

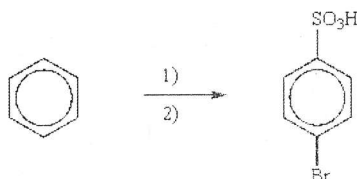
Name: ANSWER KEY

Exam 3, May 1, 2013

CHEM 226-Elementary Organic Chemistry
SUNY ONEONTA
Spring 2013

Attempt all questions within the spaces provided showing your steps clearly for partial credit. Enter your answers for questions 11-23 in the table provided on page 2

1. Which reagents would be best for reaction sequence to synthesize p-bromobenzenesulfonic acid from benzene?



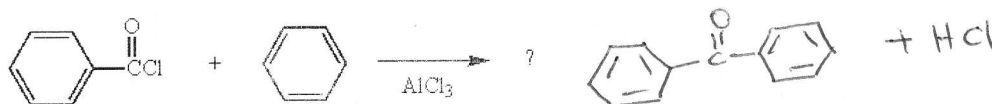
1. $\text{Br}_2, \text{FeBr}_3$

2. $\text{SO}_3, \text{H}_2\text{SO}_4$

(8)

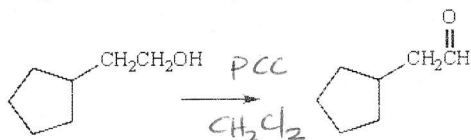
These rxns have to be done in correct order.

2. Draw the structure of the compound produced from the following reaction?



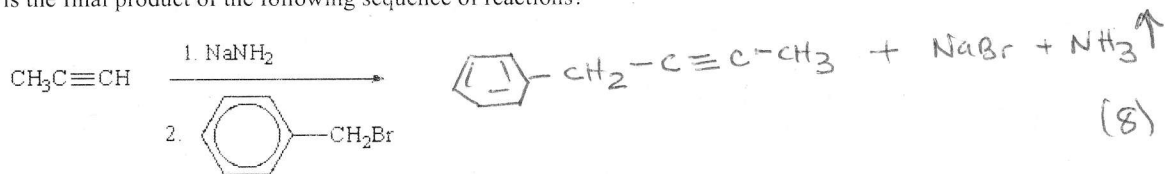
(4)

3. What reagents would accomplish the following transformation?



(4)

4. What is the final product of the following sequence of reactions?



(8)

5. What is the structure and name of the compound formed when isopropyl alcohol is treated with Jones' reagent?



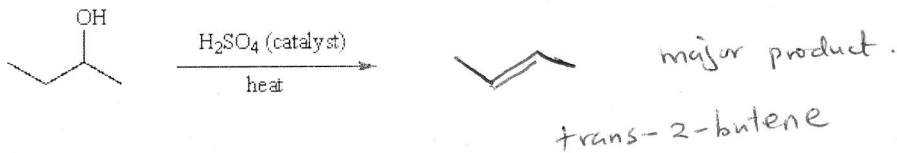
(4)

6. What is the K_a of phenol if its $\text{p}K_a$ is 9.95?

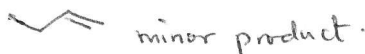
$$K_a = 10^{-\text{p}K_a} = 10^{-9.95} = 1.122 \times 10^{-10}$$

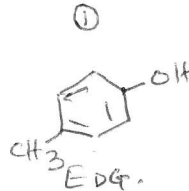
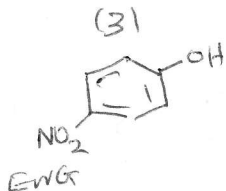
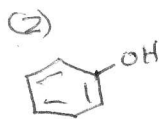
(4)

7. Draw the major product of the following acid catalyzed dehydration reaction?



(4)





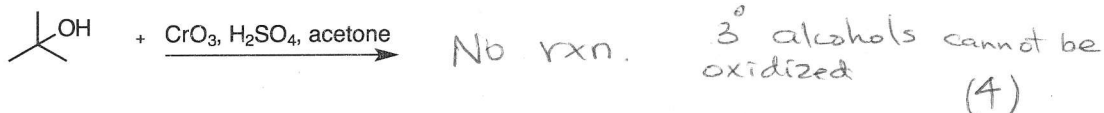
8. Arrange the following compounds in order of increasing acidity; phenol, *p*-nitrophenol and *p*-methylphenol

p-Methylphenol < phenol < *p*-nitrophenol (4)

9. Arrange the following compounds in order of increasing boiling points; dimethyl ether CH₃OCH₃ (MW= 46), ethanol CH₃CH₂OH (MW= 46), and propane CH₃CH₂CH₃ (MW = 44).

propane < dimethyl ether < Ethanol. (4)

10. Draw the product of the following reaction



11. Which bromide will react fastest in S_N2 reactions?

- A) CH₃Br
B) (CH₃)₂CHBr
C) (CH₃)₃CBr
D) (CH₃)₃CCH₂Br
E) CH₃CH₂Br

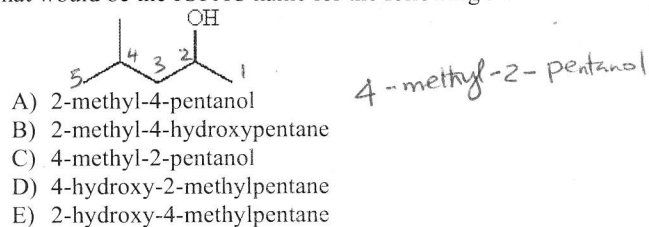
12. A Lewis base is a:

- A) proton donor
B) electron pair donor
C) electron pair acceptor
D) proton acceptor

13. Phenols are stronger acids than alcohols because of the

- A) resonance stabilization of phenoxide ions.
B) resonance stabilization of phenols.
C) resonance stabilization of alkoxide ions.
D) resonance stabilization of alcohols.
E) hydrogen bonding in phenols.

14. What would be the IUPAC name for the following alcohol?



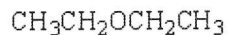
11	12	13	14	15	16	17	18	19	20	21	22	23
A	B	A	C	D	A	B	B	B	A	E	B	A

Section 1 = 48
Section 2 = 52
Total 100

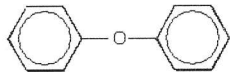
Total score _____

15. Which of the following molecules is the correct structure for dibenzyl ether?

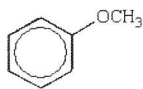
A)



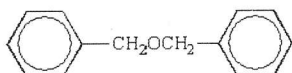
B)



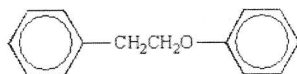
C)



D)



E)



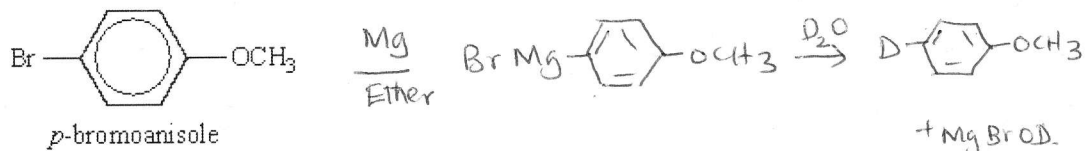
16. Which of the following is a Grignard reagent?

- A) CH_3MgCl
- B) CH_3Li
- C) $(\text{CH}_3)_2\text{CuLi}$
- D) CH_3Na
- E) $(\text{CH}_3)_2\text{Zn}$

17. Which reaction will yield $\text{CH}_3\text{CH}_2\text{CH}_2\text{D}$?

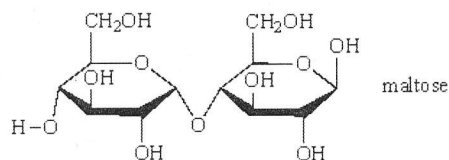
- A) $\text{CH}_3\text{CH}_2\text{CH}_3 + \text{D}_2\text{O}$
- B) $\text{CH}_3\text{CH}_2\text{CH}_2\text{MgBr} + \text{D}_2\text{O}$
- C) $\text{CH}_3\text{CH}_2\text{CH}_2\text{OLi} + \text{D}_2\text{O}$
- D) $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH} + \text{D}_2\text{O}$
- E) more than one of these

18. Starting with *p*-bromoanisole (*p*-bromophenyl methyl ether), what sequence of reactions will produce *p*-deuterioanisole?



- A) 1. D_2O 2. $\text{Br}_2, \text{AlBr}_3$
- B) 1. Mg , ether 2. D_2O
- C) 1. D_2O 2. Mg , ether
- D) 1. $\text{H}_2\text{SO}_4, \text{D}$ 2. Mg , ether 3. D_2O
- E) 1. $\text{Br}_2, \text{AlBr}_3$, 2. Mg , ether, 3. D_2O

19. Hydrolysis of the disaccharide maltose produces:

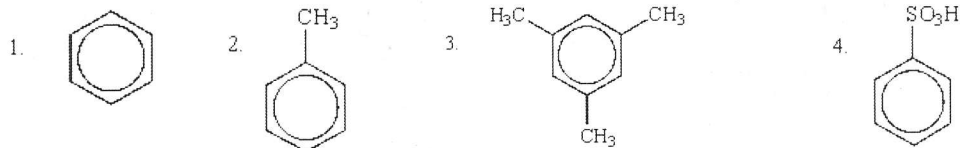


- A) sucrose
- B) glucose
- C) mannose
- D) glucose and fructose
- E) glucose and galactose

20. Hydrolysis of lactose gives:

- A) glucose and galactose
- B) glucose and fructose
- C) mannose and fructose
- D) galactose and fructose
- E) allose and mannose

21. The relative rates of nitration of the following are:



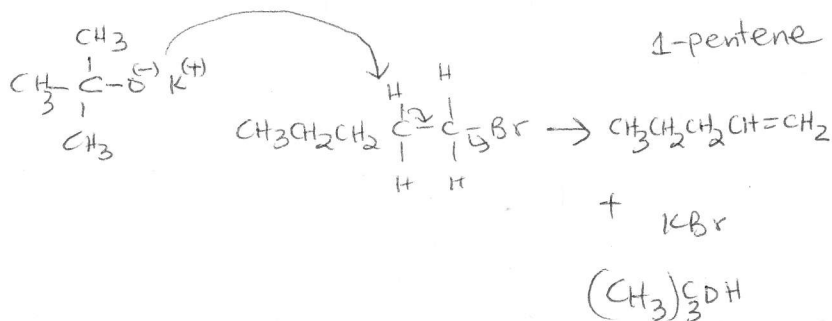
- A) $1 > 2 > 3 > 4$
- B) $4 > 2 > 1 > 3$
- C) $2 > 1 > 4 > 3$
- D) $3 > 4 > 2 > 1$
- E) $3 > 2 > 1 > 4$

22. Which of the following groups is a *meta* director?

- A) $-\text{Cl}$
- B) $-\text{COOH}$ \rightarrow EWG (m-director)
- C) $-\text{OCH}_3$
- D) $-\text{OH}$
- E) $-\text{NH}_2$

23. When 1-bromopentane is reacted with the bulky base, potassium *tert*-butoxide, in *tert*-butyl alcohol, the major elimination product is:

- A) 1-pentene
- B) *cis*-2-pentene
- C) *trans*-2-pentene
- D) butyl *tert*-butyl ether
- E) butyl alcohol



Good Luck