

# CHEMISTRY 209

60 MINUTES

Final Exam

Family Name \_\_\_\_\_

First Name \_\_\_\_\_

ID Number \_\_\_\_\_

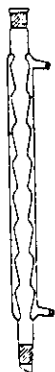
Section \_\_\_\_\_

## Question 1

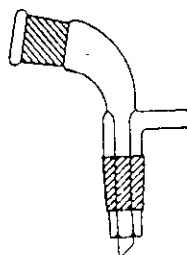
Answer all the parts

I. Label the following glassware: [4 marks]

A



B



II. Make a fluted filter paper [3 marks]

III. Explain which has the greater dipole moment, ortho-nitroaniline or para-nitroaniline. [5 marks]

IV. Draw temperature vs composition curves for non-ideal systems for the following: [10 marks]

ethyl alcohol (78°C) + water (100°C) mixture boiling at 75°C

formic acid (100°C) + water (100°C) mixture boiling at 107°C

Constant boiling mixtures are called \_\_\_\_\_

V. Why should the distilling flask not be filled much more than half-full? [3 marks]

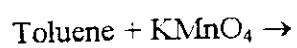
VI. In the synthesis of isoamyl acetate the equilibrium can be pushed to the right (increase the amount of ester) in two different ways. [4 marks]

1.

2.

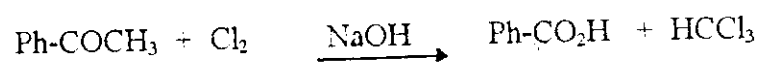
VII. Define a reducing sugar [3marks]

VIII. Give the product of the following reaction [3 marks]



Question 2 [18 marks]

Give the mechanism for the following haloform reaction



Which of the following give benzoic acid:

$\text{PhCCl}_3$

$\text{PhCH}_3$

$\text{CH}_3\text{CH}_2\text{COCH}_3$

$\text{PhCOPh}$

**Question 3 [15 marks]**

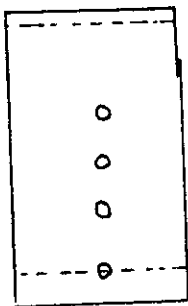
Suggest a detailed mechanism for the Kolbe-Schmitt synthesis of salicylic acid. Can you suggest a reason why the ortho isomer (rather than para) is formed almost exclusively?

Calculate the quantity of salicylic acid that is needed to prepare 1g of aspirin assuming 80% yield.

Question 4[20 marks]

How do you separate a mixture of cyclohexane (bp  $81^{\circ}\text{C}$ ) and cyclohexene (bp  $83^{\circ}\text{C}$ )?

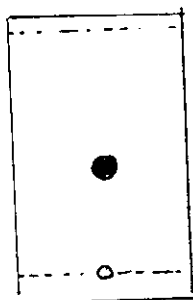
In the dehydration of 3,3-dimethyl-2-butanol the reaction is followed by TLC. The TLC plate looks as shown. Explain what this means and suggest what the products are.



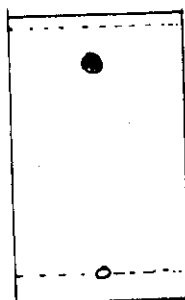
Question 5 [12 marks]

Reaction of salicylic acid with acetic anhydride gives aspirin. The reaction is followed by TLC and the following results are obtained.

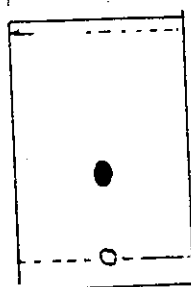
Salicylic acid



Aspirin



Aspirin is recrystallized from ethanol and the following results are obtained by TLC.



Explain what is happening during recrystallization.