

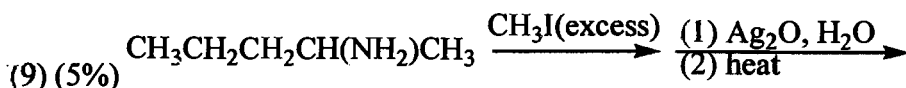
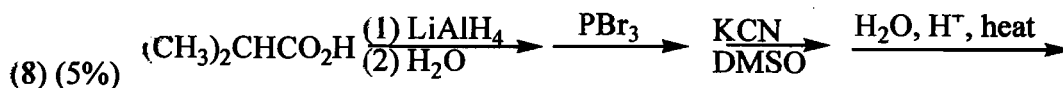
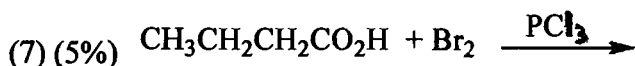
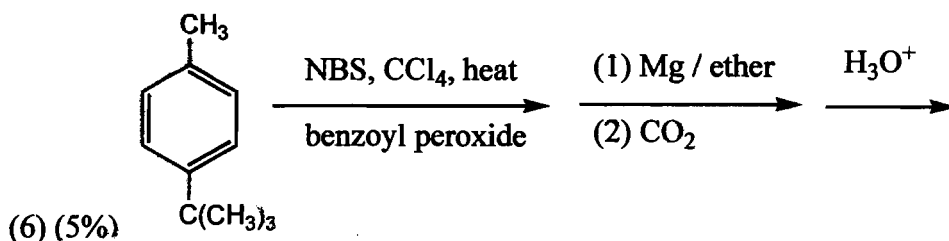
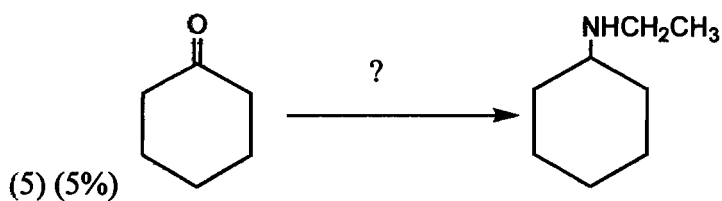
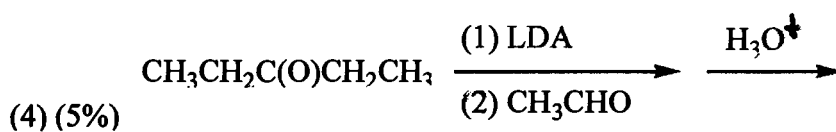
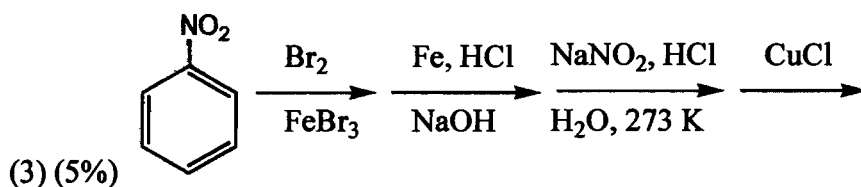
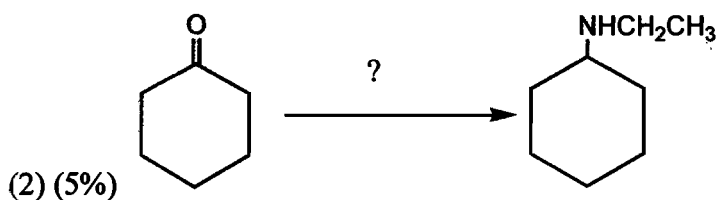
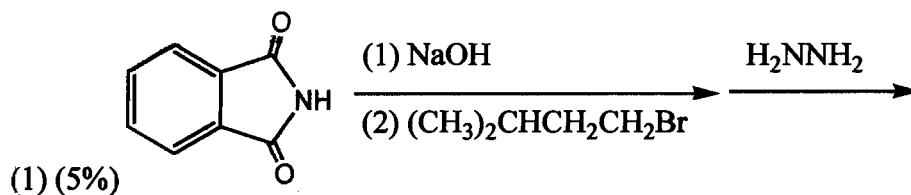
系所組別： 化學系

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考試日期： 0219， 節次： 2

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A. Give the products or reagents for each of the following reactions, or give a short answer for each of the following questions.



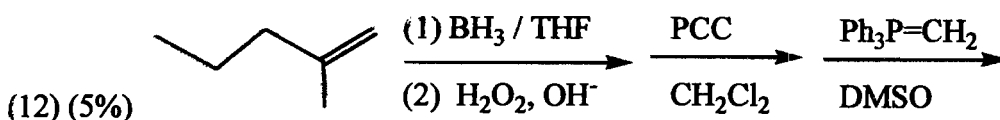
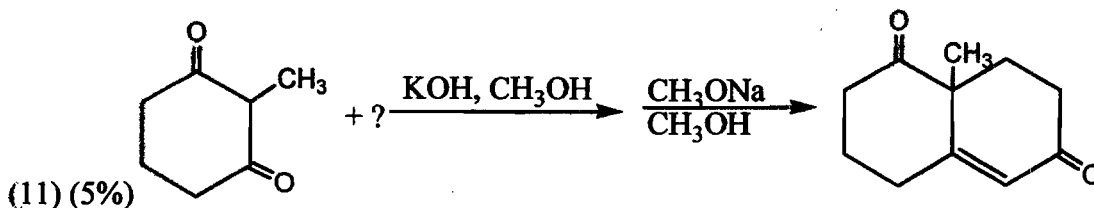
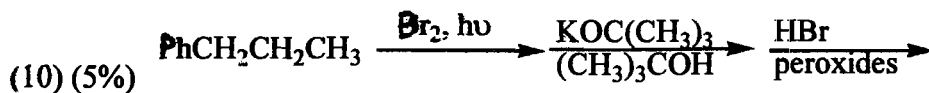
(背面仍有題目,請繼續作答)

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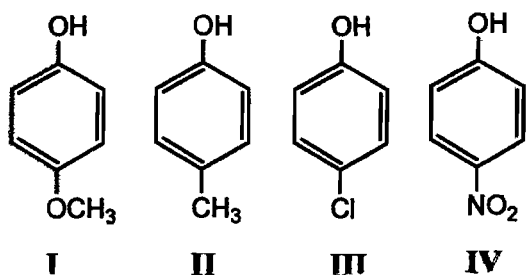
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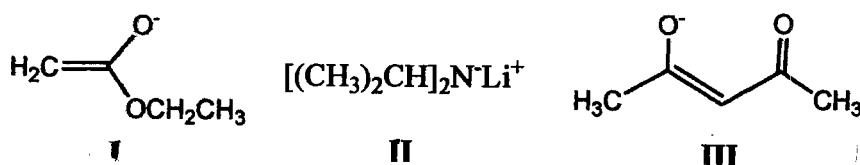
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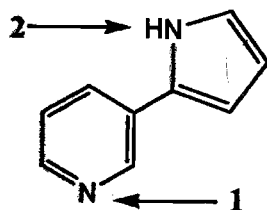
(13) (5%) Rank the compounds in order of increasing acidity



(14) (5%) Rank the compounds in order of increasing basicity (base strength).



(15) (5%) Identify the site of protonation when one equivalent of HCl is added to the



compound.

(16) (5%) The proton NMR of a compound, C8H9ClO, has the following peaks.

Which compound best fits the data?  $\delta$  2.41 (1H, broad singlet),  $\delta$  2.41 (1H, triplet),  $\delta$  3.69 (2H, triplet),  $\delta$  7.02 (2H, doublet),  $\delta$  7.50 (2H, doublet).

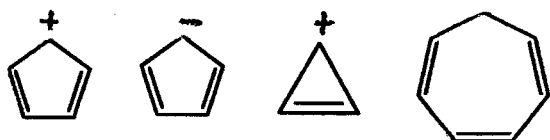
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(17) (5%) Which of the following ions are aromatic species?



(18) (5%) Identify the  $C_4H_9Cl$  isomer given the following proton NMR data:  $\delta$  1.04 (6H, doublet),  $\delta$  1.95 (1H, multiplet)  $\delta$  3.35 (2H, doublet).

B. A short answer question:

(19) (10%) Classify each process (1-10) shown in Figure 1 as:

- (a) spin allowed absorption
- (b) spin forbidden absorption
- (c) fluorescence
- (d) phosphorescence
- (e) internal conversion
- (f) intersystem crossing

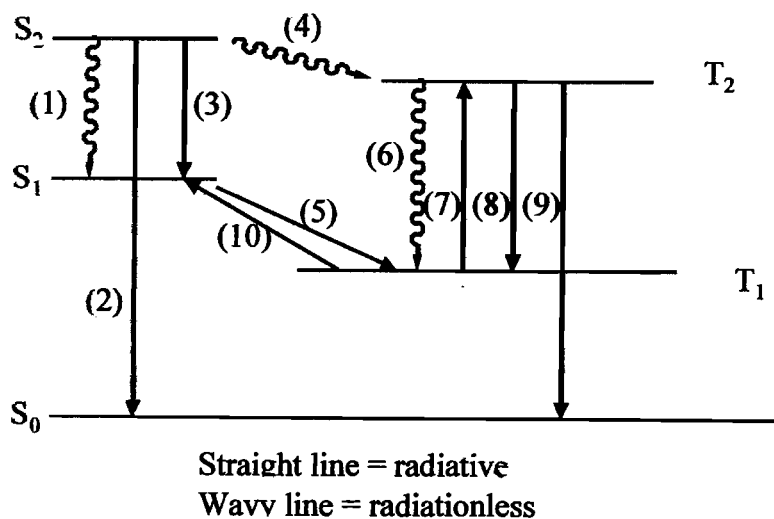


Fig.1. Energy diagram for problem 1.