

## Organic Chemistry II

### Assignment # 2

Spring 2021

Name: \_\_\_\_\_

1) Write structural formula for the following.

a) Allyl benzene

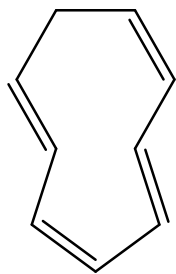
b) E-1-phenyl-1-butene

c) p-diisopropylbenzene

d) m-nitroacetophenone

e) 2,6-dimethylaniline

2) Evaluate each of the following processes applied to cyclononatetraene (shown below), and decide whether the species formed is aromatic or not.



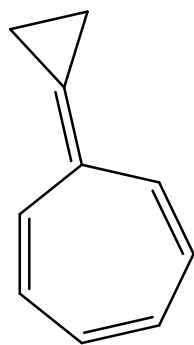
a) Addition of one more pi electron to give  $\text{C}_9\text{H}_{10}^-$ .

b) Addition of two more pi electrons to give  $\text{C}_9\text{H}_{10}^{2-}$ .

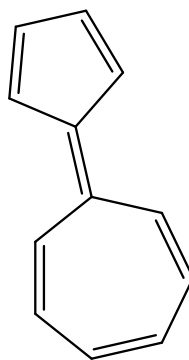
c) Loss of  $\text{H}^+$  from the  $\text{sp}^3$ -hybridized carbon

d) Loss of  $\text{H}^+$  from one of the  $\text{sp}^2$  hybridized carbons

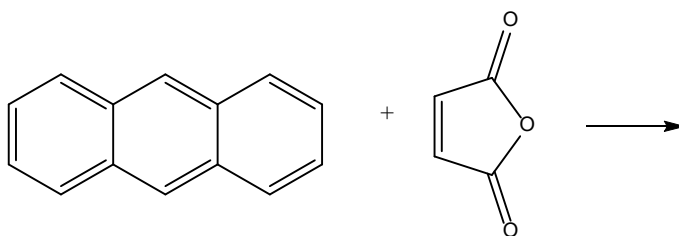
3) Which one of the following should be stabilized by resonance to a greater extent? Resonance structures required.



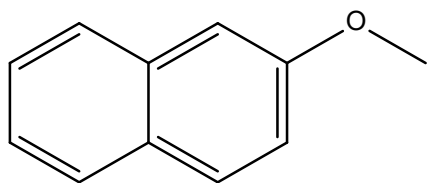
or



4) Anthracene undergoes a Diels-Alder reaction with maleic anhydride to give a cycloadduct with the formula  $\text{C}_{18}\text{H}_{12}\text{O}_3$ . a) What is its structure? b) Why does the particular ring react and not the others?



5) Birch reduction of 2-methoxynaphthalene gave a mixture of two isomeric compounds, each having the molecular formula  $C_{11}H_{14}O$ . Suggest reasonable structures for these compounds.



6) Give the structure of the expected product from the reaction of isopropylbenzene with

a) Hydrogen (3 mol), Pt

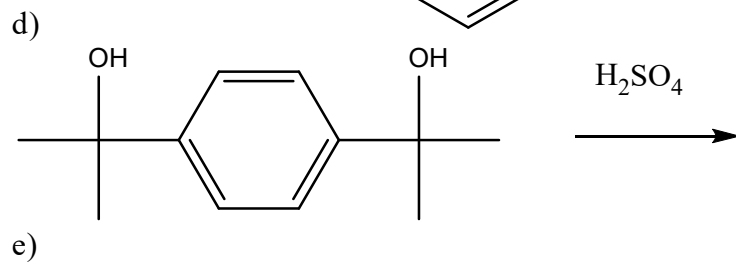
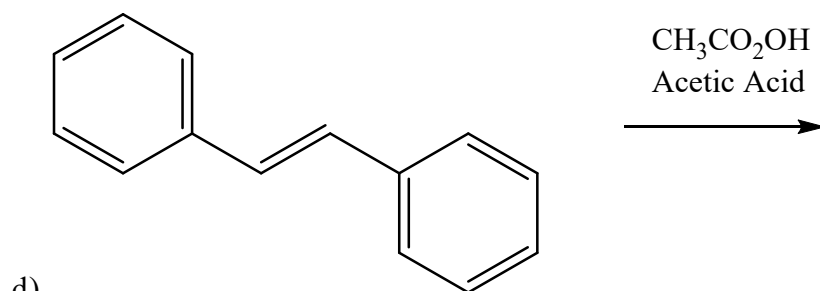
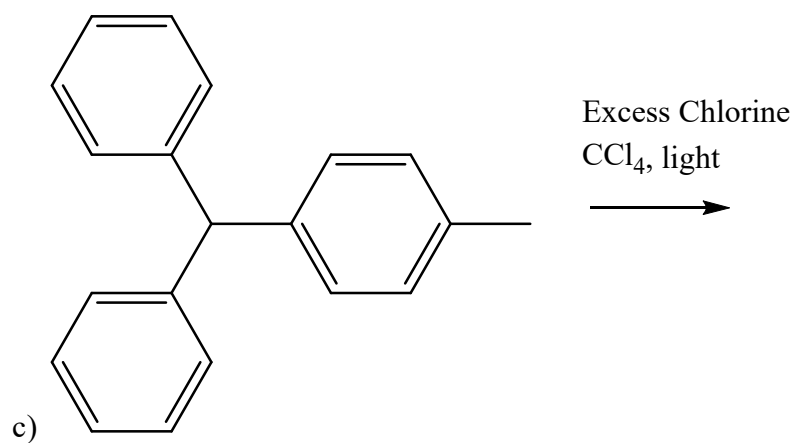
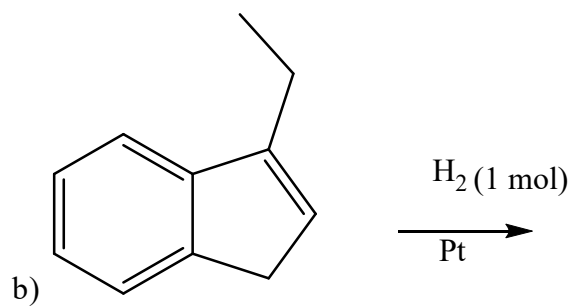
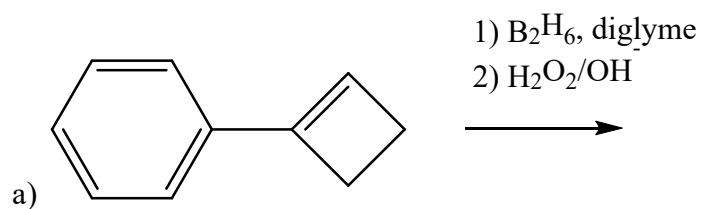
b) Sodium and ethanol in liquid ammonia

c) Sodium dichromate, water, sulfuric acid, heat

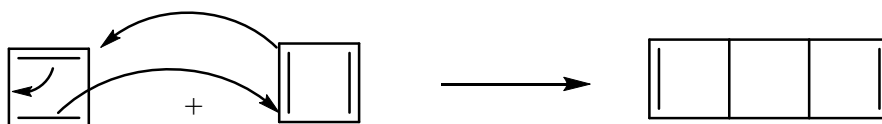
d) N-bromosuccinimide in  $CCl_4$ , heat, benzoyl peroxide

e) The product of part d treated with sodium ethoxide in ethanol

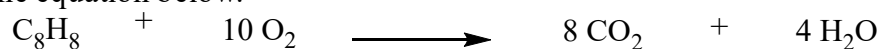
7) Give the products for the following reactions.



8) One of the chemical properties that makes cyclobutadiene difficult to isolate is that it reacts rapidly with itself to give a dimer. What reaction of dienes does this resemble?



9) Both cyclooctatetraene and styrene have the molecular formula  $C_8H_8$  and undergo combustion according to the equation below.



The measured heats of combustion are 4393 and 4543 kJ/mol. Which heat of combustion belongs to which compound? Explain your answer.

10) Bromine adds to the central ring of anthracene to give a 1,4-addition product. Write the structure of the product that would be formed if addition took place on one of the outer rings. By writing resonance structures for the product shown here and the one formed by addition to the outer ring, can you suggest why addition to the central ring is preferred?

