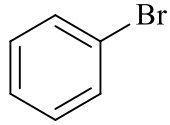
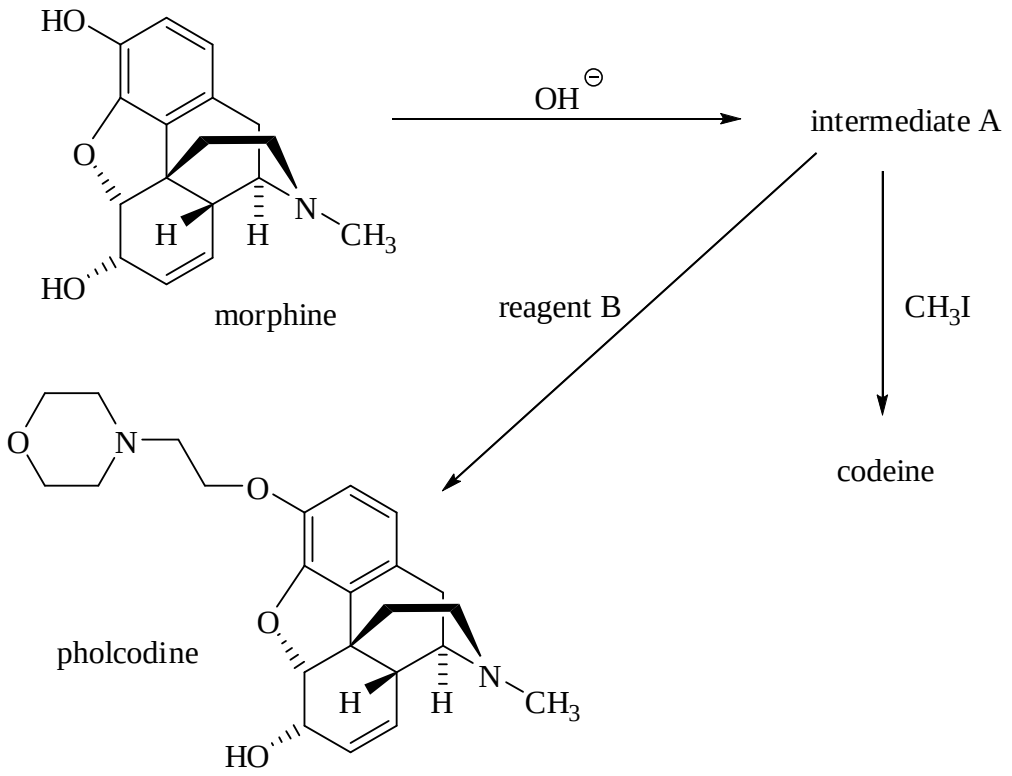
- Complete the following table. Make sure you complete the name of the starting material where indicated.

Marks 1

STARTING MATERIAL	REAGENTS/ CONDITIONS	CONSTITUTIONAL FORMULA(S) OF MAJOR ORGANIC PRODUCT(S)
	1. Mg / dry ether 2. CO_2 3. $H^{\oplus}$ / H_2O	

Marks 7

- Morphine is the principal active agent in opium and is a highly potent analgesic drug. Its structure and conversion into codeine (a moderate analgesic) and pholcodine (a cough suppressant) are shown below.



Give the molecular formula of morphine.

How many stereogenic (chiral) centres are there in morphine?

Identify the functional groups present in morphine.

Draw the structures of codeine and reagent B.

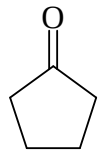
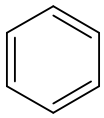
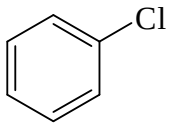
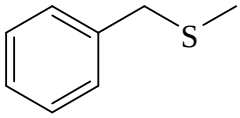
codeine	reagent B

- Define the term "elimination" and illustrate your answer with an equation.

2

Marks 3

- Complete the following table.

STARTING MATERIAL	REAGENTS/ CONDITIONS	CONSTITUTIONAL FORMULA(S) OF MAJOR ORGANIC PRODUCT(S)
	1. CH_3MgBr 2. $H^{\oplus}$ / H_2O	
		
	$CH_3S^{\ominus}\ Na^{\oplus}$	

Marks
8

- Show clearly the reagents you would use to carry out the following chemical conversions. Draw constitutional formulas for any intermediate compounds. NOTE: more than one step is necessary in each case.