

Organic Chemistry (2nd semester)

Final examination (Friday, June 14th, 2024, 8:00 ~ 10:00)

Name: \_\_\_\_\_ ; Student ID number: \_\_\_\_\_ ; Score: \_\_\_\_\_/350

Part I. 選擇題 (5 pts each, total 110 pts)

1. (E)
2. (B)
3. (B)
4. (C)
5. (BCDE)
6. (ABCE)
7. (D)
8. (B)
9. (A)
10. (A)
11. (D)
12. (C)
13. (E)
14. (A)
15. (B)
16. (C)
17. (E)
18. (A)
19. (C)
20. (B)
21. (C)
22. (A)

## Part II.

(1)  $\text{H}_2\text{SO}_4 / \text{SO}_3$   
 (2)  $\text{HNO}_3 / \text{H}_2\text{SO}_4$   
 (3)  $\text{H}_2\text{O} / \text{H}^+$  (A)

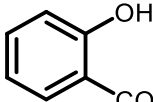
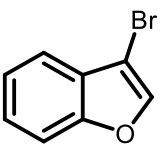
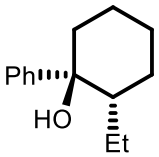
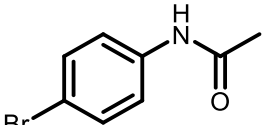
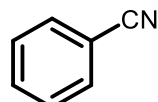
(1)  $(\text{CH}_3\text{CO})_2\text{O}$   
 (2)  $\text{Br}_2 / \text{Fe}$   
 (3)  $\text{OH}^- / \text{H}_2\text{O}$  (B)

(1)  $\text{Br}_2 / \text{Fe}$   
 (2)  $\text{Mg} / \text{Et}_2\text{O}$   
 (3)  $\text{H}_3\text{O}^+$  (C)

(1)  $\text{AlCl}_3$   
 (2)  $\text{HNO}_3 / \text{H}_2\text{SO}_4$   
 (3)  $\text{H}_2 / \text{Pd} / \text{C}$   
 (4)  $\text{Cl}$  (D)

(1)  $\text{HNO}_3 / \text{H}_2\text{SO}_4$   
 (2)  $\text{Br}_2$  (E)

## Part III: (110 pts)

(A)  (B)  (C)  (D)  (E) 

2.

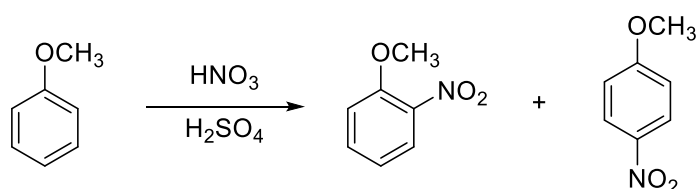
ANS: **BADEFHCG**

3. Give **systematic names** to the following compounds. (4 pts each, total 16 pts)

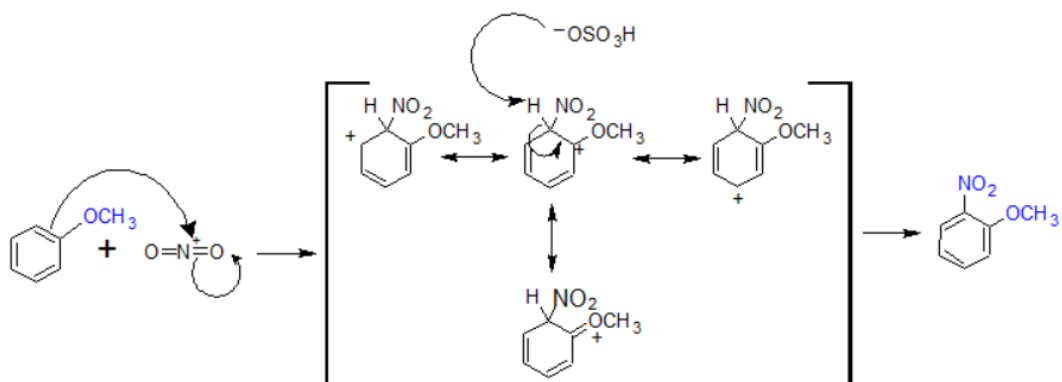
ANS: (a) 3-bromo-4-nitrophenol (b) 3-ethyl-4-iodoaniline (c) 3-bromo-2-chloro-5-methylfuran (d) 2,4-dinitrophenylhydrazine

## Part IV: Mechanism (55 pts)

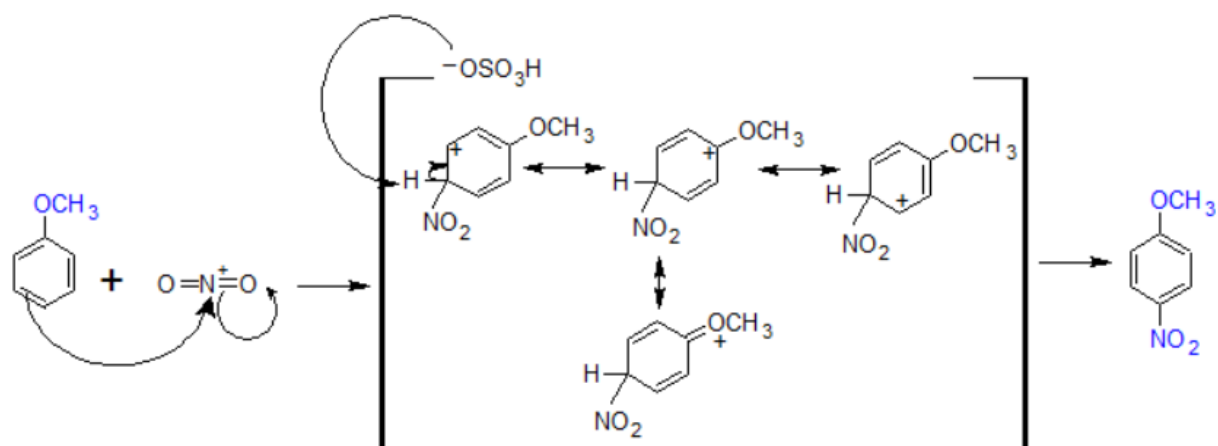
1. Propose a rational mechanism for the nitration to an anisole, Draw the resonance forms of each sigma complex to explain why the reaction undergoes ortho and para attack. (20 points)



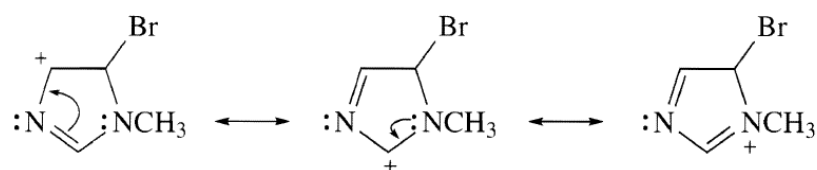
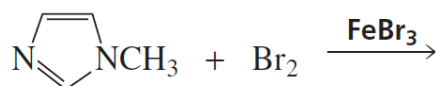
Ans : ortho



para

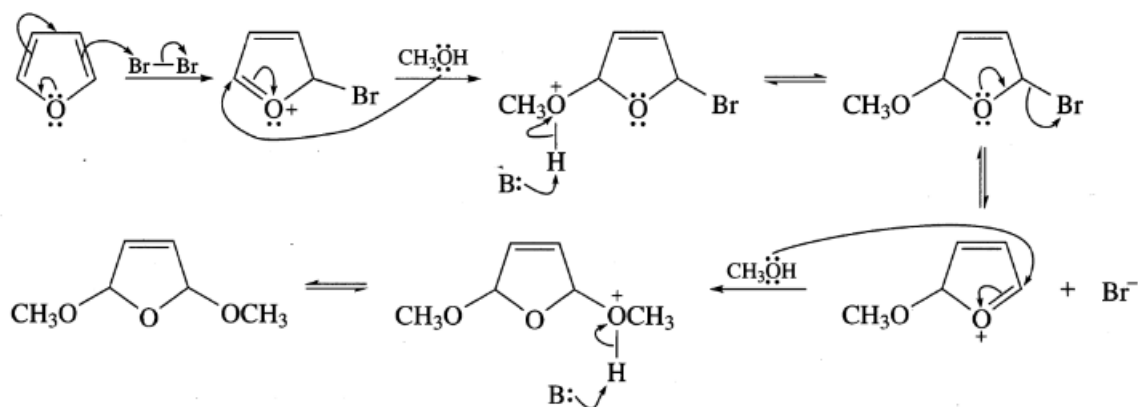
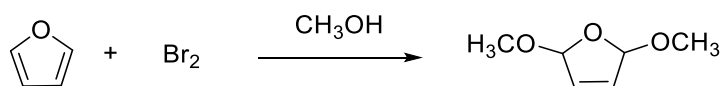


2. Propose a rational mechanism for imidazole to react with bromine and the expected product. Draw the resonance forms of each sigma complex and compare their stabilities. (20 points)



Ans:

3. Propose a reasonable mechanism for the following reaction. (15 point)



Ans: