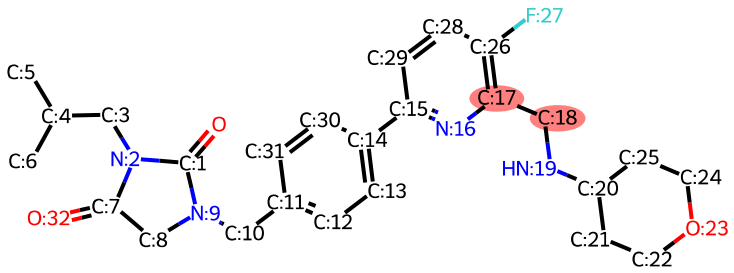
Reaction Report for *LEI_102*, Priority 10

Selected Position: `C:17 C:18`

Selected Forward Reaction: N-alkylation of secondary amines with alkyl halides

Product

Reaction site highlighted at position `C:17 C:18`

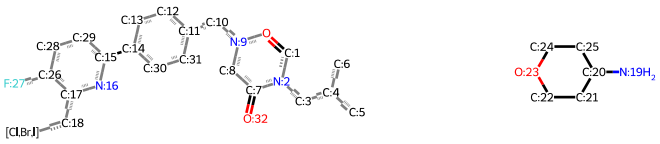


Product SMILES: `O=[C:1]1[N:2]([CH2:3][CH:4]([CH3:5])[CH3:6])[C:7](=[O:32])[CH2:8][N:9]1[CH2:10][c:11]1[cH:12][cH:13][c:14](-[c:15]2[n:16][c:17]([CH2:18][NH:19][CH:20]3[CH2:21][CH2:22][O:23][CH2:24][CH2:25]3)[c:26]([F:27])[cH:28][cH:29]2)[cH:30][cH:31]1`

Proposed Transitions

Transition 1

- **Forward Reaction:** N-alkylation of secondary amines with alkyl halides
- **Is Chemically Valid:** True
- **Is Template-based:** True
- **Reasoning:** This is the general template for the N-alkylation of a primary amine to form the target secondary amine. The leaving group on the alkyl partner is represented by a SMARTS pattern for a (Cl, Br, I). This correctly models the formation of the C18-N19 bond.
- **Is Smiles Valid:** False
- **Reactant 1:** `[Cl,Br,I][CH2:18][c:17]1[c:26]([F:27])[cH:28][cH:29][c:15](-[c:14]2[cH:30][cH:31][c:11]([CH2:10][N:9]3[CH2:8][C:7](=[O:32])[N:2]([CH2:3][CH:4]([CH3:5])[CH3:6])[C:1]=O3)[cH:12][cH:13]2)[n:16]1`
- **Reactant 2:** `[NH2:19][CH:20]1[CH2:21][CH2:22][O:23][CH2:24][CH2:25]1`



R1

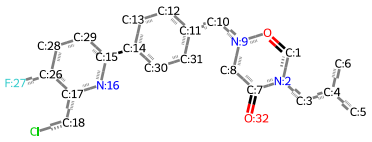
R2

Reactants for Transition 1

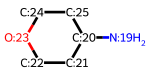
Transition 2

- **Forward Reaction:** N-alkylation of secondary amines with alkyl halides
- **Is Chemically Valid:** True
- **Is Template-based:** False
- **Reasoning:** This is a valid retrosynthetic disconnection. It proposes an SN2 reaction between a primary, benzylic-like chloride and a primary amine to form the target secondary amine. The reaction is plausible and should be reasonably chemoselective for the primary amine over other potential nucleophilic sites. Note: The provided reaction name ‘N-alkylation of secondary amines’ is inconsistent with this transformation, which correctly models the formation of the secondary amine product from a primary amine reactant.

- **Is Smiles Valid:** False
- **Reactant 1:** `Cl[CH2:18][c:17]1[c:26]([F:27])[cH:28][cH:29][c:15](-[c:14]2[cH:30][cH:31][c:11]([CH2:10][N:9]3[CH2:8][C:7](=[O:32])[N:2]([CH2:3][CH:4]([CH3:5])[CH3:6])[C:1]=O3)[cH:12][cH:13]2)[n:16]1`
- **Reactant 2:** `[NH2:19][CH:20]1[CH2:21][CH2:22][O:23][CH2:24][CH2:25]1`



R1

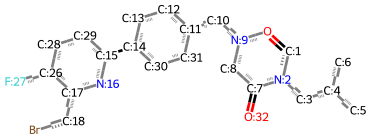


R2

Reactants for Transition 2

Transition 3

- **Forward Reaction:** N-alkylation of secondary amines with alkyl halides
- **Is Chemically Valid:** True
- **Is Template-based:** False
- **Reasoning:** This is a valid retrosynthetic disconnection. The alkyl bromide is more reactive than the corresponding chloride, making this a very favorable SN2 reaction. The primary amine is sufficiently nucleophilic. The reaction should be chemoselective under standard conditions with a non-nucleophilic base. Note: The provided reaction name ‘N-alkylation of secondary amines’ is inconsistent with this transformation, which correctly models the formation of the secondary amine product from a primary amine reactant.
- **Is Smiles Valid:** False
- **Reactant 1:** `Br[CH2:18][c:17]1[c:26]([F:27])[cH:28][cH:29][c:15](-[c:14]2[cH:30][cH:31][c:11]([CH2:10][N:9]3[CH2:8][C:7](=[O:32])[N:2]([CH2:3][CH:4]([CH3:5])[CH3:6])[C:1]=O3)[cH:12][cH:13]2)[n:16]1`
- **Reactant 2:** `[NH2:19][CH:20]1[CH2:21][CH2:22][O:23][CH2:24][CH2:25]1`

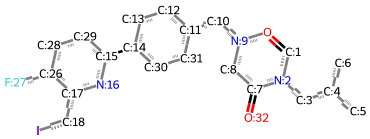


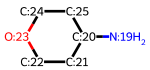
R1 R2

Reactants for Transition 3

Transition 4

- **Forward Reaction:** N-alkylation of secondary amines with alkyl halides
- **Is Chemically Valid:** True
- **Is Template-based:** False
- **Reasoning:** This is a valid retrosynthetic disconnection. The alkyl iodide is the most reactive halide for SN2 reactions, making this a very plausible pathway. Reactant stability is acceptable for this transformation. Note: The provided reaction name ‘N-alkylation of secondary amines’ is inconsistent with this transformation, which correctly models the formation of the secondary amine product from a primary amine reactant.
- **Is Smiles Valid:** False
- **Reactant 1:** `I[CH2:18][c:17]1[c:26]([F:27])[cH:28][cH:29][c:15](-[c:14]2[cH:30][cH:31][c:11]([CH2:10][N:9]3[CH2:8][C:7](=[O:32])[N:2]([CH2:3][CH:4]([CH3:5])[CH3:6])[C:1]=O3)[cH:12][cH:13]2)[n:16]1`
- **Reactant 2:** `[NH2:19][CH:20]1[CH2:21][CH2:22][O:23][CH2:24][CH2:25]1`



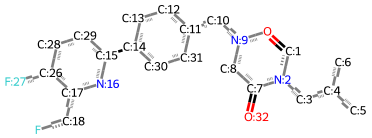


R1 R2

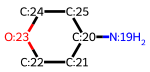
Reactants for Transition 4

Transition 5

- **Forward Reaction:** N-alkylation of secondary amines with alkyl halides
- **Is Chemically Valid:** False
- **Is Template-based:** False
- **Reasoning:** This permutation is invalid. While the reactants are stable, the C-F bond is extremely strong, making fluoride a very poor leaving group for SN2 reactions. This transformation is not synthetically plausible or practical under normal N-alkylation conditions.
- **Is Smiles Valid:** False
- **Reactant 1:** `F[CH2:18][c:17]1[c:26]([F:27])[cH:28][cH:29][c:15](-[c:14]2[cH:30][cH:31][c:11]([CH2:10][N:9]3[CH2:8][C:7](=[O:32])[N:2]([CH2:3][CH:4]([CH3:5])[CH3:6])[C:1]=O3)[cH:12][cH:13]2)[n:16]1`
- **Reactant 2:** `[NH2:19][CH:20]1[CH2:21][CH2:22][O:23][CH2:24][CH2:25]1`



R1



R2

Reactants for Transition 5