

Piperonal

1. **1**, NaH, MeOH, THF, 0 °C to r.t.  
2. NaOH, H<sub>2</sub>O, reflux, **80 %** over 2 steps



**A**

1. ClCO<sub>2</sub>Et, Et<sub>3</sub>N, THF, 0 °C  
2. NaBH<sub>4</sub>, MeOH, 0 °C, **82 %** over 2 steps  
3. PBr<sub>3</sub>, Et<sub>2</sub>O, 0 °C, **95 %**



**B**

1. **2**, MeCN, **96 %**  
2. DBU, DCM, -78 °C, **77 %**  
Name and mechanism of reaction 2?  
Explain stereochemistry

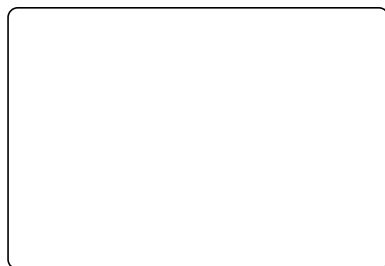


**C**

MsOH, DCM, reflux, **75 %**  
Name of reaction?

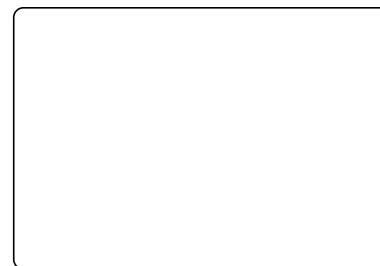


**D intermediate**

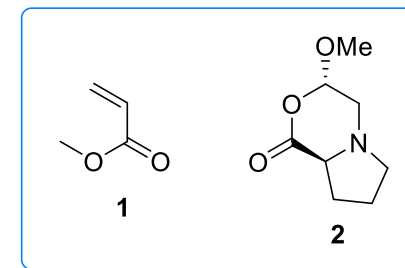


**D**

1. NBS, 1,4-dioxane, H<sub>2</sub>O, 90 °C, **90 %**  
2. O<sub>3</sub>, DCM, -78 °C; then Me<sub>2</sub>S, **41 %**



**E**





**E**

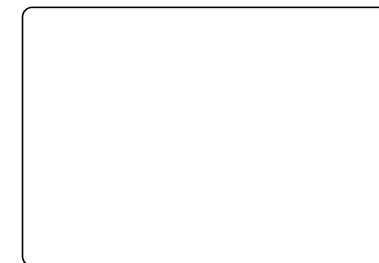
KOtBu, THF, 0 °C;  
then Me<sub>2</sub>SO<sub>4</sub>, **57 %**

Name of reaction?



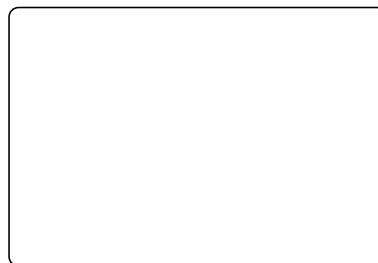
**F**

1. H<sub>2</sub>, PtO<sub>2</sub>, EtOH  
2. K<sub>2</sub>CO<sub>3</sub>, MeOH, reflux,  
**77 % over 2 steps**  
3. NaBH<sub>4</sub>, MeOH, 0 °C  
to r.t., **81 %**



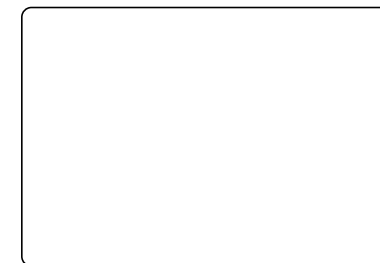
**G**

1. PCC, DCM, 0 °C to r.t., **65 %**  
2. RhH(CO)(PPh<sub>3</sub>), PhSiH<sub>3</sub>, THF, **65 %**



**H**

1. HCl, H<sub>2</sub>O, 1,4-dioxane, **60 %**  
2. LiAlH<sub>4</sub>, THF, 0 °C, **76 %**



**Cephalocyclidin A**