

東吳大學 102 學年度碩士班研究生招生考試試題

第 1 頁，共 3 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. Write down the English name for each of the following terms: (16%)

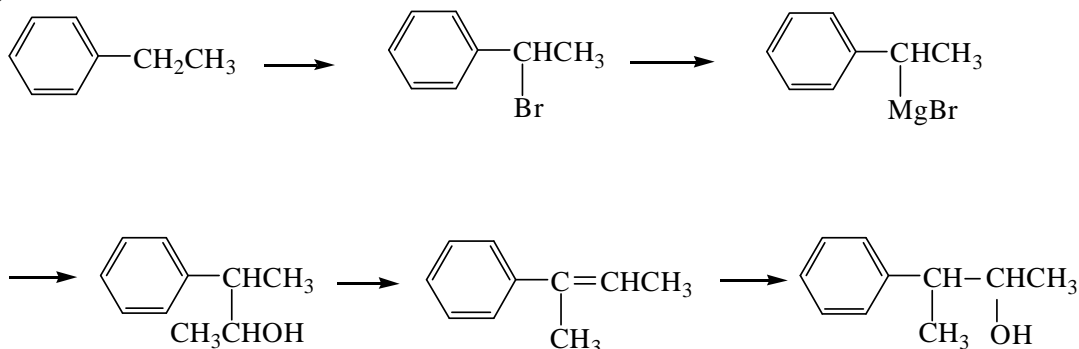
- a) 離子鍵 b) 共價鍵 c) 偶極距 d) 孤對電子
 e) 極性的 f) 自由基 g) 混成 h) 原子軌域

2. Give the structure for each of the following compounds (12%)

- (a) *tert*-pentylchloride
 (b) (E)-1-bromo-2-methyl-2-butene
 (c) isopropylalcohol
 (d) trimethylamine
 (e) *trans*-1,2-dimethylcyclohexane
 (f) isobutene

3. Supply the necessary reagents or give the product for each of the following conversions: (14%)

(a)

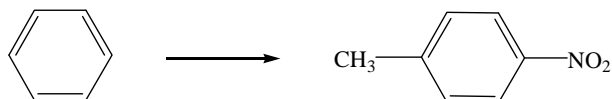


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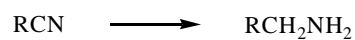
第 2 頁，共 3 頁

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(b)

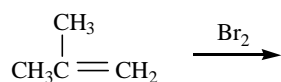


(c)

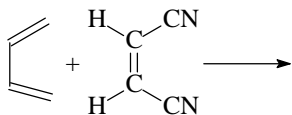


4. Predict the major product for each of the following reactions: (8%)

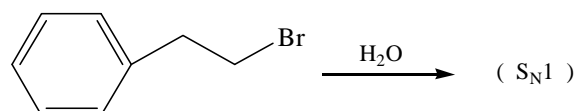
1)



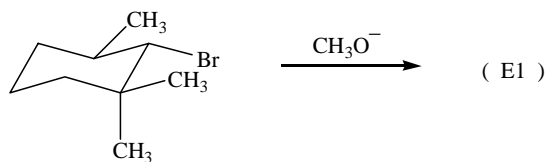
2)



3)



4)



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第 3 頁，共 3 頁

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5. Derive the molecular orbital energy-diagram for C_2 molecule. Calculate the bond orders (B.O.) of C_2^{2+} , C_2^+ , C_2 , C_2^- , C_2^{2-} according to the orbital diagram and compare their bond length and bond dissociation energy (BDE). Which are paramagnetic? or diamagnetic? (10%)
6. Write resonance structures, including formal charges, for SCN^- , NO_3^- and NO_2 . (10%)
7. Draw and assign the following molecules to their appropriate point groups. (a) PF_5 (b) SF_4 (c) SF_6 (d) $[PtCl_4]^{2-}$ (e) BeF_2 (10 %)
8. (a) Explain why $[Cu(NH_3)_4]^+$ is a completely colorless complex, but its sister complex, $[Cu(NH_3)_4]^{2+}$, is intensely blue. (b) The C–O bond strength decrease in the order of $[Mn(CO)_6]^+ > [Cr(CO)_6] > [V(CO)_6]^- > [Ti(CO)_6]^{2-}$. Explain. (10%)
9. Present qualitative crystal field splitting patterns for five d orbitals for the following symmetries: (a) trigonal, (b) square planar (c) square pyramidal (d) trigonal bipyramidal (e) trigonal prismatic. (10 %)