Chem 260 Midterm 1 3 October 2014

Name _____ (This exam is out of 100 points.)

Student Number _____

1. [2] _____
2. [2] _____
3. [2] _____
4. [6] _____
5. [10] _____
6. [5] _____
7. [5] _____
8. [5] _____
9. [8] _____
10. [12] _____
11. [8] _____
12. [5] _____
13. [20] _____
14. [10] _____

Total [100] _____

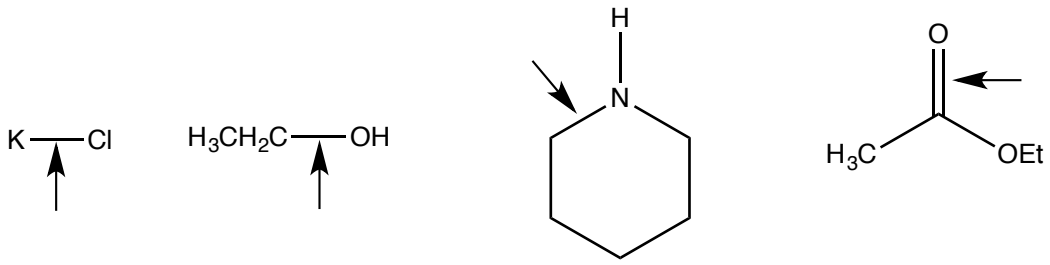
You may tear off the last page. If you do so, please be sure the staple remains intact.

1. [2 points] Circle the most electronegative element:

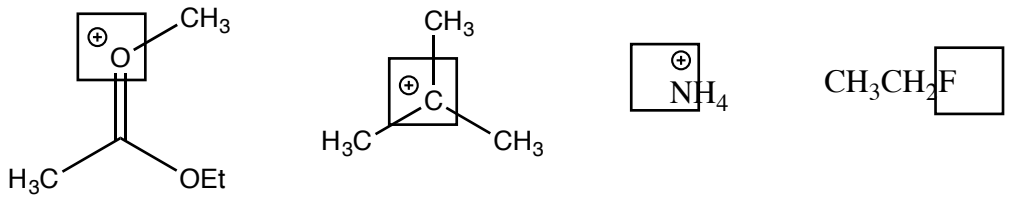
   (a) B C N O

   (b) Cl Br I

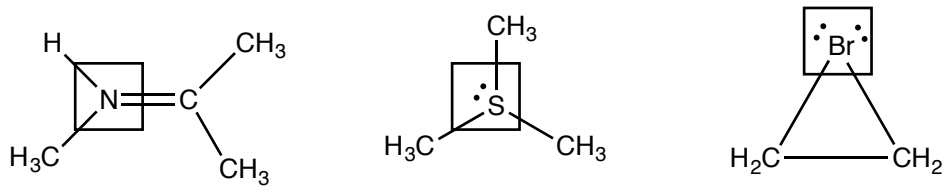
2. [2 points] Circle the compounds whose indicated bond is covalent:



3. [2 points] Circle the compounds whose boxed atom has a full octet (note: lone pairs may not be drawn.)

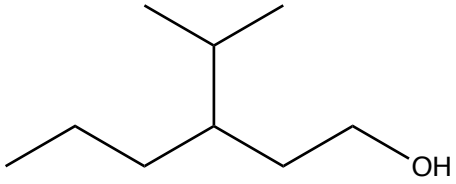


4. [6 points] Provide the formal charge of the boxed atoms. (Note all lone pairs are drawn.)



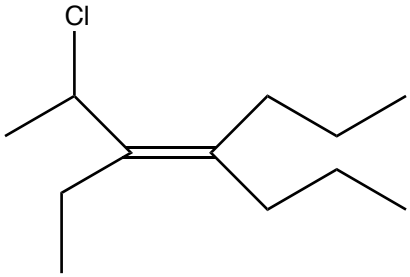
5. [10 points] Provide the IUPAC name for the following compounds:

(a)



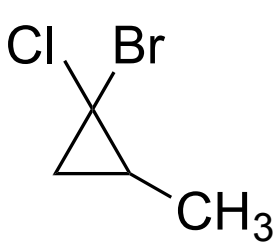
_____

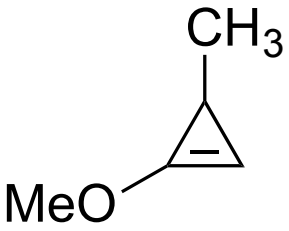
(b)

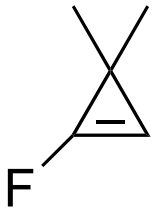


_____

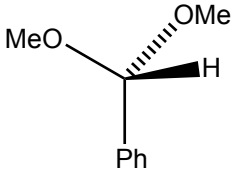
6. [5 points] Circle all of the stereogenic centers in each compound below:

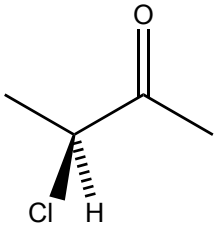


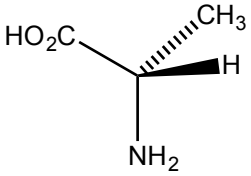


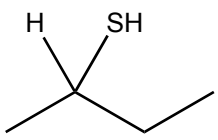


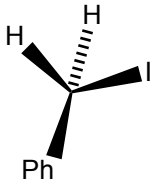
7. [5 points] Circle the compounds below that contain a stereogenic center.

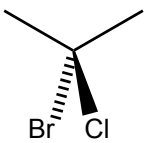




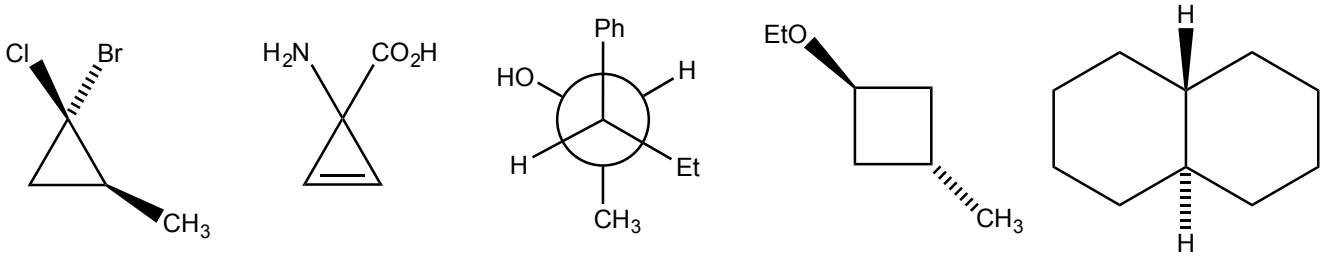




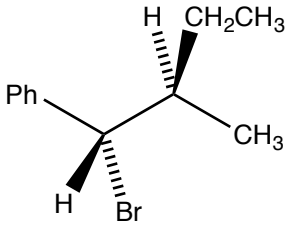




8. [5 points] Circle the compounds below that are chiral.



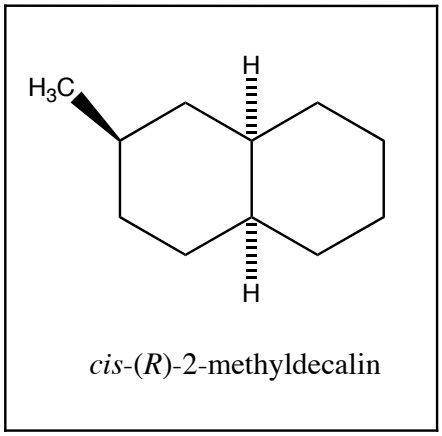
9. [8 points] In the transition state for an "E2 reaction" performed on the compound below, the bromo group (on carbon 2) will be "anti-periplanar" to the hydrogen on the adjacent carbon (carbon 3). Draw a Newman Projection of the transition state of this reaction. (Notes: Periplanar means "in the same plane." Ph = phenyl = a benzene ring.)



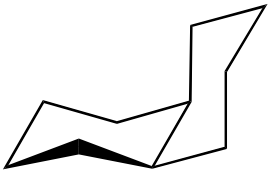
10. [12 points] Draw all possible isomers named dichlorocyclobutene (i.e., all isomers must contain a cyclobutene ring), including all stereoisomers. Do not draw any structure twice. (Note: draw cyclobut**e**nes, not cyclobut**a**nes.)

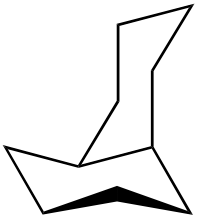
11. [8 points] Tritium (T), an isotope of hydrogen, is more stable in the equatorial position of cyclohexane by $\Delta G° = -0.0460$ kJ/mol (–0.0110 kcal/mol) at 298 K. Draw mono-tritiated cyclohexane in its **two** most stable conformations. **Circle** the most stable.

12. [5 points] Using one of the templates below, draw *cis*-(*R*)-2-methyldecalin in its most stable conformation.

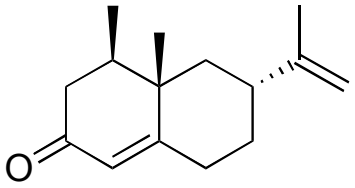


cis-(*R*)-2-methyldecalin





13. [20 points] The taste and scent of grapefruit results from a complex mixture of organic compounds. One compound that is responsible for grapefruit's odor is (+)-nootkatone.



(+)-nootkatone
density: 0.96 g/cm^3
boiling point: 170 °C
specific rotation: +196°

(a) Circle all the stereogenic centers of (+)-nootkatone.

(b) Draw the enantiomer of (+)-nootkatone below.

(c) What is the density of the enantiomer you have drawn? (Circle your answer.)

(1) 0.96 g/cm^3 (2) –0.96 g/cm^3

(3) 0.48 g/cm^3 (4) Cannot determine from the information given

(d) What is the optical rotation of the enantiomer you have drawn? (Circle your answer.)

(1) 96° (2) –96°

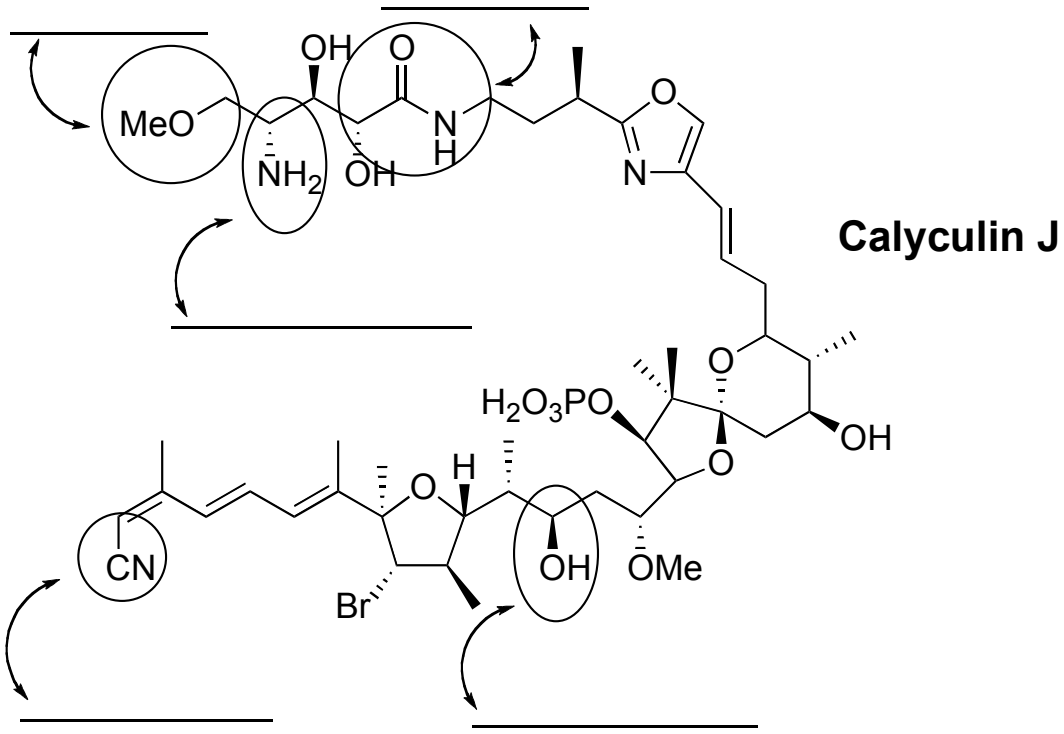
(3) –196° (4) 196°

(5) Cannot determine from the information given

13. (Continued)

(e) Calculate the specific rotation of a solution containing 34% (+)-nootkatone and 66% of the enantiomer you have drawn in part (b). (If you don't have a calculator, just setup the equations.)

14. [10 points] Calyculin J, below, was isolated from the Japanese marine sponge Discodermia calyx. It inhibits protein phosphatase 2A with an IC50 (activity) of 75 nM. Write the name of the circled functional groups in the spaces provided.



Organic Chemist's Periodic Table:

B	**C**	**N**	**O**	**F**
Al	**Si**	**P**	**S**	**Cl**
				Br
				I

You can use this page for scratch paper.