Last

First

MI

Chemistry 234 Exam 2 (Blue)

Summer 2018

Dr. J. Osbourn

Instructions: The first 14 questions of this exam should be answered on the provided Scantron. You must use a pencil for filling in the Scantron sheet. Ensure all erasures are complete. Any questions left blank will be marked incorrect. Answer the remaining questions on the exam itself. Show all work and provide complete explanations.

Please write your name on:

- The first page (Exam Cover Page)
- The second page (Grading Page)
- The Scantron Sheet Circle your Last Name

Please bubble in your WVU Student ID Number on your Scantron sheet.



The Periodic Table

	58	59	60	61	62	63	64	65	66	67	68	69	70	71
*	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
	140.1	140.9	144.2	(145)	150.4	152.0	157.3	158.9	162.5	164.9	167.3	168.9	173.0	175.0
	90	91	92	93	94	95	96	97	98	99	100	101	102	103
^	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr
	232.0	(231)	238.0	(237)	(244)	(243)	(247)	(247)	(251)	(252)	(257)	(258)	(259)	(260)

Diazonium Ion Displacement Reactions

$$\begin{array}{c} \stackrel{\oplus}{\operatorname{Ar}-\operatorname{N}\equiv\operatorname{N}}\\ \operatorname{Cl}^{\ominus} \end{array} + \begin{array}{c} \operatorname{H}_2\operatorname{O} \longrightarrow \operatorname{Ar}-\operatorname{OH} & \operatorname{CuCN} \longrightarrow \operatorname{Ar}-\operatorname{CN} \\ \operatorname{CuNO}_2 \longrightarrow \operatorname{Ar}-\operatorname{NO}_2 & \operatorname{H}_3\operatorname{PO}_2 \longrightarrow \operatorname{Ar}-\operatorname{H} \\ \operatorname{CuBr} \longrightarrow \operatorname{Ar}-\operatorname{Br} & \operatorname{CuCl} \longrightarrow \operatorname{Ar}-\operatorname{Cl} \\ \operatorname{Kl} \longrightarrow \operatorname{Ar}-\operatorname{I} & \operatorname{HBF}_4 \longrightarrow \operatorname{Ar}-\operatorname{F} \end{array}$$

Name:

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Grading Page (Exam 2):

Page	Points Possible	Points Earned			
Multiple Choice (3-5)	28				
6	21				
7	31				
8	20				
TOTAL	100				

Multiple-Choice

Choose the best answer for each of the following questions. Record each answer on your Scantron sheet. Additionally, circle/write each answer on your exam. (2 points each)

1. Which of the following reagents can successfully carry out the transformation shown below. <u>*Bubble</u>* <u>*in the letters for all that apply.*</u></u>



2. If the following molecule is subjected to a sodium borohydride reduction, which functional group would get reduced?



3. Which of the following correctly has the molecules ranked from lowest boiling point to highest boiling point?



4. Select the appropriate reagent to accomplish the following transformation.



5. What is the major product of the following reaction?



6. Which of the following molecules do you expect to be water soluble? <u>Bubble in the letters for all</u> <u>that apply!</u>



7. Which one of the following is the least stable?



8. What is the common name for the molecule shown below?



- a. tert-butyl ether
- b. tert-butyl propyl ether
- c. ethyl tert-butyl ether
- d. ethyl isopropyl ether
- e. none of the above
- 9. Which reaction below would require the use of a protecting group to be carried out successfully?





- d. All of these reactions require a protecting group
- e. None of these reactions require a protecting group

10. What is/are the major product(s) for the following reaction. *Bubble in the letters for all that apply.*



11. Which of the following compounds can be further oxidized by H_2CrO_4 ? <u>Bubble in the letters for all</u> <u>that apply.</u>



12. What is/are the major product(s) for the following reaction. *Bubble in the letters for all that apply.*



13. Which one of the following compounds is the most acidic?



14. Which one of the following is the least reactive?



Completion Section: Answer the remaining questions on the exam itself. Read the questions carefully and provide complete explanations.

15. Provide the IUPAC name for each compound shown below. (3 points each)



16. Draw a representative structure for each of the following. (1 point each)



18. Design a reasonable synthesis for the para-disubstituted benzene shown below starting with aniline. Your synthesis should be free of undesired isomers. *(5 points)*



19. Predict the major organic product(s) for each reaction below. <u>Show stereochemistry in reaction b</u>. (2 points each)



20. Show the complete electron pushing mechanism for the following reaction. (5 points)



21. The following reaction does not proceed as written. Explain the problem and provide a suitable synthetic alternative to prepare the desired product from the given starting material. (4 points)



22. Predict the product and provide the complete electron pushing mechanism for the following reaction. (5 points)

H₃C-MgBr
$$\frac{1. \text{CO}_2}{2. \text{Ph}_Br}$$

23. Provide the best set of starting materials to prepare the following ether via the Williamson Ether Synthesis. *(3 points)*



24. Provide the missing reagents for each transformation shown below. (8 points)



25. Show the complete electron pushing mechanism for the following reaction. (4 points)



26. **Bonus**: Provide the missing reagents. (+3 points)

