Lab Instructor:_____ Name:_____

Part 1: Structures of Aldehydes, Ketones, and Carboxylic Acids

Name of Compound	Condensed Structural Formula
Acetaldehyde	
Acetone	
Acetic acid	
2-Methylpropanal	
Cyclohexanone	
Benzaldehyde	
Benzoic acid	

Part 2: Solubility

Substance	Observations	Soluble or Insoluble in water?
Propionaldehyde (Propanal)		
Benzaldehyde		
Acetone		
Cyclohexanone		
Propanoic acid (Propionic acid)		
Butanoic acid (Butyric acid)		
Hexanoic acid		
Unknown number:		

Part 3: Oxidation

Substance	Observations (when chromic acid is added)	Positive or negative reaction?	If positive, predict product.
Propanal			
2-Butanone			
Acetic acid			
Unknown number:			

Part 4: Oxidation with Benedict's Reagent

Substance	Observations	Positive or negative test?
Propionaldehyde (Propanal)		
2-Butanone		
Acetic Acid		
Unknown number:		

Part 5: Iodoform Test

Substance	Observations when KI/iodine is added	Positive or negative reaction?
2-Methylpropanal		
Butanal		
2-Butanone		
Acetone		
Unknown number:		

Part 6: Acidity (pH Test)

Substance	pH	Substance	pH
Acetic acid		Acetone	
Propanoic acid		Unknown number:	
Solid salicylic acid			

Part 7: Solubility in Base

Substances mixed	Observations	Relative Solubility
Hexanoic acid in water		
Hexanoic acid in 10% NaOH		

Part 8: Sodium Bicarbonate Test

Substance	Observations when added to $NaHCO_{3\,(aq)}$	Positive or negative reaction?
Propanoic acid		
Acetic acid		
Acetone		
Unknown number:		

Part 9: Identification of the Unknown Substance

Based on the results from each of the experiments, discuss what you know about the structure of your unknown. Identify it as an aldehyde, ketone, or carboxylic acid, and include any additional conclusions based on your results. Explain your reasoning thoroughly.

Questions

1. Draw the condensed structural formulas for each of the following compounds.

   a. benzaldehyde

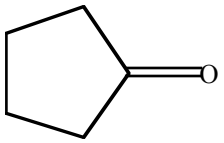
   b. 3-chlorobutanoic acid

   c. 1,4-cyclohexanedione

   d. 3-ethyl-2,2-dimethylpentanal

2. Name each of the following compounds.

a.



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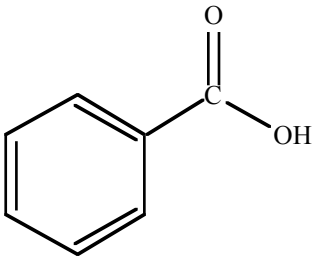
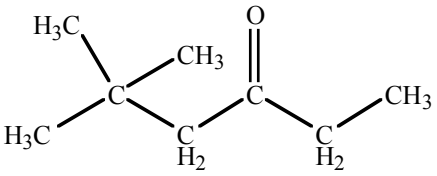
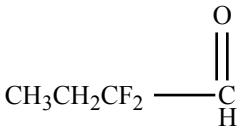


c.



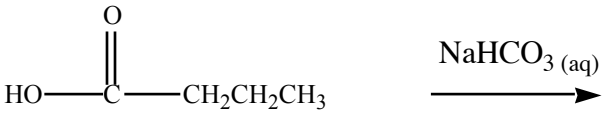
d.



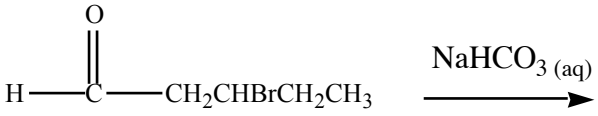
3. An unknown has a chemical formula of C_3H_6O. When chromic acid was added to the unknown, the solution remained orange. The unknown was soluble in water. When NaOH and KI/iodine were added to the unknown, a yellow precipitate formed. What is the structure of the unknown compound? Explain.

4. Write the structure of the product(s) of each of the following reactions. Also include a description of the changes you would expect to <u>see</u> (if any) in each solution.

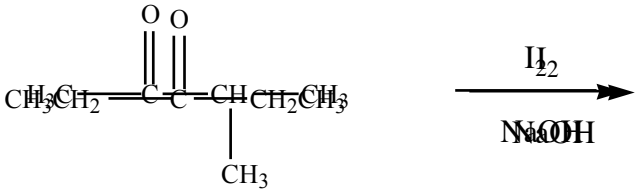
a.

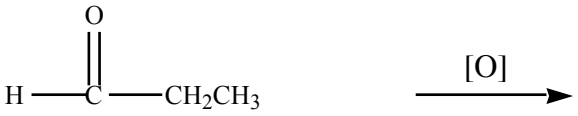


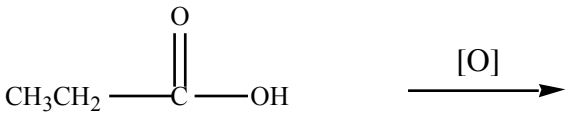
b.



d. c.



e. 

f. 

5. Would you expect 2-octanone to be soluble in water? Would you expect butanal to be soluble in water? Would either of them be more soluble in hexane than in water? Explain.

6. Would you expect pentanal to give a positive iodoform test? Would you expect acetaldeyde to give a positive iodoform test? Explain.