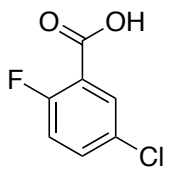
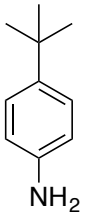
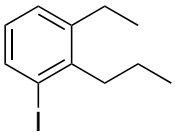
Chemistry 234
Chapter 15 Problem Set

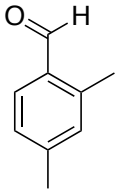
Naming Aromatic Compounds

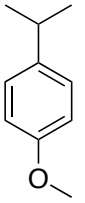
1) Provide the IUPAC name for each compound shown below.

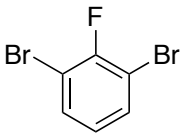


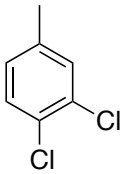


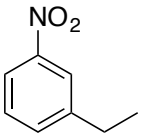






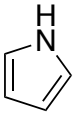


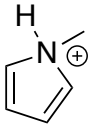


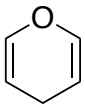


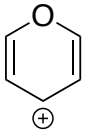
Aromaticity

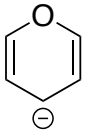
2) Classify each molecule below as aromatic, antiaromatic, or non-aromatic. For aromatic and antiaromatic compounds, give the number of π electrons in the ring.

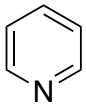


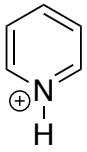


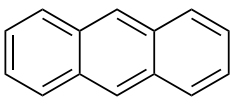


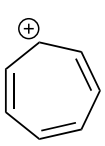


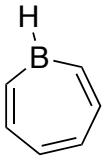


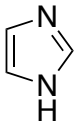




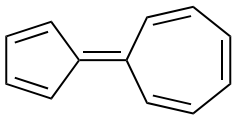






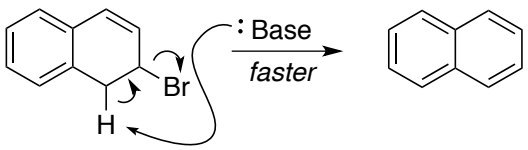


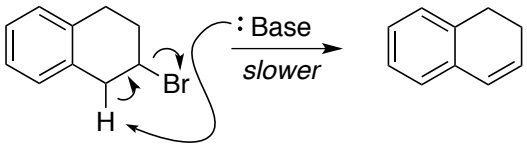
3) The molecule below has an unusually large dipole. Explain.



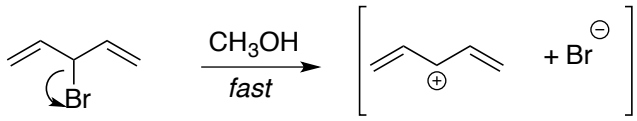
4) Use your knowledge of resonance, aromaticity, and general stability trends to analyze the following reactions or trends.

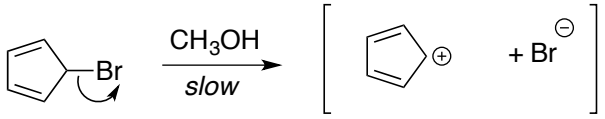
a.



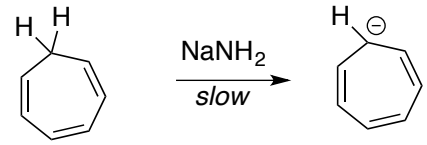


b.

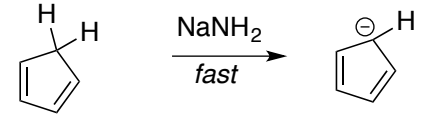




c.

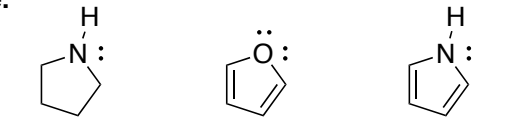


pKa = 36



pKa = 16

e.



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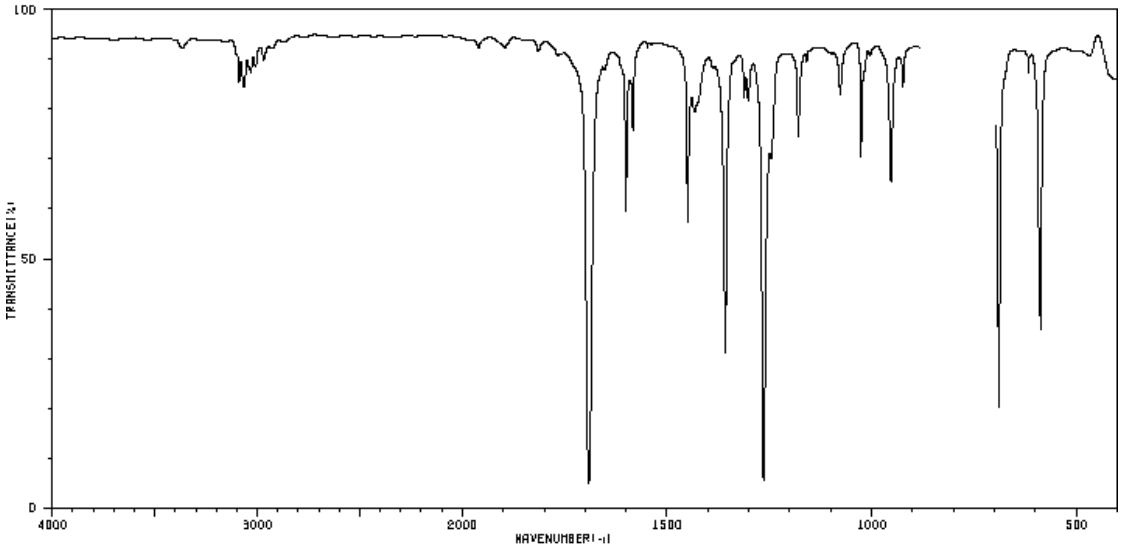
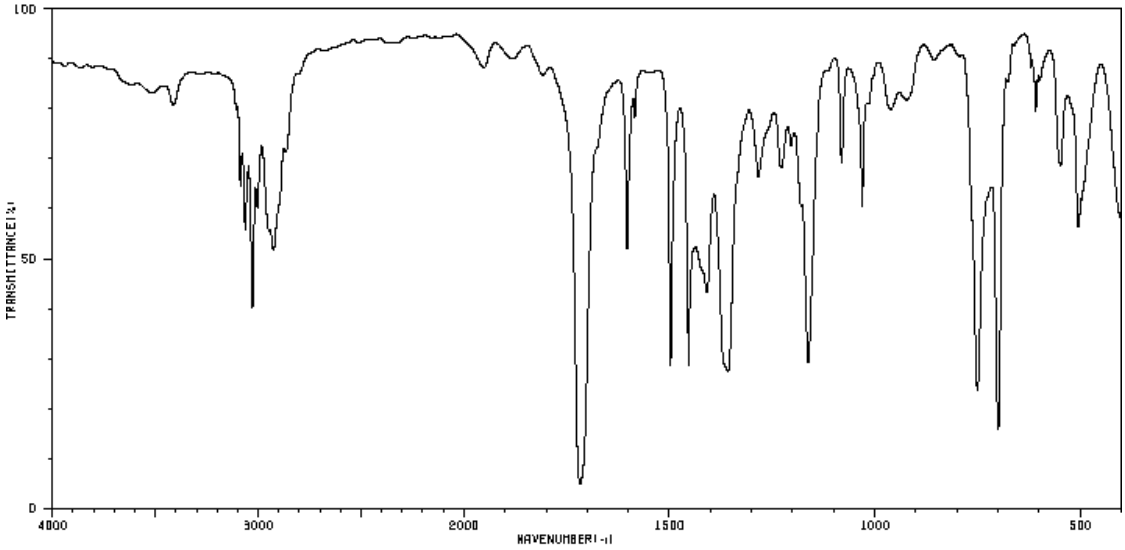
Spectroscopy

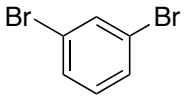
5) Construct a simulated ^{1}H NMR Spectrum of the aromatic compound naphthalene.

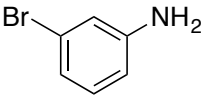
6) IR Spectra for two aromatic compounds are shown below. Match each compound to its corresponding IR spectrum and explain your reasoning.

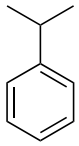


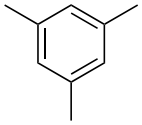


7) Determine the number of distinct ^{13}C NMR signals for each compound below.









8) Draw a structure that corresponds to each 1H NMR spectrum shown below.