

# Chemistry 216

## First Examination

March 11<sup>th</sup>, 2008

Dr. Andrew Karatjas  
(2 hours, 120 points)

### Please check your lab section

Section #	GSI Name
_____ 110	Cherie Netzloff
_____ 111	Vitaly Volberg
_____ 112	Amanda Ward
_____ 113	Aireen Romu
_____ 114	Asako Kubota
_____ 115	Jin Zhang
_____ 116	Christopher Taylor
_____ 117	Aireal Haley
_____ 118	Travis Clark
_____ 119	Sarah Simmons
_____ 120	Devon Riter
_____ 121	Diana Dinh
_____ 122	Michael Asuncion
_____ 123	Yuta Suzuki
_____ 124	Daniel Dawson
_____ 125	Eric Majchrzak
_____ 126	Thomas Slaney
_____ 127	Amberlyn Wands
_____ 128	Peng Song
_____ 129	Megan Beems
_____ 130	Therese Dorau
_____ 131	Joseph Jankolovits
_____ 132	Kaysia Ludford
_____ 310	Brianne Dzwonek
_____ 311	Aireal Haley
_____ 312	Amberlyn Wands
_____ 313	Sarah Simmons
_____ 314	Christopher Taylor
_____ 315	Devayani Bhawe
_____ 316	Jenni Westerhuis
_____ 317	Daniel Dawson
_____ 318	Amanda Ward
_____ 319	Jing Chen
_____ 320	Devon Riter
_____ 321	Diana Dinh
_____ 322	Michael Asuncion
_____ 323	Yuta Suzuki
_____ 324	Eric Majchrzak
_____ 325	Thomas Slaney
_____ 326	Jacob Begres

Name \_\_\_\_\_ **KEY** \_\_\_\_\_

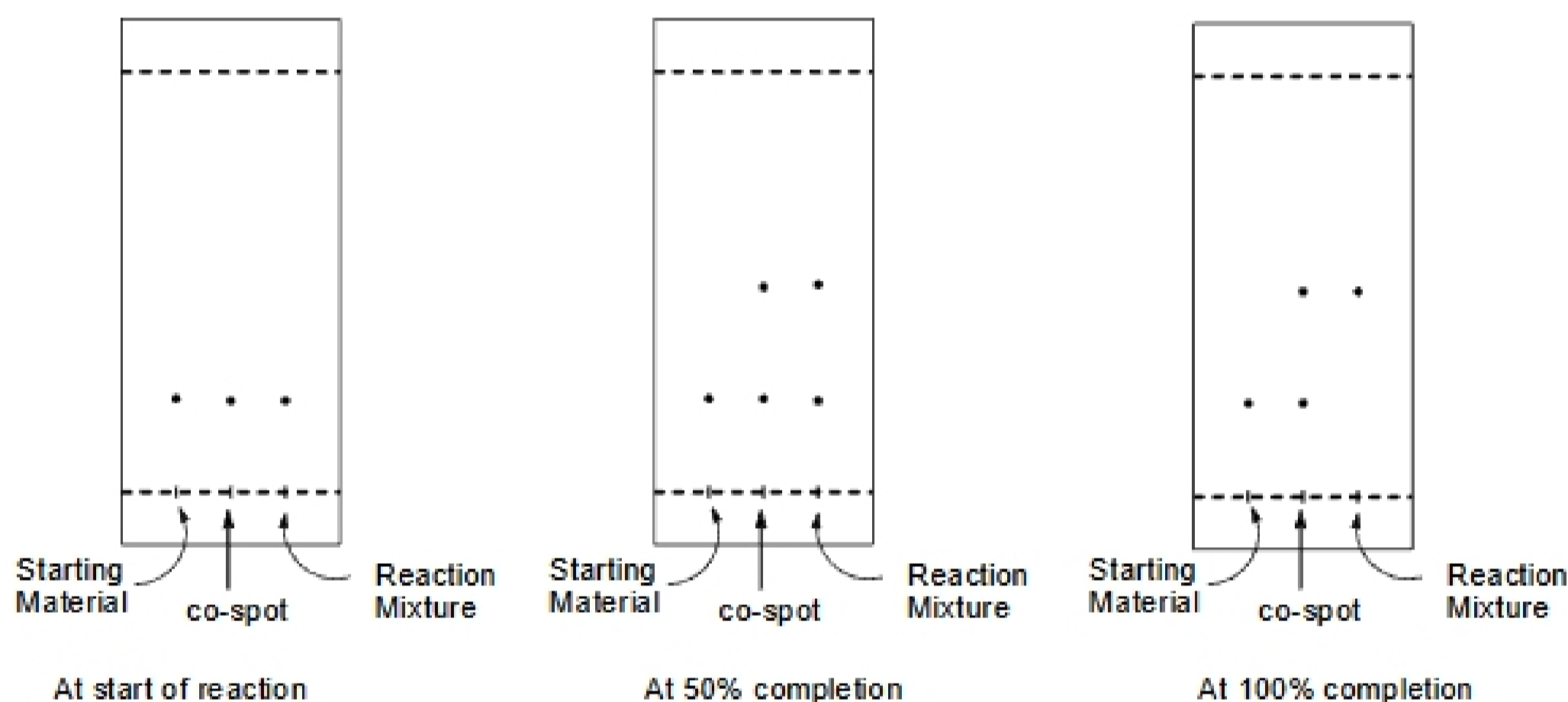
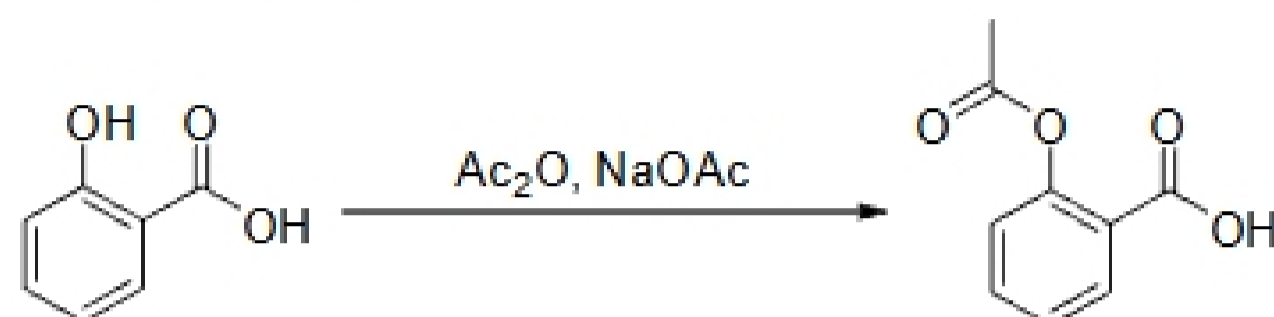
Signature \_\_\_\_\_

Student ID# \_\_\_\_\_

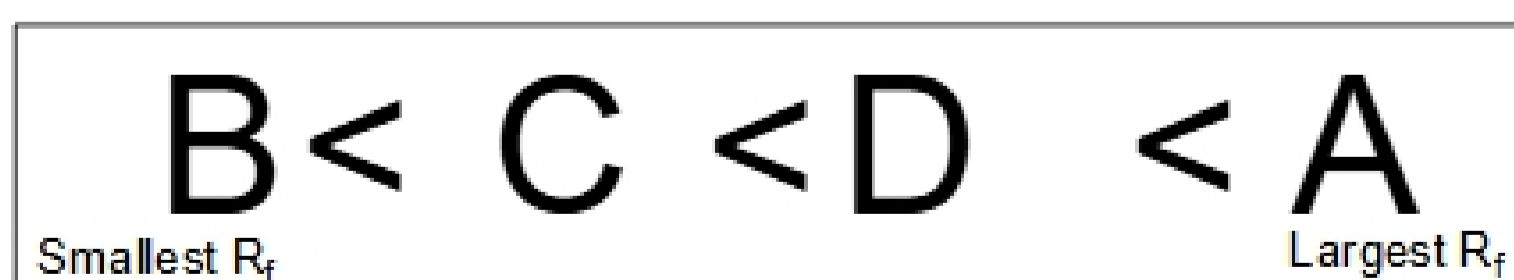
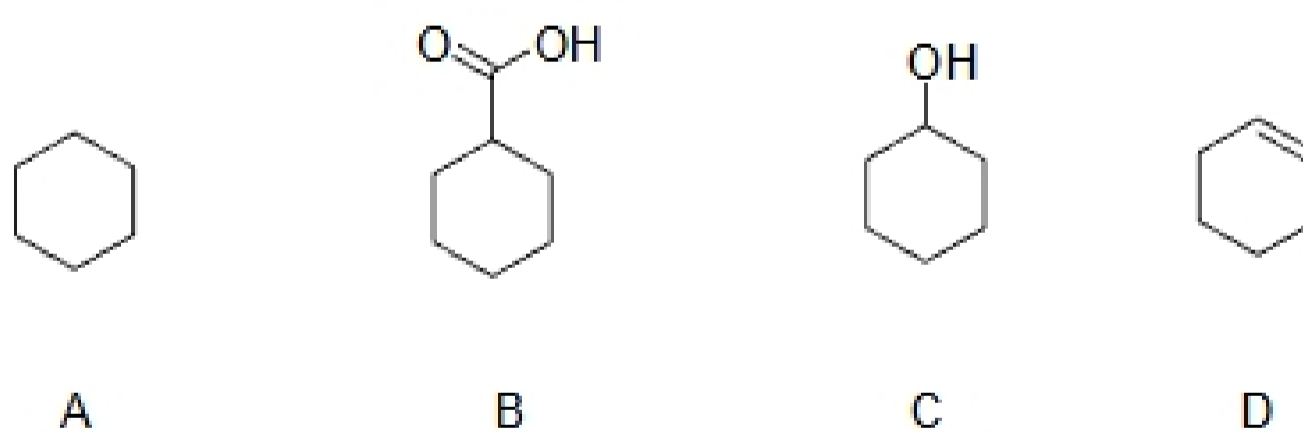
Section #	GSI Name
_____ 327	Aireen Romu
_____ 328	Jinhui Chen
_____ 329	Lindsay Saunders
_____ 410	Vitaly Volberg
_____ 412	Travis Clark
_____ 414	Jing Chen
_____ 417	Peng Song
_____ 419	Ian McLachlan
_____ 420	Therese Dorau
_____ 421	Jessica Lee
_____ 422	Jin Zhang
_____ 423	Kaysia Ludford
_____ 424	Jinhui Chen
_____ 425	Brianne Dzwonek
_____ 426	Shaun Patel
_____ 427	Kristy Bojazi
_____ 428	Devayani Bhawe
_____ 429	Asako Kubota

I	9		
II	7		
III	10		
IV	15		
V	9		
VI	13		
VII	20		
VIII	13		
IX	9		
X	15		
Total	120		

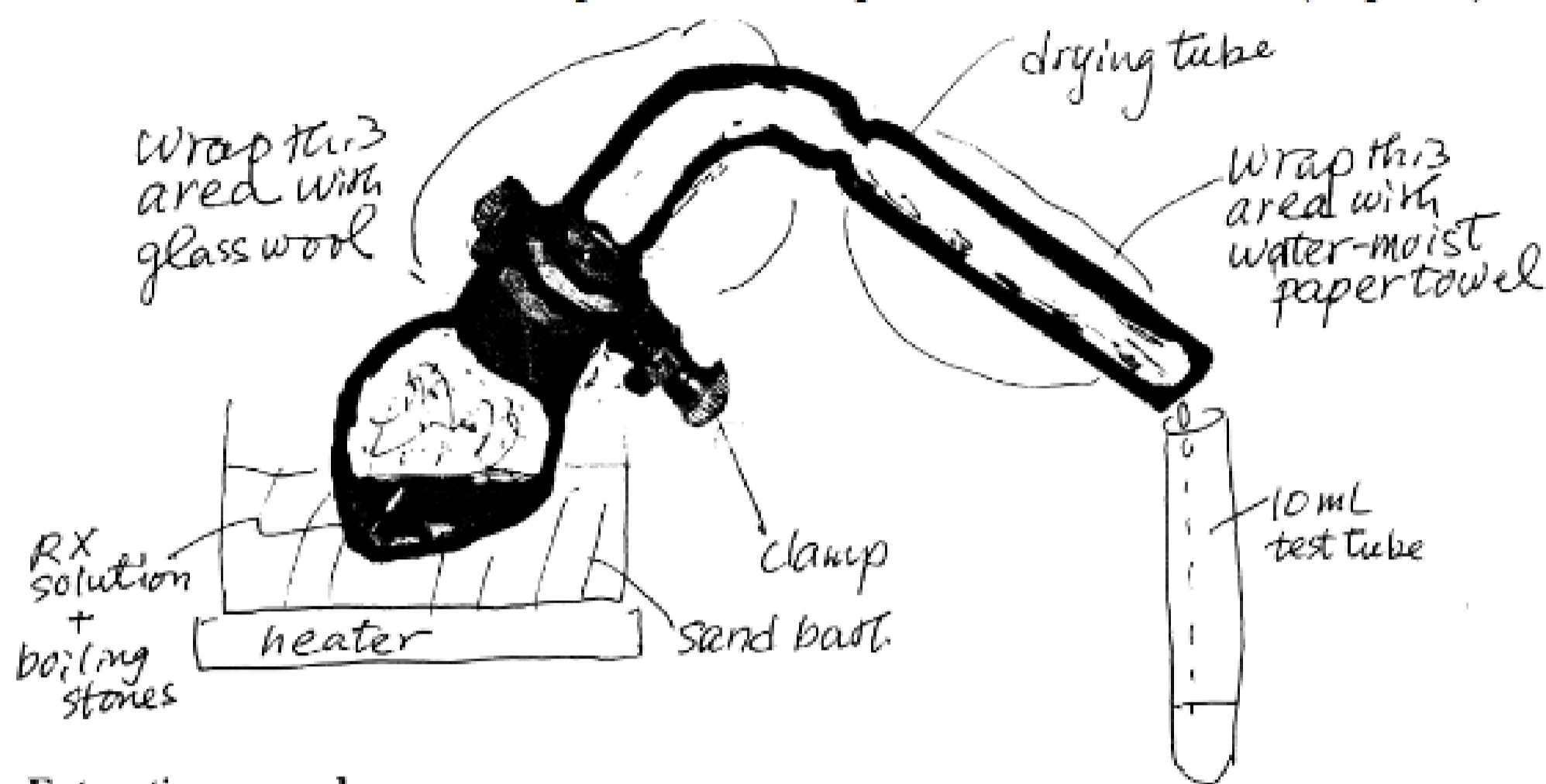
I. One of the more common uses of TLC is monitoring the progress of a reaction. For the reaction drawn below, draw in the spots (after development) on the TLC plate diagrams drawn below. Plate #1: At the start of the reaction. Plate #2: At 50% completion. Plate #3: When the reaction is finished. Each plate should have a lane for starting material, the reaction mixture, and a co-spot. Show only the spots for starting material and product (9 points).



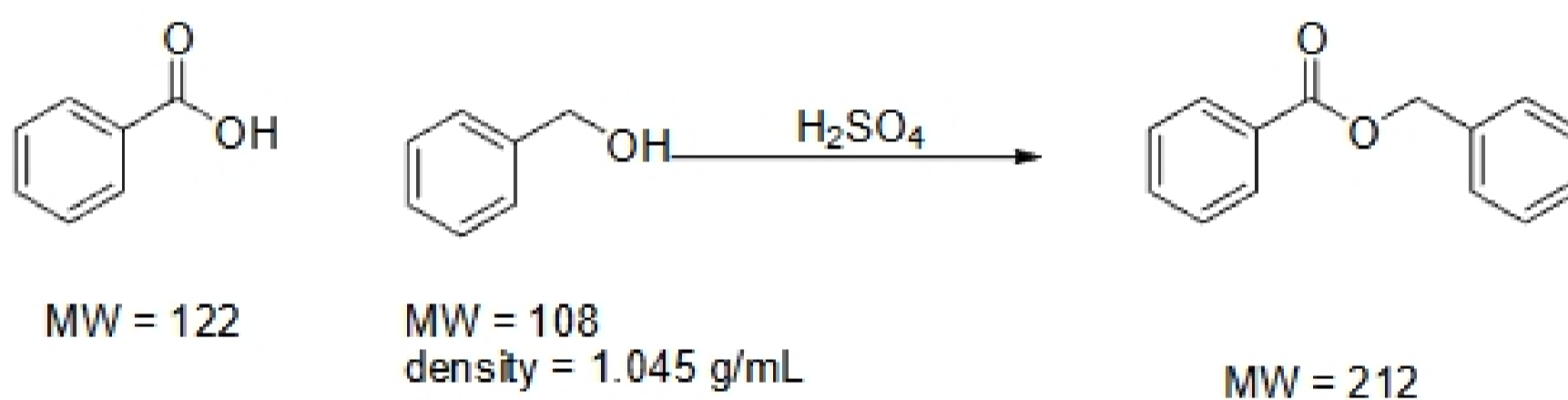
II. Rank the following compounds on the basis on *increasing*  $R_f$ . No partial credit will be given on this question (7 points).



III. Draw and label all of the parts of the setup for a steam distillation (10 points).



IV. For the following esterification reaction, show all work when doing the calculations (15 points).



a. If 2.44 g of benzoic acid, 6.20 mL of benzyl alcohol, and 0.5 mL of sulfuric acid are used, what is the limiting reagent?

Sulfuric acid – catalytic

Benzoic acid –  $2.44 \text{ g} / 122 \text{ g/mol} = 20 \text{ mmol}$  – – – – – **LIMITING REAGENT**

Benzyl alcohol –  $6.20 \text{ mL} * 1.045 \text{ g/mL} = 6.48 \text{ g} / 108 \text{ g/mol} = 60 \text{ mmol}$

b. What is the theoretical yield of this reaction?

$$0.02 \text{ mol} * 212 \text{ g/mol} = 4.24 \text{ g}$$

c. From this reaction, 2.00 g of product was recovered. What is the percent yield of this reaction?

$$= 2.00 \text{ g} / 4.24 \text{ g} * 100 = 47\%$$