

Each of the following questions is 10 points.

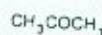
- Describe the types of ionization techniques used in gas chromatography-mass spectrometry.
- A standard operating procedure states that a column must have an efficiency > 30000 theoretical plates/m. Calculate each column of theoretical plate and which of these 15 cm columns meets the specification?

Retention time of analyte (min)	$W_{1/2}$ (min)
Column 1 6.4	0.2
Column 2 5.6	0.2
Column 3 10.6	0.6

- Predict the approximate shifts in ppm of the CH_3 and CH_2 groups in following molecules and the number of protons producing the signal at each shift.

Table 8.1 Approximate chemical shift values for non-aromatic protons attached to carbon

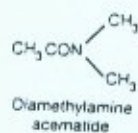
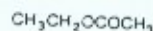
Group	δ ppm	Group	δ ppm	Group	δ ppm
$\text{CH}_3\text{-C}$	0.9	$\text{R-CH}_2\text{-C}$	1.4	CH-C	1.5
$\text{CH}_3\text{-C-O}$	1.3	$\text{R-CH}_2\text{-C-N}$	1.4	CH-C-O	2.0
$\text{CH}_3\text{-C=C}$	1.6	$\text{R-CH}_2\text{-C-O}$	1.9	CH-CO-N	2.4
$\text{CH}_3\text{-CO}$	2.0	$\text{R-CH}_2\text{-CO-N}$	2.2	CH-CO	2.7
$\text{CH}_3\text{-CO-N}$	2.0	$\text{R-CH}_2\text{-C=C}$	2.3	CH-N	2.8
$\text{CH}_2\text{-N}$	2.4	$\text{R-CH}_2\text{-CO}$	2.4	CH-Ar	3.3
$\text{CH}_2\text{-Ar}$	2.3	$\text{R-CH}_2\text{-N}$	2.5	CH-O	3.9
$\text{CH}_2\text{-O}$	3.3	$\text{R-CH}_2\text{-Ar}$	2.9	CH-N-CO	4.0
$\text{CH}_2\text{N}^+(\text{R})_3$	3.3	$\text{R-CH}_2\text{-O}$	3.6	CH-Cl	4.2
$\text{CH}_2\text{-O-CO}$	3.7	$\text{R-CH}_2\text{-O-CO}$	4.1	R-CH=C	4.5-6.0



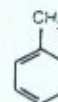
Acetone



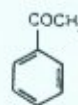
Acetylacetone

Dimethylamine
acetamide

Ethyl acetate



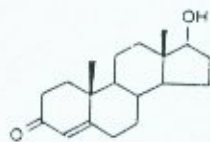
Toluene



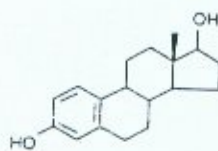
Acetophenone

Reference data

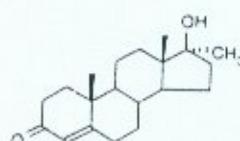
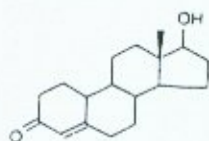
- What are principal advantages and the principal limitation of the following detectors?
(a) electron capture detector (b) thermal conductivity detector.
- Predict the order of elution, from first to last, of the following steroids from an ODS column with methanol/ water (70: 30) as the mobile phase.



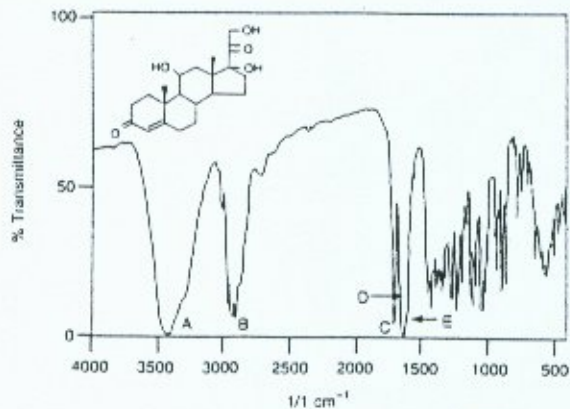
Testosterone



Estradiol



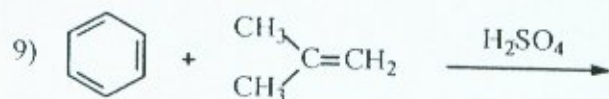
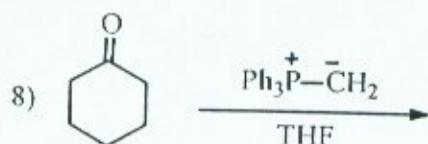
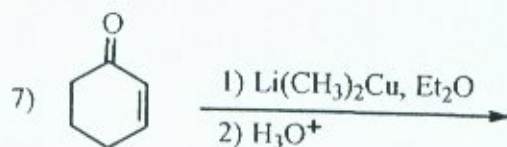
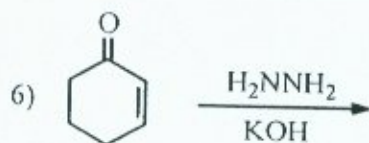
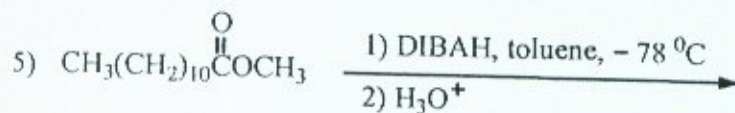
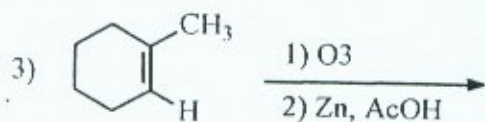
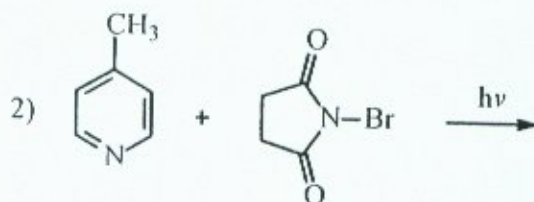
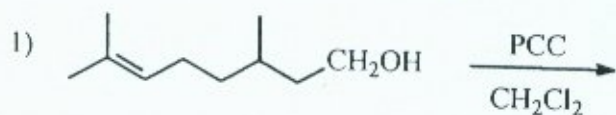
6. Assign the bands A-E indicated in the spectrum of hydrocortisone

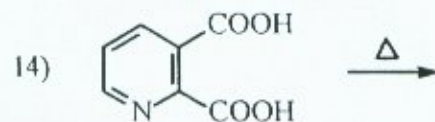
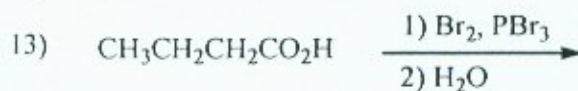
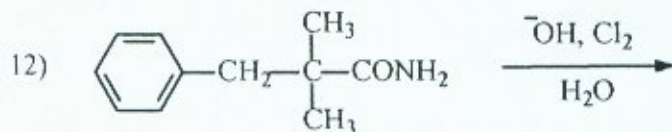
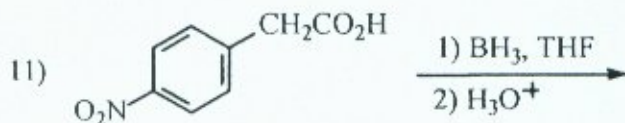
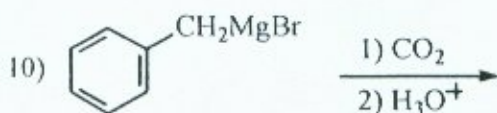


7. Define bathochromic shift and hyperchromic effect.
8. Describe solid-phase extraction and types of adsorbants used.
9. What are variables affecting electro-osmotic flow (EOF) in capillary electrophoresis?
10. What properties of a supercritical fluid are important in chromatography?

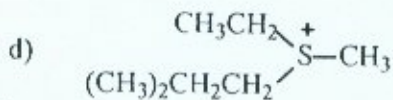
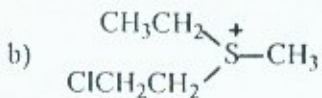
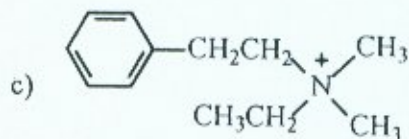
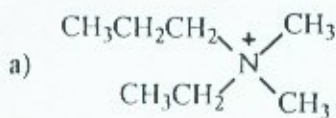
藥博 16. 有機化學

[I] 寫出下列方程式的主要產物：(30%)

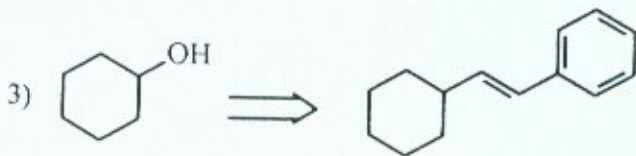




[II] 寫出下列化合物經由 Hofmann 分解，生成雙鍵的構造式：(10%)



[III]寫出下列方程式的合成設計：(30%)



[IV] 寫出下列方程式可能的反應機構：(30%)

