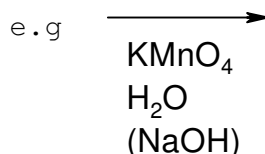


ORGANIC CHEMISTRY LAB QUESTIONS – SCH 4U

Reaction Section

Write descriptive organic equations for all reactions performed in the lab activities covered in class. This includes all reactions for which an observation was recorded in the observation table. Break up your reactions with headings that correspond to the headings given in the observation tables. If no reaction occurred, write N.R. for the products of the reaction. For the oxidations of alcohols which were done without or with a catalyst, write only one reaction per alcohol. Use the following for the descriptive reaction.



This means that the (NaOH) is optional.

For esters only do the following. Under each alcohol, write the **common** name of the alcohol. Under each carboxylic acid write the I.U.P.A.C. name of the carboxylic acid. Finally, write the name of the ester under the ester product.

Alkene Bromine Water Addition Test:

1. What is responsible for the brown colour in the bromine water? What is the concentration of bromine in the bromine water (give an approximate percentage and please provide a reference for where you have found this information). If the brown colour fades to clear, what precisely has happened to the bromine molecules? Why might you notice a slight difference in the shade of the brown colour once the brown colour has migrated to the organic phase.
2. If this reaction were performed on benzene, no colour change is observed. Why is this. Fully explain the reason behind this using the new vocabulary found in the reaction package.
3. How does electronic resonance make possible the "Diels Alder" reaction (a diagram may help)? Is the product of this reaction an aromatic compound (Why or why not)? Please notice that a change in carbon framework is achieved in this reaction. See the following URL for good information:

<http://www.chem.ucalgary.ca/courses/350/Carey5th/Ch10/ch10-5.html>

4. Draw a sketch of the two phase nature of these reactions by using pentane and bromine water as the example. Draw this sketch twice, once before shaking and a second time after shaking. Label completely (hydrocarbon phase, aqueous phase, bromine, water and pentane). You may use symbols for some of these labels (i.e Br₂, H₂O and "zigzag" for pentane). This diagram can be somewhat free style! You will need to be aware of the key observation in order to make sense of this question.

5. What role does polarity play in the subtle change in bromine location when shaking pentane with bromine water? Explain thoroughly.

Potassium Permanganate Oxidation Test of Alkenes:

6. How does the diol product formed in these reactions qualify as an oxidation. Explain thoroughly with reference to the addition of all atoms to the alkene starting material.

Oxidation of Alcohols with Potassium Permanganate:

7. Which alcohols were able to make carboxylic acids and why? Which alcohols were able to make ketones and why? Which alcohol should be completely unreactive and why?
8. KMnO_4 is a very common oxidizing agent in organic chemistry. What are some other oxidizing agents that could be used instead of KMnO_4 (list at least five - include your reference).

Reaction of Alcohols with Sodium Metal:

9. Name the property of the alcohols that determines the speed at which the reaction proceeds and give a good definition of this property.
10. Using this property suggest a relative reactivity ranking (most reactive to least reactive) for the alcohols used in this reaction. Present your ranking in the form of simplified organic structures separated by greater than signs. Show the degree of each alcohol below each structure.
11. Create a second list using the observed reactivity ranking from the experiment. Comment on the agreement or disagreement between theory and experimental observations.
12. How could sodium metal be used to determine if a five carbon alcohol is 1-pentanol, 2-pentanol or 4-pentanol (yes I have proofread this question). Explain using appropriate terminology and detail.

Ester Synthesis:

13. What were the two reasons for adding sulphuric acid?
14. How was the relative solubility of the acid, alcohol and ester product used to help separate the product ester from any un-reacted reactants? (i.e. how did water reduce the stench of the carboxylic acids?)