

東海大學

TUNG HAI UNIVERSITY

有機化學實驗

# Friedel-Crafts Alkylation of Benzene

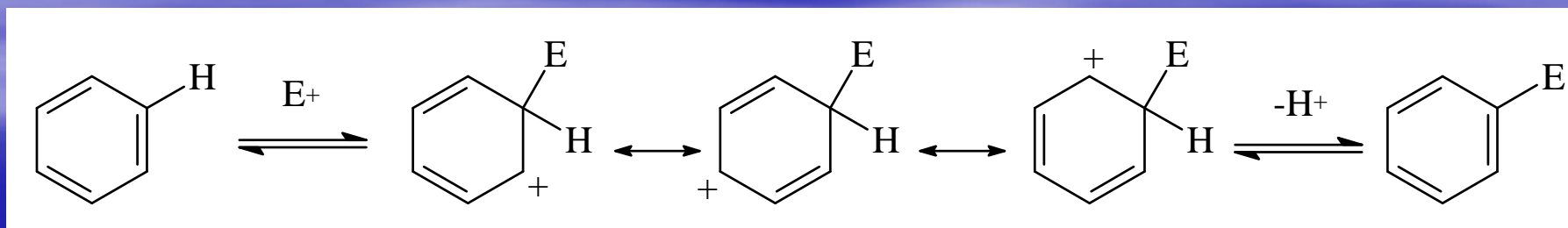
佛瑞德－克來福特烷基化反應

## 1. Nucleophilic substitution $S_N1$ $S_N2$ :

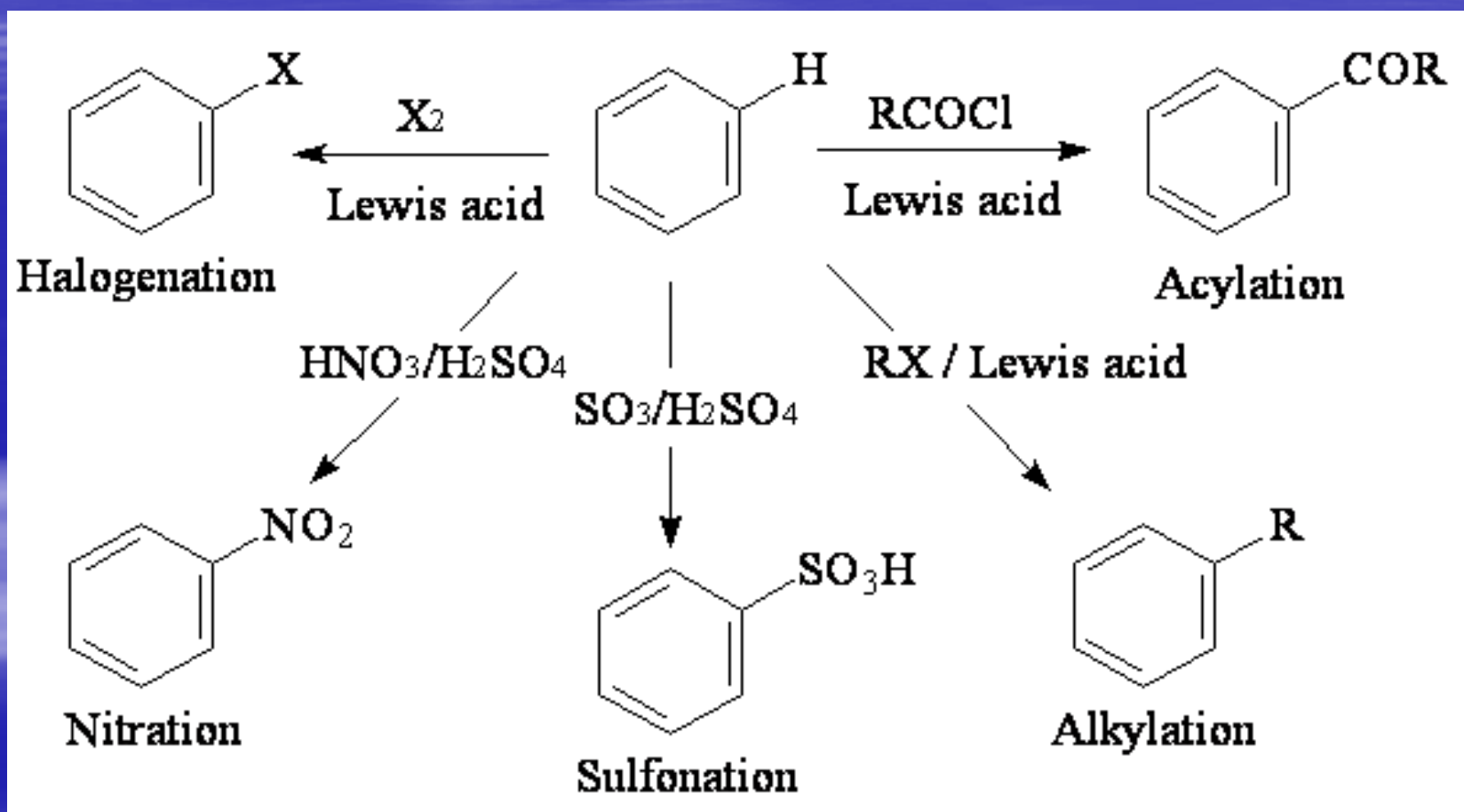


For aromatic system : Electrophilic aromatic substitution

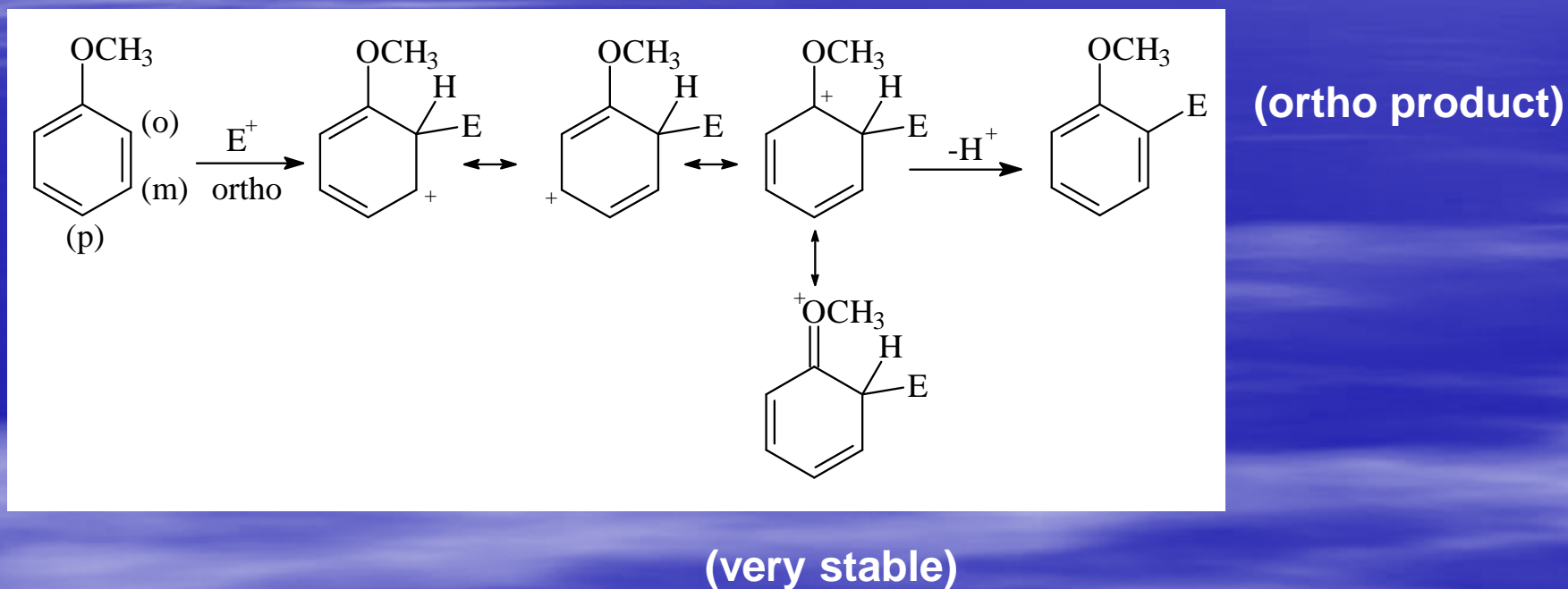
## 2. Mechanism :



## Reactions :



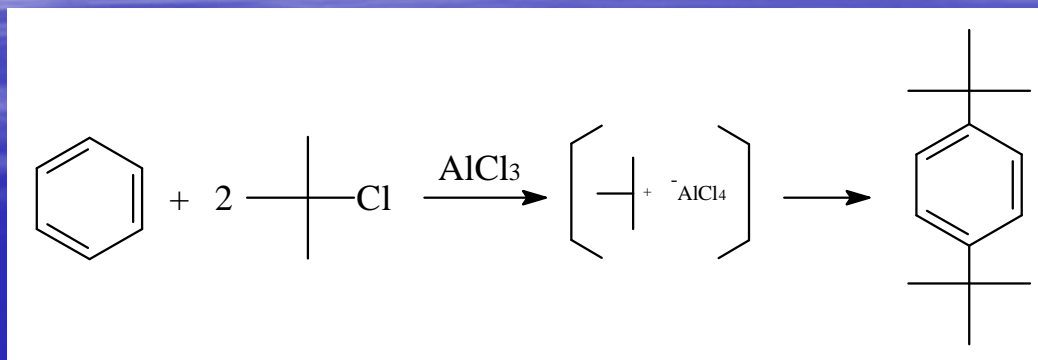
## Regioselectivity :



※ (1) 畫出親電子取代基接在meta和para位置之中間體的所有共振圖形。

(2) 請解釋為何ortho 和para 的產物為主要產物？

Reaction equation:



1mL benzene + 2mL t-butyl chloride  
in 50mL R.B. flask (no water)

↓(ice-water bath)

add 0.2g  $\text{AlCl}_3$  and stir vigorously (in hood)

↓

remove the flask from ice bath and stand for 5 min at r.t.  
(in hood)

↓

add 3mL ice water to the mixture



**transfer the mixture to a separatory funnel**

↓(Add 3mL  $\text{CH}_2\text{Cl}_2$  to wash the flask)

**extract the product with (2mL x 3)  $\text{CH}_2\text{Cl}_2$**



**wash the organic layer with 10mL dist. water**

↓(collect the organic layer)

**dry with  $\text{MgSO}_4(\text{anhy})$**



**filter and collect the filtrate**



**concentration**



- ↓  
**the oily product + 5mL MeOH**
- ↓  
**heat to dissolve (water bath)**
- ↓  
**stand at r.t. until the crystal has produced**
- ↓  
**collect the crystal (wash it with the ice water)**
- ↓  
**suction to dry**
- ↓  
**weight**
- ↓  
**calculate the % yield (result report)**

1. 繳交產物並告知產物淨重。
2. 實驗問題：2, 4