

Chemistry 2542, Summer Session

Sample Final Exam

This exam has 6 problems (200 pts) on 8 pages. Make sure your copy is complete and correct.

Printed Name (Last, First) _____

Your final grades will be available this afternoon

Good Luck!

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Chemistry 2542
Final Exam

This exam has 6 problems on 8 pages. Make sure your copy is complete and correct.

Printed Name (Last, First) _____

Scores:

1. _____

2. _____

3. _____

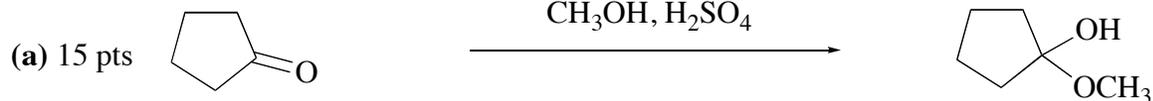
4. _____

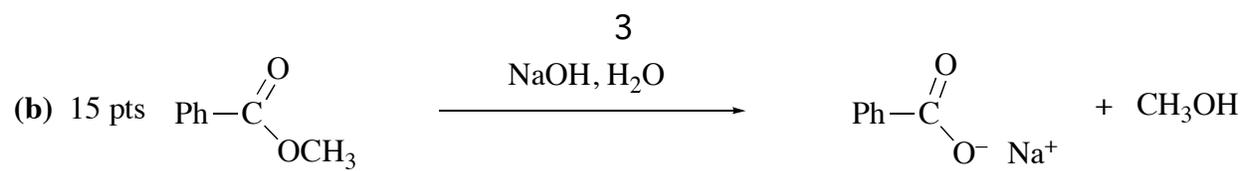
5. _____

6. _____

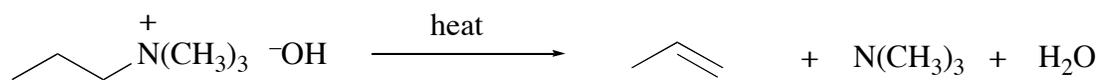
Total: _____

1. (45) Using **curved arrows** and showing the structure of the **intermediates**, write **mechanisms** that account for the products in the following reactions:

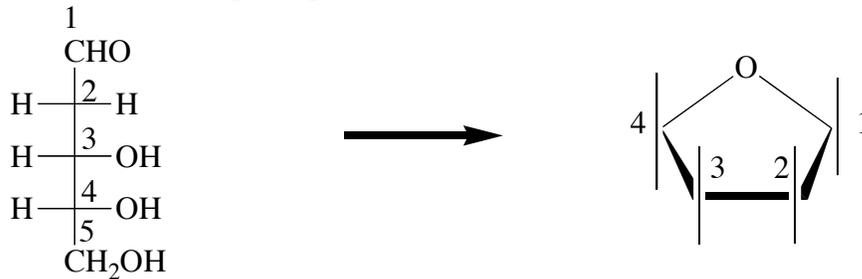




(c) 15 pts



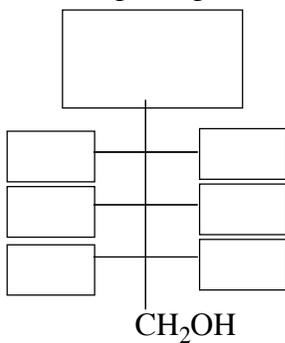
2. (15) (a) Finish drawing of the Haworth projection formula of 2-Deoxy-D-ribose in the form of β -D-furanose (β -2-Deoxy-D-ribofuranose). [make sure to place **all** missing -H and -OH groups at the end of each bond!] (8 pts; 2 pts each carbon atom)



β -2-Deoxy-D-ribose

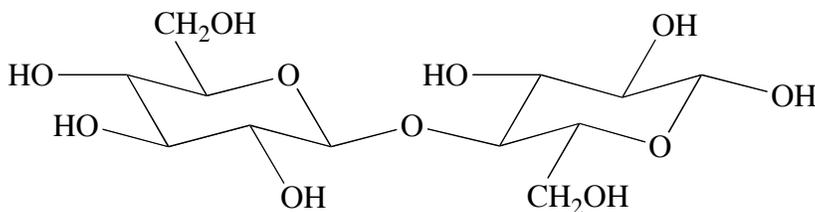
β -2-Deoxy-D-ribofuranose

(b) Finish drawing of Fischer projection of 2-Deoxy-L-ribose (7 pts; 1 pt each box):



2-Deoxy-L-ribose

3. (9) The structure shown below is cellobiose, the product of the hydrolysis of cellulose:



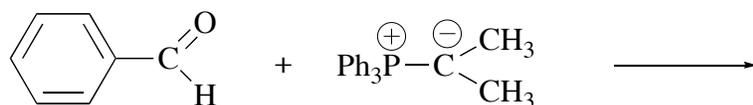
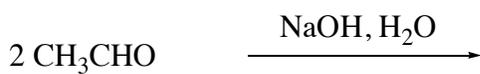
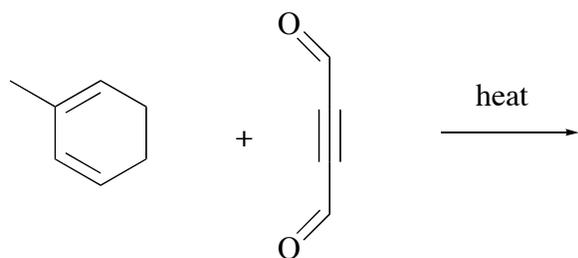
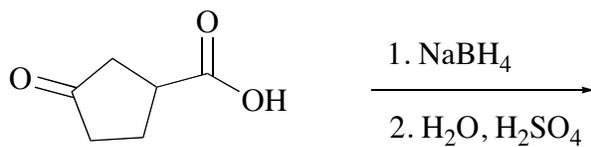
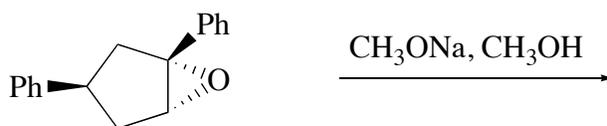
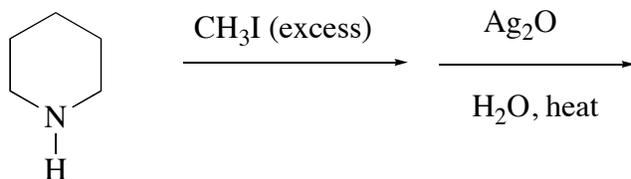
(a) (5) Using an arrow symbol (--->) show the **glycosidic** linkage in this disaccharide. What type of glycosidic linkage is it?

Answer _____

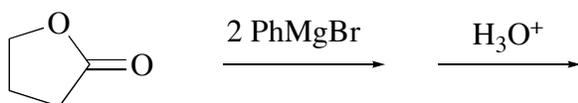
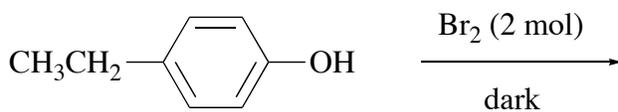
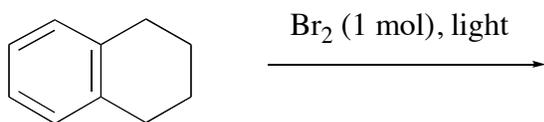
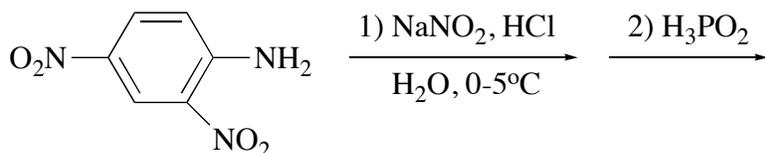
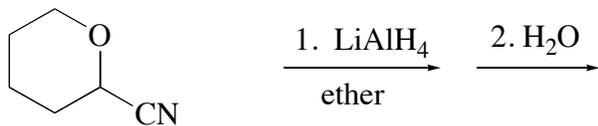
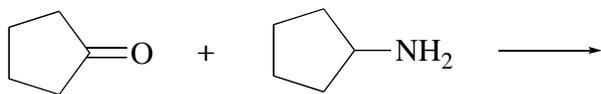
(b) (4) Is cellobiose a **reducing** sugar or not?

Answer _____

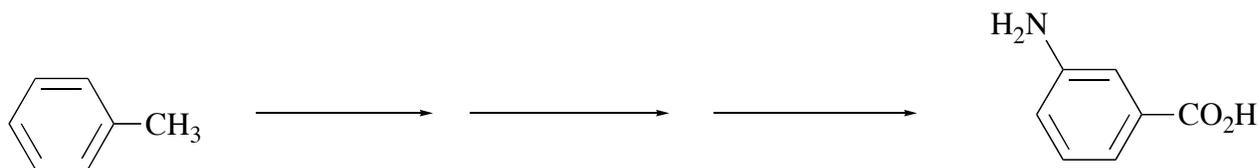
4. (52) Complete the following equations by drawing structures of the **major** product(s) expected in each reaction (4 pts each).



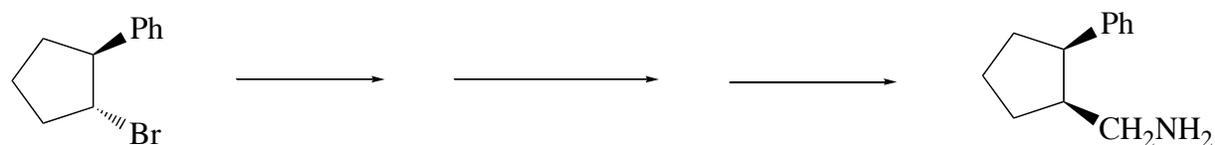
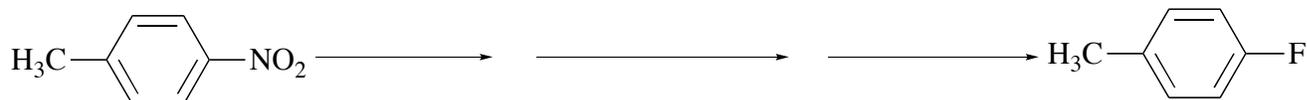
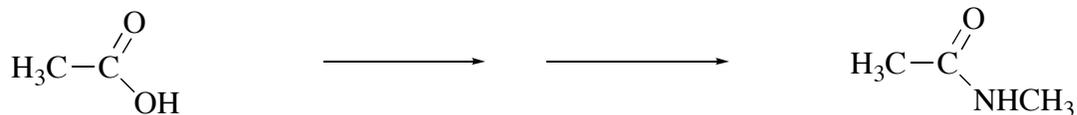
6



5. (39) Give the **reagents on the arrow** that can be used to convert the reactant to the indicated product in high yield (3 pts each reagent).



7



6. (40, 5 pts each) For each of the following questions (a)-(h) **circle** the item that is the correct answer.

(a) Which of the following compounds has the highest **acidity**?

water phenol ammonia ethanol benzene ethylamine sodium benzoate aniline

(b) Which of the following compounds is the strongest **base**?

aniline methane methanol *o*-ethylphenol phenol *p*-ethylaniline methylamine

(c) Which one of the following compounds is the **most reactive** in the **Electrophilic Aromatic Substitution** reaction?

aniline 1,3,5-trinitrobenzene benzoic acid bromobenzene chlorobenzene benzene

(d) Which one of the following compounds has the **highest** reactivity in the **nucleophilic acyl substitution**?

benzamide ethyl acetate acetamide *N*-methyl formamide succinimide benzoyl bromide

(e) Which one of the following species is **aromatic**?

cyclopropene cyclobutadiene cyclopentadiene cyclopentadienyl cation cyclohexadiene
 cycloheptatriene cycloheptatrienyl anion cyclopropenyl anion cyclooctatetraene
 cyclohexene cyclopentene ethylene acetylene cyclopentadienyl anion

(f) Which one of the following compounds has the **highest boiling point**?

ethane methyl acetate propanoic acid acetyl chloride 1-butyne propanone butane

(g) How many **stereoisomers** (including enantiomers) has a molecule of *aldohexose* in the *pyranose* form?

one two three four five six seven eight nine ten sixteen thirty two sixty four

(h) Which of the following compounds will have the *characteristic IR* peak at about 1700 cm^{-1} and four signals in the $^1\text{H NMR}$ spectrum?

