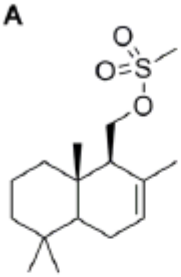
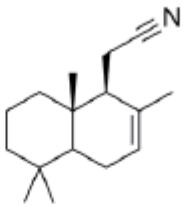
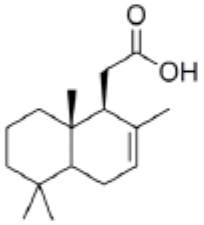
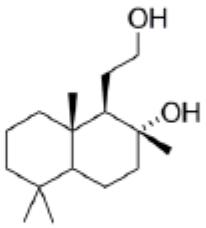
Question 1			
		Answer	**Marks**
(a)		Ambrox ($C_{16}H_{28}O$) has a molar mass of ((16*12.01)+(28*1.008)+(1*16)) = 236.384 g mol^{-1}. 10000000 g produced every year, therefore (10000000/236.384) = $4.2x10^4$ moles of Ambrox are produced each year.	1 mark
(b)		**A**  $C_{16}H_{28}O_3S$ **B**  $C_{16}H_{25}N$ Accept structures with the nitrile group shown as CN	1 mark per correct structure
		C  $C_{16}H_{26}O_2$ Accept structures with the carboxyl group shown as COOH. **D**  $C_{16}H_{30}O_2$	
(c)	**i)**	The percentage yields for each step are combined to give an overall yield of 24.87 %.	1 mark
	ii)	Number of moles of (-)-drimenol needed = (number of moles of Ambrox produced in a year)/(overall yield) = (42304.5/0.2487) = 170102.5 moles of (-)-drimenol (-)-drimenol has a molar mass of ((15*12.01)+(26*1.008)+(1*16)) = 222.358 g mol^{-1}. The mass of (-)-drimenol needed is therefore (222.358*170102.5) = 38 tonnes. Also accept correctly worked solutions using the candidate's answers to (a) and (c) i). Do not penalise candidates for rounding values in the intermediate part of the calculation.	1 mark
	iii)	The mass of bark needed = (mass of (-)-drimenol)/(proportion of (-)-drimenol in bark) = 37.825/0.005 = $7.6x10^3$ tonnes. Also accept correctly worked solutions using the candidate's answer to (c) ii).	1 mark