

題號： 283
科目： 有機化學(B)
節次： 6

國立臺灣大學 109 學年度碩士班招生考試試題

題號：283

共 3 頁之第 1 頁

※ 注意：請於試卷內之「非選擇題作答區」標明題號依序作答。

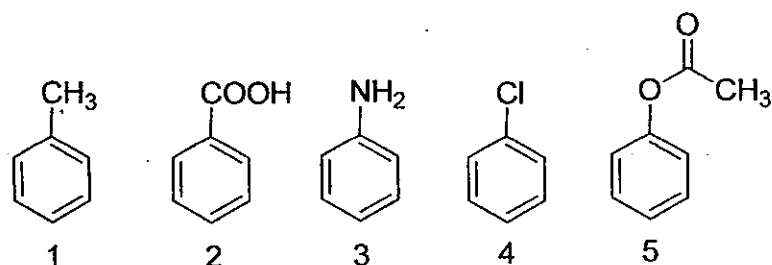
(1) Which of the following compounds is the most stable? (3%)

- (A) 2-methyl-1,2-pentadiene
- (B) (*E*)-2-methyl-1,3-pentadiene
- (C) (*Z*)-2-methyl-1,3-pentadiene
- (D) 2-methyl-2,3-pentadiene
- (E) 2-methyl-1,4-pentadiene

(2) Which of the following alkyl halides yields the most stable carbocation intermediate during solvolysis in hot ethanol? (3%)

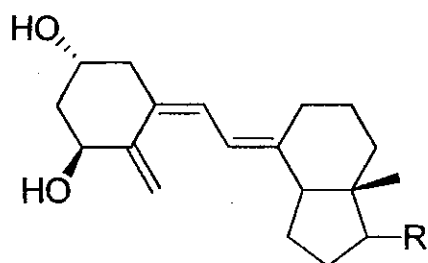
- (A) methyl iodide
- (B) (*S*)-2-bromopentane
- (C) (*R*)-2-bromopentane
- (D) (*S*)-3-bromopent-1-ene
- (E) 1-chlorobutane

(3) Rank the following compounds in order of increasing reactivity towards chlorination with $\text{Cl}_2/\text{AlCl}_3$ (slowest reacting to fastest). (3%)



- (A) $3 < 4 < 2 < 1 < 5$
- (B) $2 < 4 < 1 < 3 < 5$
- (C) $4 < 2 < 1 < 3 < 5$
- (D) $2 < 4 < 5 < 1 < 3$
- (E) $2 < 4 < 1 < 5 < 3$

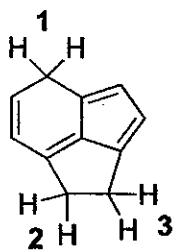
(4) Given that 1,3-butadiene has a UV absorption of 217 nm, predict the approximate absorption for the conjugated system in vitamin D3. (3%)



- (A) 210 nm (B) 230 nm (C) 250 nm (D) 270 nm (E) 290 nm

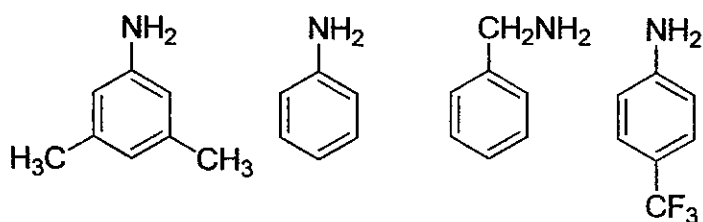
見背面

(5) Which sequence ranks the indicated protons in order of increasing acidity? (3%)

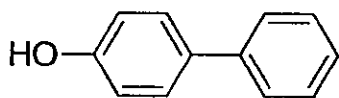


(A) $1 < 2 < 3$ (B) $1 < 3 < 2$ (C) $2 < 1 < 3$ (D) $2 < 3 < 1$ (E) $3 < 1 < 2$ (F) $3 < 2 < 1$

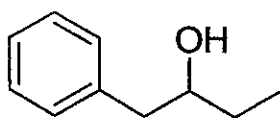
(6) Please identify which compound is most basic and which one is least basic. (4%)



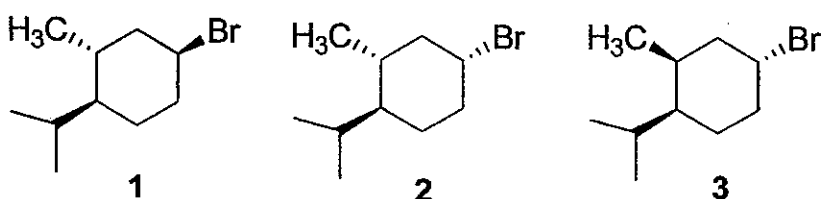
(7) Please show how you would use a Suzuki reaction to prepare the compound below. (5%)



(8) Please show how you would use a Grignard reaction to prepare the compound below. (hint: there are two potential reactions for preparation) (6%)



(9) Please draw the most stable chair conformation for each of the following compounds, and also rank the stability among the three chair conformations. (10%)

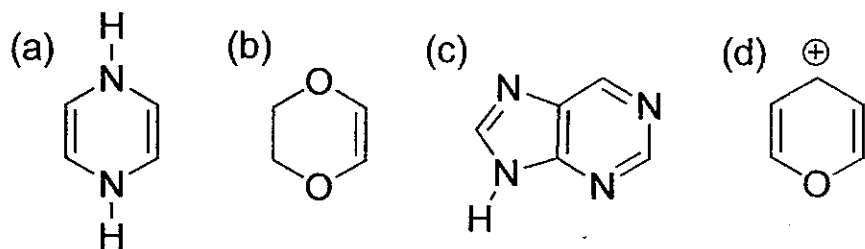


(10) Please explain (a) why ethanol ($pK_a = 16$) is more acidic than *tert*-Butanol ($pK_a = 18$), and (b) acetylene ($pK_a = 25$) is more acidic than ethane ($pK_a = 50$). (6%)

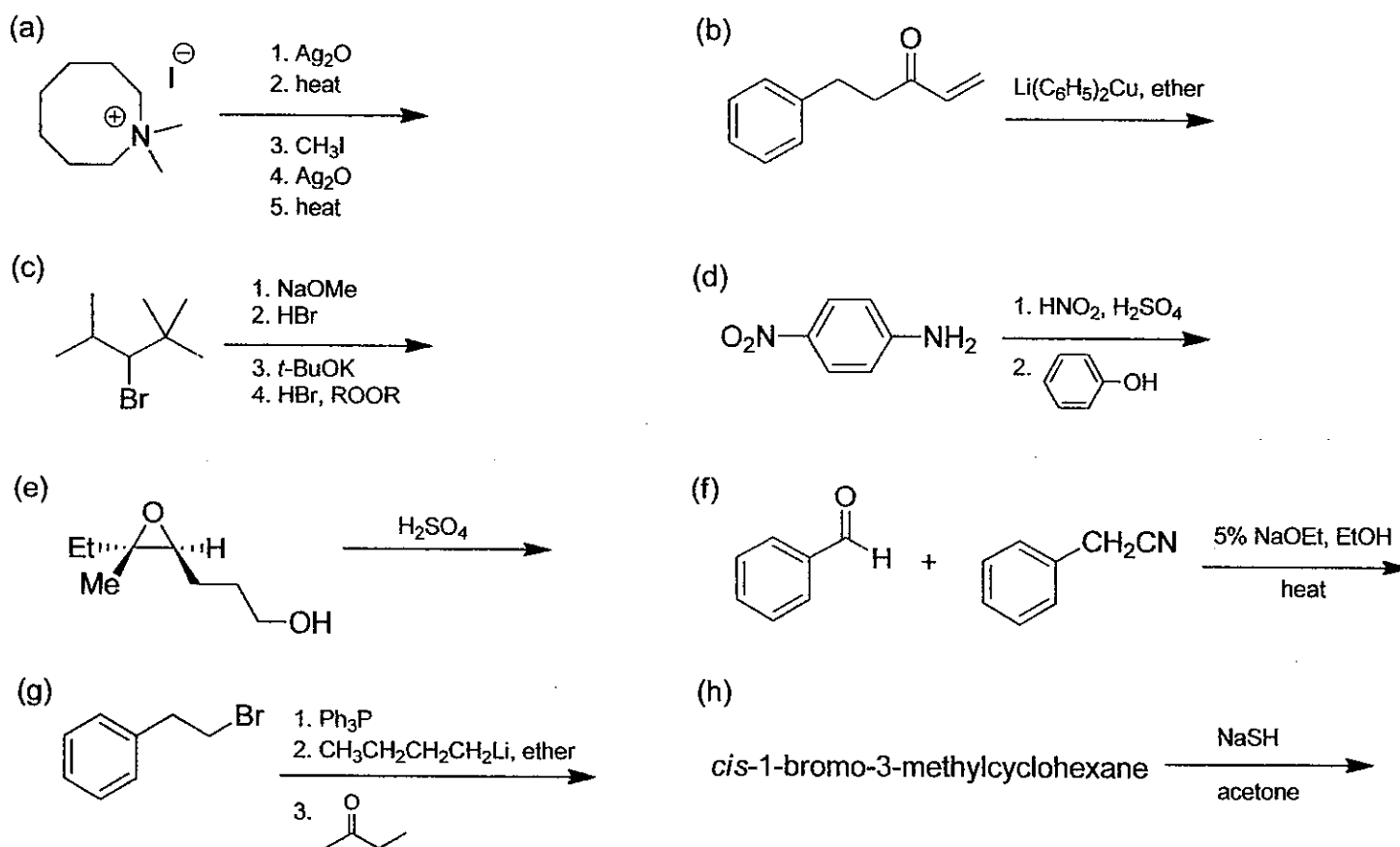
(11) Please use molecular orbital (MO) theory to explain why cyclobutadiene is more reactive than benzene. (6%)

接次頁

(12) Please identify the following structures, if flat, would be classified as aromatic, antiaromatic or nonaromatic? (8%)



(13) Please provide the structure of the major organic product in the reactions below. (32%, 4% each)



(14) Please propose the structure for the compound that fit the following ¹³C NMR (off resonance splitting for each peak is shown as a table within the figure) and ¹H NMR spectra. (formula = C₉H₁₁OBr) (8%)

