

# 國立嘉義大學九十五學年度

## 應用化學系碩士班招生考試(甲組)試題

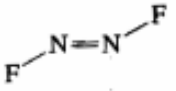
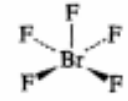
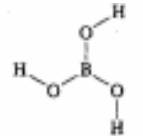
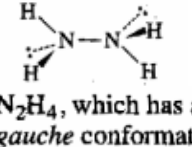
### 科目：綜合化學-I

#### I. Inorganic Chemistry

1. Arrange the order by putting “>” or “<” between the following molecules :  
(8% , 2% each)

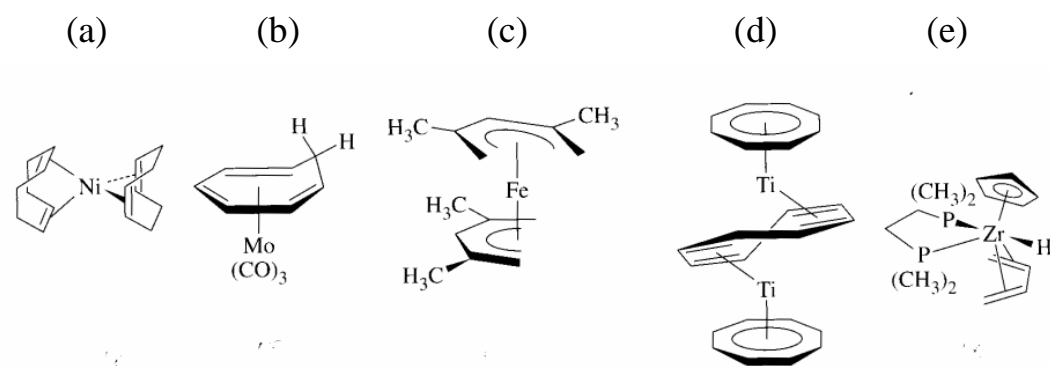
- (a)  $\text{SbCl}_3$      $\text{SbBr}_3$      $\text{SbI}_3$  ( halogen-Sb-halogen angle)  
 (b)  $\text{PI}_3$      $\text{AsI}_3$      $\text{SbI}_3$  ( I-X-I angle)  
 (c)  $\text{NH}_3$      $\text{N}(\text{CH}_3)_3$      $\text{N}(\text{SiH}_3)_3$  ( R-N-R angle)  
 (d)  $\text{PF}_3$      $\text{PCl}_3$      $\text{PBr}_3$  ( X-P-X angle)

2. Give the point group of the following: (8%)

Molecule	Point Group	Molecule	Point Group
			
			

3. Explain why the octahedral complex (e.g.  $\text{Co}(\text{H}_2\text{O})_6^{+2}$ ) is light color whereas the tetrahedral complex (e.g.  $\text{CoCl}_4^{-2}$ ) is intense color (blue) (6%)

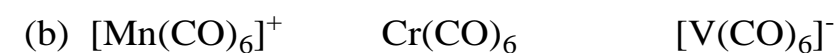
4. Which of the following complex **does not** obey the 18-electron rule? (5%)



(Hint: Cr, Mo, W are the same group.)

(Hint: Ti, Zr, Hf are the same group.)

5. Which of the two complexes has the **lowest** energy of CO stretching frequency in the IR region ? **Give explanations.** ( 9% , 3% each)



6. (a) Reduce the following representations to irreducible representations (3%)

$C_{3v}$	E	$2C_3$	$3\sigma_v$
$\Gamma_1$	6	3	2

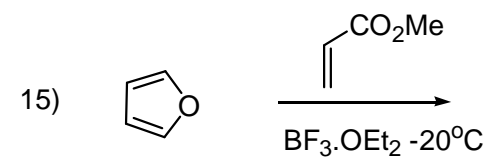
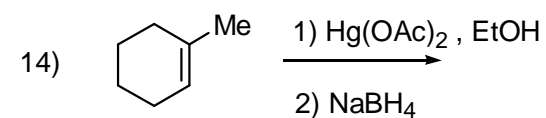
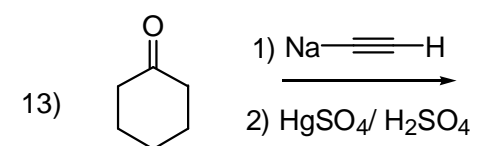
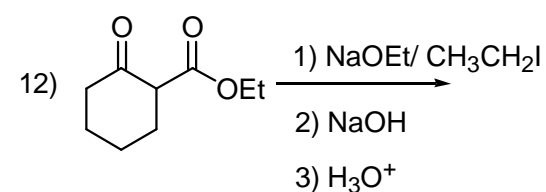
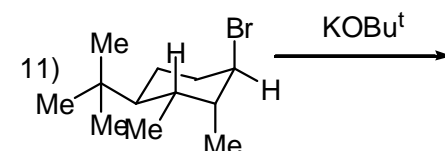
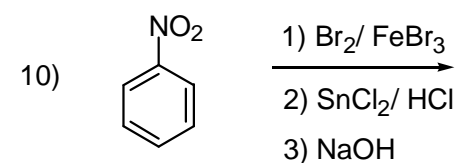
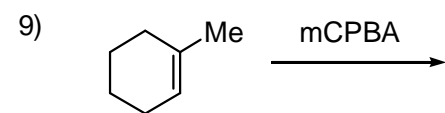
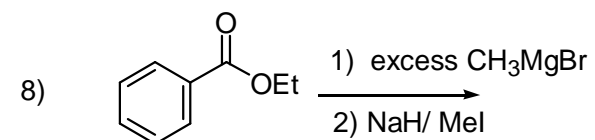
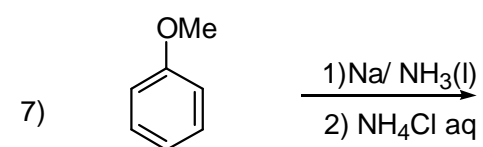
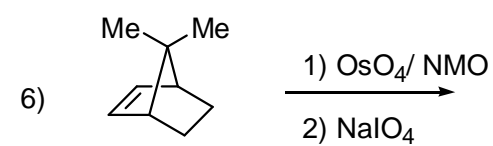
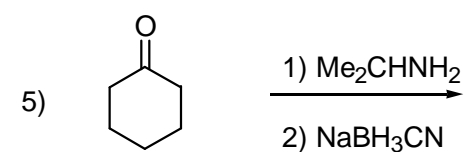
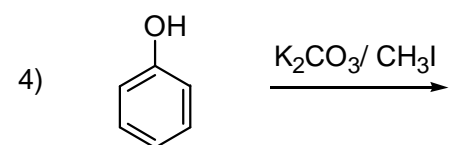
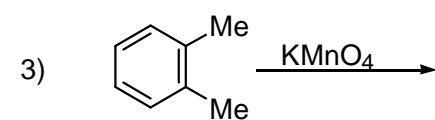
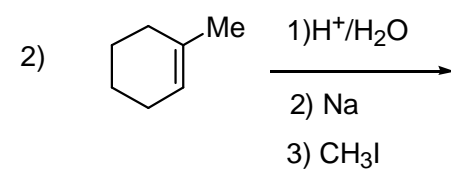
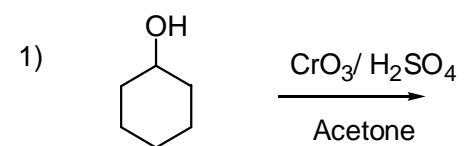
(b) Determine the order of the group. (3%)

(c) Verify that the sum of the squares of the characters multiplied by the number of operations equals the order of the group. (3%)

7. In aqueous solution, hydrazine is a weaker or stronger base than ammonia? Why? (5%)

## II. Organic chemistry

1. Please complete the following reactions by giving the major product. (45% , 3% each)



2. Please synthesize the following compound from the giving starting material. (5%)

