

SECTION ONE (33%)

化學研究所

I-1) 試寫出下列各化合物的構造式: (7%)

- (a) DMF; (b) p-Benzoylbenzoic acid; (c) NBS;
 (d) Glycerin; (e) syn-Acetaldehyde oxime;
 (f) 1-Chlorobicyclo[2.2.2]octane; (g) Sodium isopropylacetylde.

I-2) 試以 (a) Fischer projection, (b) sawhorse diagram, (c) Newman projection 畫出 erythro-2-bromo-3-phenylbutane 的最穩定構造式. (3%)

I-3) 試說明為何對一硝基酚的沸點比隣一硝基酚為高? (2%)

I-4) 試簡述有機反應的特性. (4%)

I-5) 有機合成的反應過程中, 吾人為何常加入 NaOAc 或吡啶 (pyridine) 做為除酸劑? 可否改用 NH_4OAc 或吡咯 (pyrrole) 代替之. 為何? (4%)

I-6) 為何 nitrogen ylids 不易存在而 phosphorous ylids 可存在? 試解釋之. (4%)

I-7) 試填入下表的各空格 (6%)

化學式		$\cdot\text{CH}_3$	$\oplus\text{CH}_3$	$\ominus\text{CH}_3$
名稱	中文			
	英文			
電子組態				
形狀				

I-8) 膽固醇溶於氯仿中的濃度為每 100 c.c. 溶液中含 6.5 g.

(a) 此溶液置於 5 cm 長的管中, 測得其旋光度為 -1.2° . 試求膽固醇的比旋光度.

(b) 若將此 10 c.c. 溶液稀釋到 20 c.c. 然後於 5 cm. 管中測其旋光度, 其旋光度將為多少? (3%)

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SECTION TWO (35%)

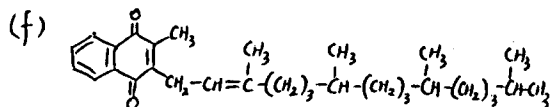
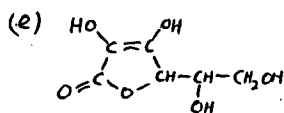
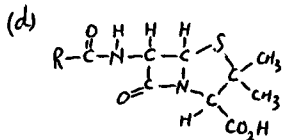
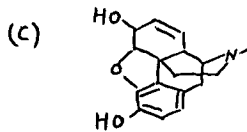
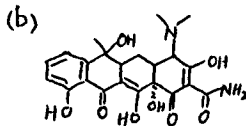
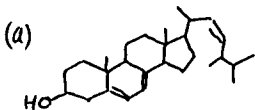
(II-1) True = T, false = F, pick the correct answer. (4%)

- (a) Electron-releasing groups bonded to an amine nitrogen increase its basicity. (T, F)
- (b) An N-alkyl sulfonamide is insoluble in sodium hydroxide because it has no acidic hydrogen. (T, F)
- (c) The ^{12}C isotope gives an NMR spectrum, but it is not used in determining structure as often as proton NMR is. (T, F)
- (d) In the UV-Vis region, the intensity of absorption is independent of the number of absorbing molecules in the light path. (T, F)
- (e) A sodium lamp generates plane-polarized light. (T, F)
- (f) The specific rotation of a compound depends on the number of molecules of the optically active materials that are in the path of the plane-polarized light. (T, F)
- (g) All molecules that contain only one asymmetric carbon are chiral, but all chiral molecules do not contain an asymmetric carbon atom. (T, F)
- (h) The longer the wavelength(λ) of light, the greater the energy. (T, F)

(II-2) Fill in the blank with the correct word(s) provided at the end of each problem. (6%)

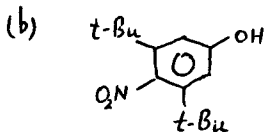
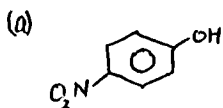
- (a) An increase in shielding leads to a _____ shift in the NMR spectrum. (upfield, downfield, unchanged, unpredictable)
- (b) Optically active stereoisomers that are not enantiomers are _____. (diastereomers, enantiomers, anomers, epimers, chiral centers)
- (c) Stereoisomers which differ in the configuration of the hemiacetal carbon of the carbohydrate are called _____. (mutarotators, anomers, epimers, conformers, optical antipodes)
- (d) Separation of a racemic mixture into its optically active forms is called _____. (purification, resolution, racemization, elimination, identification)
- (e) The group least likely to be listed as an auxochrome is (i) -OH, (ii) -CH₃, (iii) -NH₂, (iv) -OCH₃, (v) -NH(CH₃).
- (f) The group that has its stretching vibration occurred at the highest frequency is (i) C=C, (ii) C≡C, (iii) C=O, (iv) C-C, (v) C-O.

(II-3) Of the following compounds, (3%)

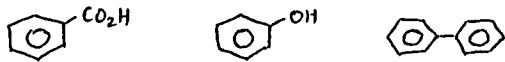


- (i) _____ an alkaloid;
- (ii) _____ a fat-soluble vitamin;
- (iii) _____ a water-soluble vitamin;
- (iv) _____ a tetracycline;
- (v) _____ a steroid;
- (vi) _____ a penicillin.

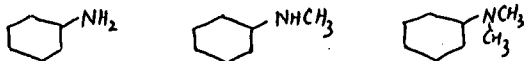
(II-4) Which is more acidic? Why? (2%)



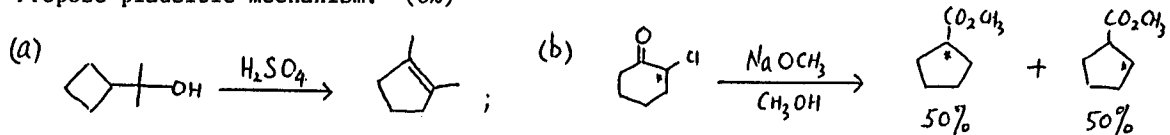
(II-5) How would you separate a mixture of the following? Assume that they are dissolved in diethylether. (5%)



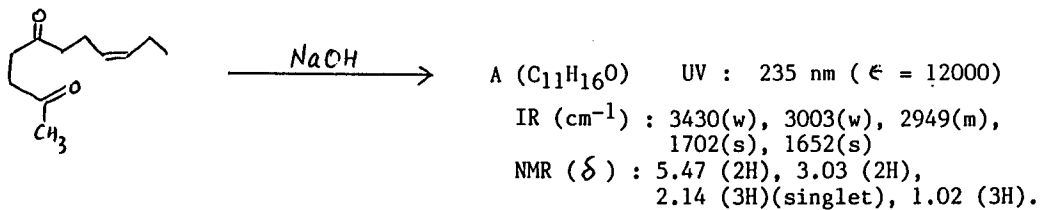
(II-6) Suggest a chemical test that would distinguish among the following. What would you expect from each? (4%)



(II-7) Propose plausible mechanism. (6%)

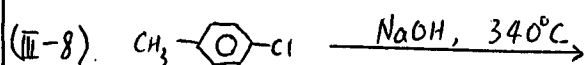
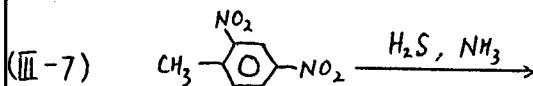
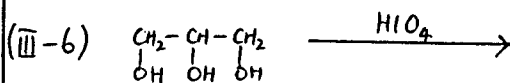
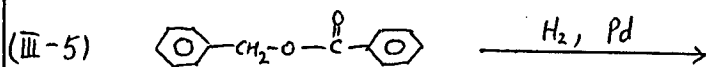
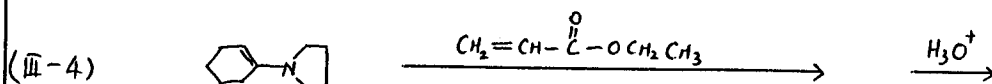
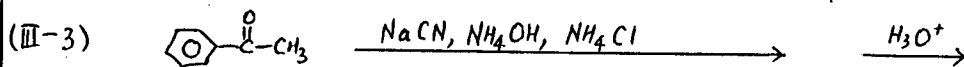
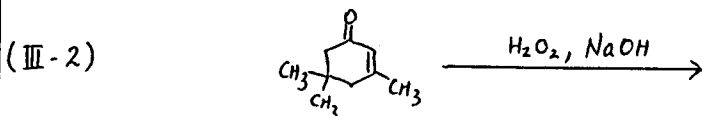
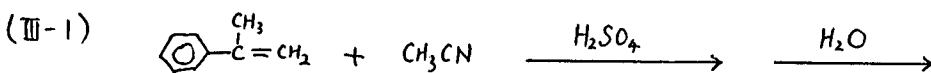


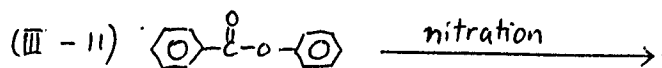
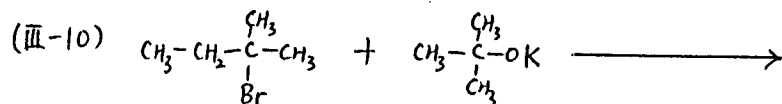
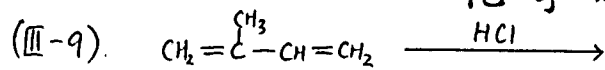
(II-8) Determine the structure of A. (5%)



SECTION THREE (32%)

(III-A) Complete the following reactions (22%)





(III-B) Show how one might carry out the following syntheses. (10%)

