Lab Instructor:_____ Name:_____

Part 1: Structures of Alcohols and Phenols

Name of Compound	Condensed Structural Formula	Classification
Ethanol		
2-Propanol		
2-Methyl-2-propanol		
Cyclohexanol		
Phenol		

Part 2: Solubility

Substance	Observations (when water is added)	Observations (when hexane is added)
Ethanol		
2-Propanol		
2-Methyl-2-propanol		

Part 2 Continued:		
Substance	**Observations (when water is added)**	**Observations (when hexane is added)**
Cyclohexanol		
1-Octanol		
20% phenol/water solution		
Unknown number:		

Part 3: Oxidation

Substance	**Observations (when chromic acid is added)**	**Positive or negative reaction?**	**If positive, predict product.**
Ethanol			
2-Propanol			
2-Methyl-2-propanol			
20% phenol/water solution			
Unknown number:			

Part 4: Lucas Test

Substance	**Observations**	**Time needed for cloudiness to appear**	**Positive or negative test?**
Ethanol			
2-Propanol			

Part 4 Continued:			
Substance	**Observations**	**Time needed for cloudiness to appear**	**Positive or negative reaction?**
2-Methyl-2-propanol			
Unknown number:			

Part 5: Iodoform Test

Substance	**Observations when KI/iodine is added**	**Positive or negative reaction?**
Ethanol		
2-Propanol		
20% phenol solution		
Unknown number:		

Part 6: $FeCl_3$ Test

Substance	**Observations when $FeCl_3$ is added**	**Positive or negative reaction?**
Ethanol		
Phenol		
Salicylic Acid		

Part 6 Continued:		
Substance	**Observations when $FeCl_3$ is added**	**Positive or negative reaction?**
Unknown number:		

Part 7: Phenol Solubility in Base

Substances mixed	**Observations**	**Relative solubility**
Phenol and water		
Phenol and 5% $NaHCO_{3\ (aq)}$		
Phenol and 5% $NaOH_{\ (aq)}$		

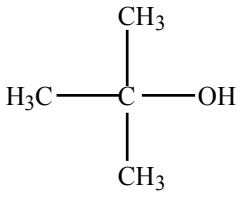
Part 8: Identification of the Unknown Substance

Based on the results from each of the experiments, discuss what you know about the structure of your unknown. Explain your reasoning thoroughly.

Questions

1. Label each of the following alcohols as primary, secondary, tertiary, or phenolic and name each one.

a.



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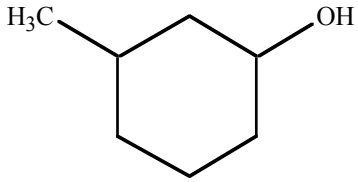

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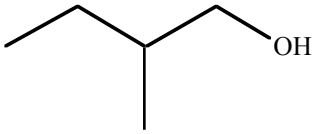

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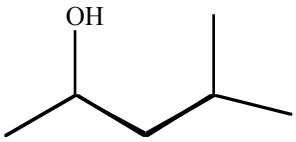

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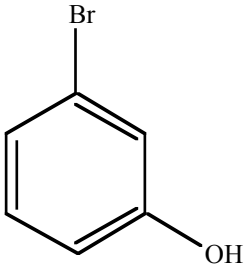
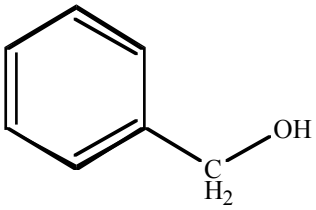


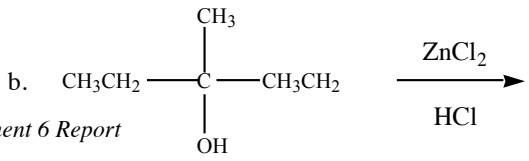
f.



2. An unknown has a chemical formula of $C_4H_{10}O$. When chromic acid was added to the unknown, it turned green. When the Lucas reagent was added to a separate portion of the unknown, it turned cloudy in 5 minutes. When NaOH and KI/iodine was added to the unknown, a yellow precipitate formed. What is the structure of the unknown compound?

3. Write the structure of the product(s) of each of the following reactions.

a. $CH_3CH_2CH_2OH \xrightarrow[HCl]{ZnCl_2}$

b. 

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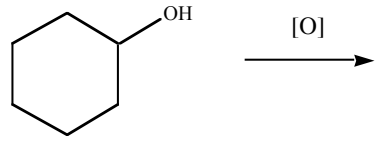
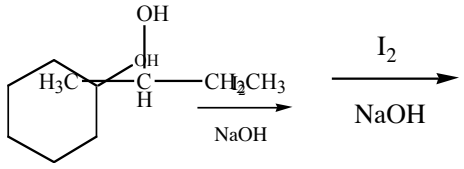


d.

e.



4. Would you expect 1-propanol to be soluble in water? Would you expect 1-heptanol to be soluble in water? Would either of them be more soluble in hexane than in water? Explain.

5. An unknown alcohol or phenol was tested in the lab. When chromic acid was added, it turned from orange to green. When $FeCl_3$ was added to a separate portion of the unknown, it turned purple. What can you say about the structure of this unknown?