770, 0.4580, 0.3410, 0.4460 |
| cypd-248_5mn   | mtz001 | yes         | full          | no     |               |                     |            | yes     |                               | 1.14                          | 97.00% (96.43%) | 0.1651 | 0.1833       | P41212 (mtz)                               | 57.282, 57.282, 87.893, 90, 90, 90 (mtz)    | No search |                     |                   |  |
| cypd-317_2mn   | mtz001 | yes         | full          | yes    | 317           | c1cc2c(c1)c1ccccc12 | 6          | 9       | yes                           | 1.14                          | 98.99% (96.55%) | 0.2389 | 0.2593       | P41212 (mtz)                               | 57.024, 57.024, 87.466, 90, 90, 90 (mtz)    | Not found | 0/9                 | 0.5540            | 0.5440, 0.4850, 0.4640, 0.4420, 0.4460, 0.4460 |
| cypd-343_5mn20 | mtz001 | yes         | full          | yes    | 343           | NS(=O)(=O)c1ccccc1  | 6          | 9       | no                            | Fitting ligand to d1.11 (mtz) | 83.81 (mtz)     |        |              | P41212 (mtz)                               | 57.256, 57.256, 87.603, 90, 90, 90 (mtz)    |           |                     |                   |  |
| cypd-438_1mn   | mtz001 | yes         | full          | yes    | 438           | c1ccccc1            | 6          | 9       | yes                           | 1.07                          | 93.27% (87.72%) | 0.2342 | 0.2446       | P41212 (mtz)                               | 57.294, 57.294, 87.555, 90, 90, 90 (mtz)    | Not found | 0/9                 | 0.4910            | 0.4710, 0.4000, 0.4590, 0.3830, 0.4050, 0.4050 |
| cypd-440_5mn   | mtz001 | yes         | full          | yes    | 440           | c1ccccc1            | 6          | 9       | no                            | Rebuilding mode 1.7 (mtz)     | 84.39 (mtz)     |        |              | P41212 (mtz)                               | 55.3529, 55.3529, 78.971, 90, 90, 90 (mtz)  |           |                     |                   |  |
| cypd-519_4mn45 | mtz003 | yes         | full          | yes    | 619           | OB(c1ccccc1)O       | 6          | 9       | no                            | Importing data at 1.69 (mtz)  | 96.62 (mtz)     |        |              | P41212 (mtz)                               | 56.4117, 56.4117, 79.9383, 90, 90, 90 (mtz) |           |                     |                   |  |
| cypd-560_57s   | mtz001 | yes         | full          | yes    | 860           | OC1CNC1             | 6          | 9       | no                            | Rebuilding mode 2.56 (mtz)    | 83.76 (mtz)     |        |              | P41212 (mtz)                               | 57.185, 57.185, 87.568, 90, 90, 90 (mtz)    |           |                     |                   |  |
| cypd-561_5mn30 | mtz001 | yes         | last          | no     |               |                     |            | no      | Importing data at 4.72 (mtz)  | 92.56 (mtz)                   |                 |        | P41212 (mtz) | 56.737, 56.737, 82.376, 90, 90, 90 (mtz)   |   |           |                     |                   |  |
| cypd-563_2mn30 | mtz001 | yes         | full          | yes    | 863           | OC(=O)c1ccccc1      | 6          | 9       | no                            | Fitting ligand to d1.24 (mtz) | 94.95 (mtz)     |        |              | P41212 (mtz)                               | 56.917, 56.917, 86.828, 90, 90, 90 (mtz)    |           |                     |                   |  |
| cypd-564_1mn   | mtz001 | yes         | full          | yes    | 864           | CC(C(=O)O)c1ccccc1  | 6          | 9       | no                            | Fitting ligand to d1.67 (mtz) | 97.56 (mtz)     |        |              | P41212 (mtz)                               | 55.904, 55.904, 79.962, 90, 90, 90 (mtz)    |           |                     |                   |  |
| cypd-565_5mn   | mtz001 | yes         | full          | no     |               |                     |            | yes     |                               | 1.10                          | 94.91% (90.35%) | 0.1498 | 0.1638       | P41212 (mtz)                               | 57.319, 57.319, 87.742, 90, 90, 90 (mtz)    | No search |                     |                   |  |
| cypd-566_6mn   | mtz001 | yes         | full          | yes    | 866           | NCC1CC1             | 6          | 9       | yes                           |                               | 78.63% (35.17%) | 0.1547 | 0.1731       | P41212 (mtz)                               | 57.231, 57.231, 87.540, 90, 90, 90 (mtz)    | FOUND     | 1/9                 | 0.6020            | 0.5560, 0.5710, 0.4200, 0.4240, 0.5410, 0.5410 |
| cypd-567_5mn30 | mtz001 | yes         | full          | no     |               |                     |            | yes     |                               | 1.05                          | 88.91% (70.68%) | 0.1461 | 0.1595       | P41212 (mtz)                               | 57.317, 57.317, 87.721, 90, 90, 90 (mtz)    | No search |                     |                   |  |
| cypd-569_5mn   | mtz001 | yes         | full          | no     |               |                     |            | yes     |                               | 1.36                          | 95.06% (95.51%) | 0.1641 | 0.2032       | P41212 (mtz)                               | 56.778, 56.778, 86.916, 90, 90, 90 (mtz)    | No search |                     |                   |  |
| cypd-572_2mn30 | mtz001 | yes         | full          | no     |               |                     |            | no      | Rebuilding mode 2.34 (mtz)    | 94.25 (mtz)                   |                 |        | P41212 (mtz) | 56.569, 56.569, 81.405, 90, 90, 90 (mtz)   |   |           |                     |                   |  |
| cypd-574_5mn30 | mtz002 | yes         | last          | no     |               |                     |            | yes     |                               | 1.93                          | 42.16% (7.91%)  | 0.4865 | 0.5447       | P41212 (mtz)                               | 78.276, 78.276, 78.915, 90, 90, 90 (mtz)    | No search |                     |                   |  |
| cypd-577_5mn   | mtz001 | yes         | full          | no     |               |                     |            | no      | Rebuilding mode 1.87 (mtz)    | 98.84 (mtz)                   |                 |        | P41212 (mtz) | 55.929, 55.929, 80.734, 90, 90, 90 (mtz)   |   |           |                     |                   |  |
| cypd-578_5mn   | mtz001 | yes         | last          | no     |               |                     |            | yes     |                               | 2.99                          | 48.13% (48.13%) | 0.4060 | 0.5753       | P41212 (mtz)                               | 80.231, 80.231, 87.177, 90, 90, 90 (mtz)    | No search |                     |                   |  |
| cypd-579_3mn20 | mtz001 | yes         | full          | no     |               |                     |            | no      | Rebuilding mode 1.82 (mtz)    | 98.41 (mtz)                   |                 |        | P41212 (mtz) | 55.7825, 55.7825, 80.083, 90, 90, 90 (mtz) |   |           |                     |                   |  |
| cypd-580_1mn   | mtz001 | yes         | full          | no     |               |                     |            | yes     |                               | 1.39                          | 95.74% (99.85%) | 0.1745 | 0.2291       | P41212 (mtz)                               | 55.782, 55.782, 79.804, 90, 90, 90 (mtz)    | No search |                     |                   |  |
| cypd-581_2mn20 | mtz001 | yes         | full          | no     |               |                     |            | yes     |                               | 1.17                          | 98.24% (91.23%) | 0.1537 | 0.1721       | P41212 (mtz)                               | 57.197, 57.197, 87.073, 90, 90, 90 (mtz)    | No search |                     |                   |  |
| cypd-582_5mn   | mtz001 | yes         | full          | no     |               |                     |            | yes     |                               | 1.25                          | 93.86% (66.90%) | 0.1498 | 0.1683       | P41212 (mtz)                               | 56.948, 56.948, 87.535, 90, 90, 90 (mtz)    | No search |                     |                   |  |
| cypd-584_5mn   | mtz001 | yes         | full          | no     |               |                     |            | no      | Rebuilding mode 0.1 (mtz)     | 96.16 (mtz)                   |                 |        | P41212 (mtz) | 56.112, 56.466, 81.038, 90, 90, 90 (mtz)   |   |           |                     |                   |  |
| cypd-585_55s   | mtz001 | yes         | full          | yes    |               |                     |            | yes     |                               | 1.25                          | 96.66% (88.59%) | 0.1783 | 0.2092       | P41212 (mtz)                               | 57.112, 57.112, 87.450, 90, 90, 90 (mtz)    | No search |                     |                   |  |

Finally, the results of all ‘launch’ subcommands you have run are compiled by running automatically the ‘summary’ subcommand.

**Note:** If there are several RESULTS folders (case when launched for several space groups, or different templates), a global SUMMARY file that compiles all SUMMARY files can be created by manually running ‘summary’ subcommand.

## 9.3 Phenix options according to modes (only for information)

phenix.ligand\_pipeline<sup>1</sup> options are the following:

- common options:

nproc=Auto

preserve\_chain\_id=True: Preserves the original chain ID

refine.after\_ligand.hydrogens=False: Hydrogen atoms won’t be added prior to the final refinement step (else refinement significantly slower)

prune=False: disable Prune the model after refinement to remove residues and sidechains in poor density

keep\_hetatms=True: prevent Phaser from resetting HETATMs occupancies to zero

refine.after\_mr.update\_waters=False: don’t add/remove waters automatically

- ‘fast’ mode:

skip\_xtriage=True

mr=False: rigid-body refinement will be used

quick\_refine=True: which will shorten both refinement steps from 6 to 3 cycles, and disable weight optimization.

build=False

skip\_ligand=True

reference\_structure='model.pdb': If specified, phenix.find\_alt\_orig\_sym\_mate will be applied to map the solution to the reference structure (not working when Phaser with several monomers)

- ‘full’ mode:

mr=Auto: the program will try rigid-body refinement first, then run Phaser if the R-free is too high (>0.4)

build=Auto: Run AutoBuild after initial refinement. By default, this will be done if R-free is greater than the max\_r\_free cutoff = 0.3

autobuild.quick=True: Run AutoBuild in quick mode. Inferior results, but a huge time-saver

quick\_refine=True: which will shorten both refinement steps from 6 to 3 cycles, and disable weight optimization.

- ‘allsg’ mode:

mr=True

quick\_refine=False

- if ligand search:

ligand\_copies=1 (except if option `-nblig >1`)

keep\_input\_restraints=True : if the input files include pre-calculated restraints for the target ligand, eLBOW will propagate these restraints instead of generating new ones.

## 9.4 References

## EASYPEPIPE ‘SUMMARY’

This step can be run after several runs of *‘launch’* subcommands.

For each ‘launch’ subcommand, a ‘RESULT’ csv file is created that summarizes the corresponding results for each dataset (*see here*). So, if you have tried several options, you will have as many ‘RESULTS’ csv files.

```

— RESULTS_P41212_FAST_autoPROC_1.csv
— RESULTS_P41212_FAST_best1_1.csv
— RESULTS_P41212_FAST_best2_1.csv
— RESULTS_P41212_FAST-LIG_best1_1.csv
— RESULTS_P41212_FAST-LIG_best1_2.csv
— RESULTS_P41212_FULL_autoPROC_1.csv
— RESULTS_P41212_FULL_best1_1.csv
— RESULTS_P41212_FULL-LIG_9_CC0.6_autoPROC_1.csv
— RESULTS_P41212_FULL-LIG_9_CC0.6_autoPROC_2.csv
— RESULTS_P41212_FULL-LIG_9_CC0.6_autoPROC_3.csv
— RESULTS_P41212_FULL-LIG_9_CC0.6_best1_1.csv
— RESULTS_P41212_FULL-LIG_9_CC0.6_best1_2.csv
— RESULTS_P41212_FULL-LIG_best1_1.csv
— RESULTS_P41212_FULL-LIG_best1_2.csv

```

Then, you probably want to compile all these results for a better view.

Now, the command ‘summary’ is automatically run at the end of each ‘launch’ command, but only for the RESULTS folder of this command (in this example, the ‘RESULTS\_P41212’ folder).

If you have done several ‘launch’ with different space group for example, that means the RESULTS folders will be different, you will have to run manually the ‘summary’ command.

Then a global SUMMARY file will be created, that compiles all SUMMARY files present in RESULTS folders if there are several RESULTS folders (case when launched for several space groups, or different templates).

## 10.1 Usage

easypipe.py data summary [-h]

| arguments          | description  |
|--------------------|--|
| -h, --help         | show this help message and exit                              |
| -o, --only_success | generate also a result file with only successfull treatments |

Example:

```
$ easypipe.py PROCESSED_DATA summary
```

## 10.2 What does it do ?

In the ‘RESULT’ folder, ‘summary’ subcommand creates a ‘SUMMARY’ csv file where all datasets results are compiled.

With the option ‘-only\_success’, unsuccessful treatments are not listed in the summary file, for a better clarity.

For each datasets, redondant results are deleted and the remaining ones are sorted according to:

- ‘dataset’
- ‘SUCCESS’
- ‘ligand search’
- ‘Ligand’ (found or not)
- ‘Completeness’
- ‘Nb of ligands found’
- ‘Rwork’

SUMMARY\_RESULTS\_P41212

| dataset         | treated | mode | ligand search | ligand smiles | CC           | nb ligands | SUCCESS | filtering step          | Resolution(A)           | Completeness    | Rwork           | Rfree  | space group (pdb) | unit cell (pdb)                                  | Ligand                                     | Nb of ligands found | LigandFit best CC | LigandFit individual CCs                        |
|-----------------|---------|------|---------------|---------------|--------------|------------|---------|-------------------------|-------------------------|-----------------|-----------------|--------|-------------------|--|--|---------------------|-------------------|---|
| cypD-134_37s    | yes     | fast | no            |               |              |            | yes     |                         | 1.31                    | 98.11% (98.02%) | 0.1953          | 0.1893 | P41212            | 56.858 56.858 87.565 90.00 90.00 90.00           | No search                                  |                     |                   |   |
| cypD-134_37s    | yes     | fast | no            |               |              |            | yes     |                         | 1.64                    | 97.33% (96.22%) | 0.3123          | 0.3041 | P41212            | 57.085 57.085 87.787 90.00 90.00 90.00           | No search                                  |                     |                   |   |
| cypD-134_37s    | yes     | full | yes           | 134           | OB(c1ccccc1) | 0.6        | 9       | no                      | Fitting ligand to dense | 1.31 (mtz)      | 98.12 (mtz)     | 0.2303 | 0.3698            | P41212 (mtz)                                     | 56.858, 56.858, 87.565, 90, 90, 90 (mtz)   | No search           |                   |   |
| cypD-172_1min20 | yes     | fast | no            |               |              |            | yes     |                         | 0.88                    | 98.40% (92.75%) | 0.2303          | 0.3698 | P41212            | 55.832 55.832 80.310 90.00 90.00 90.00           | No search                                  |                     |                   |   |
| cypD-172_1min20 | yes     | fast | no            |               |              |            | yes     |                         | 1.04                    | 96.86% (95.50%) | 0.2377          | 0.4563 | P41212            | 55.278 55.278 79.525 90.00 90.00 90.00           | No search                                  |                     |                   |   |
| cypD-172_1min20 | yes     | fast | no            |               |              |            | no      | Importing data and fail | 3.08 (mtz)              | 76.05 (mtz)     |                 |        | P41212 (mtz)      | 55.3038, 55.3039, 79.668, 90, 90, 90 (mtz)       | No search                                  |                     |                   |   |
| cypD-203_5min30 | yes     | full | yes           | 203           | OC1CCNC      | 0.6        | 9       | yes                     |                         | 1.51            | 98.08% (99.41%) | 0.1866 | 0.2162            | P41212   | 56.740 56.740 80.034 90.00 90.00 90.00     | FOUND               | 1/9               | 0.6670 0.6670,0.5400,0.5770,0.4580,0.3410,0.538 |
| cypD-203_5min30 | yes     | fast | no            |               |              |            | yes     |                         | 1.51                    | 98.09% (99.41%) | 0.1935          | 0.2181 | P41212            | 56.740 56.740 80.034 90.00 90.00 90.00           | No search                                  |                     |                   |   |
| cypD-203_5min30 | yes     | fast | no            |               |              |            | yes     |                         | 1.32                    | 90.45% (81.27%) | 0.1920          | 0.2491 | P41212            | 56.583 56.583 79.576 90.00 90.00 90.00           | No search                                  |                     |                   |   |
| cypD-203_5min30 | yes     | fast | no            |               |              |            | no      | Importing data and fail | 48.67 (mtz)             | 48.67 (mtz)     |                 |        | P41212 (mtz)      | 56.701, 56.701, 79.7425, 90, 90, 90 (mtz)        | No search                                  |                     |                   |   |
| cypD-248_5min   | yes     | full | no            |               |              |            | yes     |                         | 1.14                    | 97.00% (96.43%) | 0.1651          | 0.1833 | P41212            | 57.282 57.282 87.853 90.00 90.00 90.00           | No search                                  |                     |                   |   |
| cypD-248_5min   | yes     | fast | no            |               |              |            | yes     |                         | 1.14                    | 97.00% (96.43%) | 0.1701          | 0.1860 | P41212            | 57.282 57.282 87.853 90.00 90.00 90.00           | No search                                  |                     |                   |   |
| cypD-248_5min   | yes     | fast | no            |               |              |            | yes     |                         | 1.03                    | 95.87% (47.19%) | 0.2077          | 0.2240 | P41212            | 57.274 57.274 87.837 90.00 90.00 90.00           | No search                                  |                     |                   |   |
| cypD-248_5min   | yes     | fast | no            |               |              |            | yes     |                         | 1.00                    | 79.14% (15.53%) | 0.2001          | 0.2174 | P41212            | 57.264 57.264 87.827 90.00 90.00 90.00           | No search                                  |                     |                   |   |
| cypD-248_5min   | yes     | fast | no            |               |              |            | no      | Importing data and fail | 1.38 (mtz)              | 97.92 (mtz)     |                 |        | P41212 (mtz)      | 57.2164, 57.2164, 87.6953, 90, 90, 90 (mtz)      | No search                                  |                     |                   |   |
| cypD-317_2min   | yes     | full | yes           | 317           | c1cc2c(c1)c  | 0.6        | 9       | yes                     |                         | 1.14            | 98.99% (96.55%) | 0.2389 | 0.2593            | P41212   | 57.024 57.024 87.466 90.00 90.00 90.00     | Not found           | 0/9               | 0.5540 0.5440,0.4850,0.4640,0.4420,0.4460,0.446 |
| cypD-317_2min   | yes     | fast | no            |               |              |            | yes     |                         | 1.14                    | 98.99% (96.55%) | 0.1524          | 0.1703 | P41212            | 57.024 57.024 87.466 90.00 90.00 90.00           | No search                                  |                     |                   |   |
| cypD-317_2min   | yes     | fast | no            |               |              |            | yes     |                         | 1.06                    | 90.42% (71.71%) | 0.1875          | 0.2010 | P41212            | 57.017 57.017 87.460 90.00 90.00 90.00           | No search                                  |                     |                   |   |
| cypD-317_2min   | yes     | fast | no            |               |              |            | yes     |                         | 1.07                    | 90.04% (73.88%) | 0.1902          | 0.2154 | P41212            | 56.984 56.984 87.471 90.00 90.00 90.00           | No search                                  |                     |                   |   |
| cypD-343_5min20 | yes     | fast | no            |               |              |            | yes     |                         | 1.11                    | 78.03% (17.06%) | 0.1412          | 0.1510 | P41212            | 57.235 57.235 87.572 90.00 90.00 90.00           | No search                                  |                     |                   |   |
| cypD-343_5min20 | yes     | fast | no            |               |              |            | yes     |                         | 1.11                    | 77.95% (16.36%) | 0.1418          | 0.1571 | P41212            | 57.256 57.256 87.603 90.00 90.00 90.00           | No search                                  |                     |                   |   |
| cypD-343_5min20 | yes     | fast | no            |               |              |            | yes     |                         | 1.11                    | 77.88% (16.43%) | 0.1376          | 0.1604 | P41212            | 57.269 57.269 87.620 90.00 90.00 90.00           | No search                                  |                     |                   |   |
| cypD-343_5min20 | yes     | full | yes           | 343           | N5(-O)(=O)c  | 0.6        | 9       | no                      | Fitting ligand to dense | 1.11 (mtz)      | 83.81 (mtz)     |        |                   | P41212 (mtz)                                     | 57.256, 57.256, 87.603, 90, 90, 90 (mtz)   | No search           |                   |   |
| cypD-343_5min20 | yes     | fast | no            |               |              |            | no      | Importing data and fail | 1.44 (mtz)              | 48.32 (mtz)     |                 |        | P41212 (mtz)      | 80.585, 80.1558, 87.5141, 90, 90, 1008, 90 (mtz) | No search                                  |                     |                   |   |
| cypD-438_1min   | yes     | full | yes           | 438           | c1cc2c(c1)c  | 0.6        | 9       | yes                     |                         | 1.07            | 93.27% (67.72%) | 0.2342 | 0.2446            | P41212   | 57.294 57.294 87.555 90.00 90.00 90.00     | Not found           | 0/9               | 0.4910 0.4710,0.4000,0.4590,0.3830,0.4050,0.491 |
| cypD-438_1min   | yes     | fast | no            |               |              |            | yes     |                         | 1.07                    | 93.26% (67.72%) | 0.1788          | 0.2001 | P41212            | 57.294 57.294 87.555 90.00 90.00 90.00           | No search                                  |                     |                   |   |
| cypD-438_1min   | yes     | fast | no            |               |              |            | no      | Importing data and fail | 1.05 (mtz)              | 44.52 (mtz)     |                 |        | P41212 (mtz)      | 80.7025, 80.8632, 87.4104, 90, 90, 90 (mtz)      | No search                                  |                     |                   |   |
| cypD-440_5min   | yes     | fast | no            |               |              |            | yes     |                         | 1.82                    | 96.37% (93.75%) | 0.3947          | 0.4708 | P41212            | 56.512 56.512 81.831 90.00 90.00 90.00           | No search                                  |                     |                   |   |
| cypD-440_5min   | yes     | fast | no            |               |              |            | yes     |                         | 2.66                    | 94.39% (90.11%) | 0.3666          | 0.4621 | P41212            | 55.353 55.353 78.971 90.00 90.00 90.00           | No search                                  |                     |                   |   |
| cypD-440_5min   | yes     | full | yes           | 440           | c1cc2c(c1)   | 0.6        | 9       | no                      | Rebuilding model in     | 0.27 (mtz)      | 84.39 (mtz)     |        |                   | P41212 (mtz)                                     | 55.3529, 55.3529, 78.971, 90, 90, 90 (mtz) | No search           |                   |   |

This way, the first row of each dataset should be most of the time the best treatment to consider, but is always better to have a critical eye on information like completeness or resolution to be sure ...

And, if there are several RESULTS folders (case when launched for several space groups, or different templates), a global SUMMARY file will be created, that compiles all SUMMARY files present in RESULTS folders. Sorting criteria are the same as above.

## EASYPEPIPE ‘AUTO’

This mode allows to launch main easYPipe steps (prep, reindex, launch, summary) without any intervention. Ligand search is not possible for the moment.

### 11.1 Usage

easypipe.py data auto [-h] [-m {fast,full,allsg}] ref

| arguments | description   |
|-----------|---|
| ref       | folder with fasta file and pdb file for replacement, and cif(s) if ligand(s) in the model |

**Warning:** reference pdb files should include the row starting with ‘CRYST1’ containing information on space group

| optional arguments                               | description   |
|--|---|
| -h, -help  | show this help message and exit   |
| -m {fast,full,allsg},<br>-mode {fast,full,allsg} | running mode: fast, full, or allsg (default = fast)   |
| -b NUMBER, -best<br>NUMBER                       | launch only for mtz with best completeness, NUMBER indicates how many mtz to treat (default 1), ex: -best 2   |
| -a, -autoproc                                    | launch only for mtz from autoPROC, or if none launch for mtz with best completeness   |
| -w, -whole                                       | launch for the whole mtz processes  |
| -t TEMPLATE, -tem-<br>plate TEMPLATE             | optional template name for log files and result folders, in case re-launching with different reference pdb of the same space group (else will overwrite). |

Example:

```
$ easypipe.py PROCESSED_DATA auto my_ref_folder --best 2 --mode full
equivalent to:
$ easypipe.py PROCESSED_DATA auto my_ref_folder -b 2 -m full
```

### 11.2 How the data should be organized ?

Processed data should be in datasets folders, all grouped in a folder. More information on how to organize your data [here](#).

## 11.3 What does it do ?

Executes successively, without any intervention, the following steps:

- *prep*
- *reindex*
- *launch*
- *summary*

The options are the same as for *launch*, except for the options concerning the search for ligands which is not enabled at the moment. In the same way, the option “simulate” is not possible because it would imply an intervention. A new ‘launch csv’ file is therefore generated each time.

## EASYPEPIPE ‘PANDDA’

If you have more than 40 datasets, you can try to use [PanDDA](#)<sup>1</sup> which is particularly suitable to the detection of weakly bound ligands such as fragments.

This step can be run after all ‘launch’ subcommands have been executed, and aims at organizing the data processed with easYPipe in order to be able to run PanDDA.

### 12.1 Usage

`easypipe.py data pandda [-h]`

Example:

```
$ easypipe.py ./PROCESSED_DATA/ pandda
```

### 12.2 What does it do ?

For each dataset, ‘pandda’ easYPipe subcommand copies in a dataset folder suitable for PanDDA:

- pdb and mtz files generated with easYPipe,
- cif and pdb files of corresponding ligand,

---

<sup>1</sup> <https://pandda.bitbucket.io/>

```
PANDDA/
├── logs
│   └── pandda-data_easypipe_2021-02-24_195235.log
└── PANDDA_P41212
    ├── data
    │   ├── cypD-134_37s_mtz001
    │   │   ├── 134.cif
    │   │   ├── 134.pdb
    │   │   ├── cypD-134_37s_mtz001_full.mtz
    │   │   └── cypD-134_37s_mtz001_full.pdb
    │   ├── cypD-203_5min30_mtz001
    │   │   ├── 203.cif
    │   │   ├── 203.pdb
    │   │   ├── cypD-203_5min30_mtz001_full.mtz
    │   │   └── cypD-203_5min30_mtz001_full.pdb
    │   ├── cypD-248_5min_mtz001
    │   │   ├── 248.cif
    │   │   ├── 248.pdb
    │   │   ├── cypD-248_5min_mtz001_full.mtz
    │   │   └── cypD-248_5min_mtz001_full.pdb
    │   ├── cypD-317_2min_mtz001
    │   │   ├── 317.cif
    │   │   ├── 317.pdb
    │   │   ├── cypD-317_2min_mtz001_full.mtz
    │   │   └── cypD-317_2min_mtz001_full.pdb
    │   ├── cypD-343_5min20_mtz002
    │   │   ├── 343.cif
    │   │   ├── 343.pdb
    │   │   ├── cypD-343_5min20_mtz002_full.mtz
    │   │   └── cypD-343_5min20_mtz002_full.pdb
    │   ├── cypD-438_1min_mtz001
    │   │   ├── 438.cif
    │   │   ├── 438.pdb
    │   │   ├── cypD-438_1min_mtz001_full.mtz
    │   │   └── cypD-438_1min_mtz001_full.pdb
    │   ├── cypD-440_5min_mtz002
    │   │   ├── 440.cif
    │   │   ├── 440.pdb
    │   │   ├── cypD-440_5min_mtz002_fast.mtz
    │   │   └── cypD-440_5min_mtz002_fast.pdb
    │   └── cypD-619_4min45_mtz003
    │       └── 619.cif
```

## 12.3 References