Supporting Information.docx: Supporting information to the manuscript. Contains figure S1 and the description of the Cell painting assay. ds enamine pnp cpa actives.xlsx: Cell painting data for 187 measurements that were found active. 44 measurements were active at 10µM, 143 were active at 30µM. Columns: Enamine Id: Compound identifier (Enamine) Compound Id: Compound identifier (COMAS) Well\_Id: Unique identifier of a measurement in the dataset Conc uM: measurement concentration in µM Induction: Cell painting induction value Rel Cell Count: Cell count in percent, relative to DMSO controls Toxic: Whether the compound is toxic (Rel Cell Count < 50) or not at the tested concentration Cluster\_High: The biological cluster with the highest similarity to this measurement, using subprofile analysis Cluster Sim: The biosimilarity value to this cluster, in percent Cluster\_\*: Individual biosimilarity to the given biological cluster, using subprofile analysis, in percent Smiles: SMILES encoding of the structure SPS: Spatial score nSPS: normalized spatial score NumHA: number of heavy (non-hydrogen) atoms **PNP** Status npfc ctypes: fragment connection types found in the compound npfc num\_frags: number of NP fragments found in the compound Median\_\*: The 579 individual Cell painting feature values (Z-scores) ds\_enamine\_pnp\_cpa\_actives\_struct.xlsx: Cluster assignments for 187 measurements that were found active. 44 measurements were active at  $10\mu$ M, 143 were active at  $30\mu$ M. Columns: Enamine Id: Compound identifier (Enamine) Conc uM: measurement concentration in µM Induction: Cell painting induction value Rel\_Cell\_Count: Cell count in percent, relative to DMSO controls Cluster: The assigned biological cluster, using subprofile analysis A biosimilarity of >= 80% is required, otherwise the cluster is "not assigned" Cluster\_\*: Individual biosimilarity to the given biological cluster, using subprofile analysis, in percent

enamine\_pnp\_fcc.xlsx:

The hundred most common fragment combinations in the Enamine PNP set.

Columns:

fcc: Fragment combination classification. Has 3 parts: <Frag1\_ld>[ctype]<Frag2\_ld>
count: The number of occurrences in the data set
perc: Percentage of occurrence
frag1\_smiles: Smiles of the first fragment
ctype: connection type (see manuscript)
frag2\_smiles: Smiles of the second fragment