

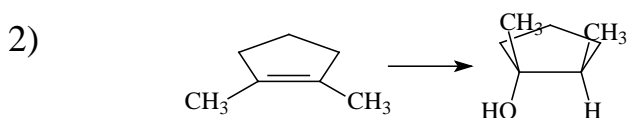
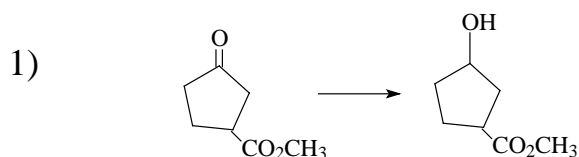
東吳大學 103 學年度碩士班研究生招生考試試題

第 1 頁，共 2 頁

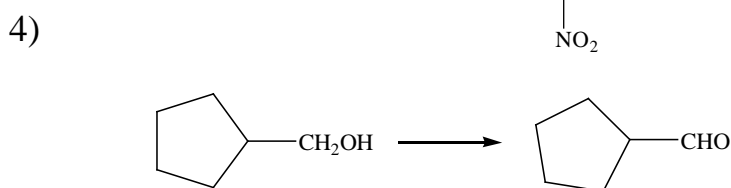
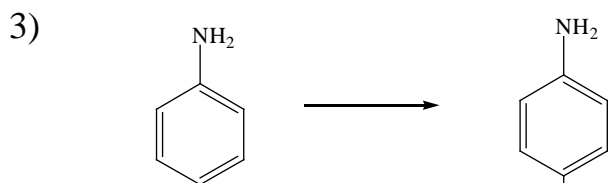
系級	化學系碩士班	考試時間	100 分鐘
科目	有機化學暨無機化學	本科總分	100 分

1. (10%) Rationalize the difference in boiling points for each of the following pairs of substances (2% for each)
 - (a) *n*-pentane 36.2°C and neopentane 9.5°C
 - (b) dimethyl ether -25°C and ethanol 79°C
 - (c) HF 20°C and HCl -85°C
 - (d) *n*-propane -42°C and dimethyl ether -25°C
 - (e) LiCl 1360°C or HCl -85°C
2. (10%) Define the following terms. (a) Pauli-exclusion principle (b) cis-trans isomers of square planar complex (c) resonance (d) nodal plane (e) shielding
3. (10 %) Draw and assign the following molecules to their appropriate point groups. (a) BF₃ (b) CH₄ (c) H₂C=C=CH₂ (d) [AuCl₄]⁻ (e) C₆H₆ (benzene)
4. (10%) The complex [Ni(CN)₄]²⁻ is diamagnetic but [NiCl₄]²⁻ is paramagnetic with two unpaired electrons. Likewise, [Fe(CN)₆]³⁻ has only one unpaired electron, but [Fe(H₂O)₆]³⁺ have five. Explain these experimental observations using valence bond theory, respectively.
5. (10%) Consider the isomers of NNO and NON molecules. Would you expect which one will be more stable? And why?
6. (8%) Give the characteristic IR absorption frequencies for the following functional groups: (a) ROH (b) RCO₂H (c) .RNH₂ (d) benzene
7. (12%) Give the structure for each of the following compounds
 - (a) isobutylalcohol
 - (b) (Z)-1-bromo-2-methyl-2-butene
 - (c) *tert*-butylbromide
 - (d) *cis*-1,2-dimethylcyclohexane

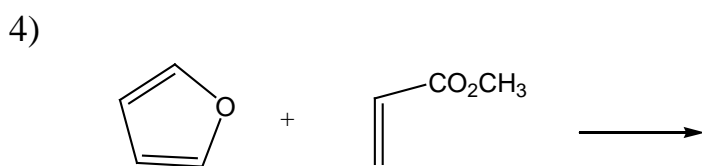
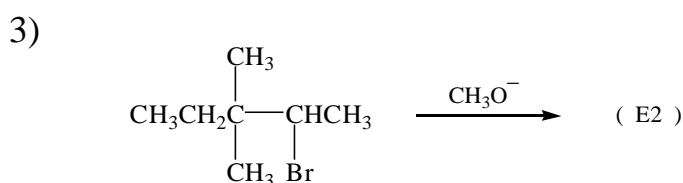
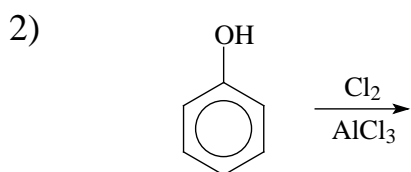
8. (12%) Supply the reagent for each of the following conversions:



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9. (12%) Give the product for each of the following reactions:



10. (6%) Write a reasonable mechanism for the following reaction:

