

21 points (3 points each) Mark your answers on the scantron sheet. You may keep this copy.

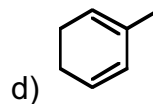
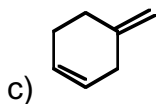
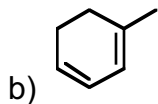
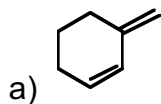
1. How many degrees of unsaturation does a molecule with the formula $C_{11}H_{13}N_2Cl$ have?

- a) 2 b) 4 c) 5 d) 6

2. Which of the following sets of data would match the proton NMR of ethanol (CH_3CH_2OH)?

- a) 1.2 ppm (triplet, 3H); 2.6 ppm (singlet, 1H); 3.8 ppm (quartet, 2H)
b) 1.2 ppm (quartet, 3H); 2.6 ppm (singlet, 1H); 3.8 ppm (triplet, 2H)
c) 1.2 ppm (singlet, 3H); 2.6 ppm (singlet, 1H); 3.8 ppm (singlet, 2H)
d) none of the above

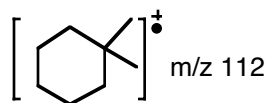
3. Which of the following molecules are **not** conjugated?



4. The energy of bond stretching in a molecule corresponds to what region of the EM Spectrum?

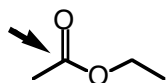
- a) microwave b) infrared c) 6 ultraviolet d) radio frequency

5. In the mass spectrum of 1,1-dimethylcyclohexane, what would be the mass of the most abundant fragment (atomic mass $C=12$, $H=1$)?



- a) 97 b) 82 c) 70 d) 56

6. In the ^{13}C NMR of ethyl acetate, where would you expect the carbonyl carbon?



- a) 220 ppm b) 180 ppm c) 120 ppm d) 50 ppm

7. Which of the following molecules would show an IR absorbance at 2200 cm^{-1} ?

- a) cyclohexane b) CH_3CH_2OH c) CH_3CN d) H_2O