



THE UNIVERSITY OF
SYDNEY

School of Chemistry

Chemistry 1B Advanced and SSP (CHEM1902/1904)

Problem Sheet 1

There are a number of important learning resources available on your unit area on the First Year Chemistry website: <http://firstyear.chem.usyd.edu.au/chem1902>

Spend some time getting yourself familiar with this website and have a look at available resources, which include self help quizzes, games and calculators.

One of the most important resources is **ChemCAL**, an interactive tutorial/quiz program which covers most of the first year chemistry topics. Past students have found the program's interactive tutorials very useful. A link to ChemCAL is provided on the menu of all First Year Chemistry webpages. You log on to ChemCAL using your course code ('1902') as username, and *helium* as the password. (Note that none of the marks you receive in the various ChemCAL quizzes are ever recorded or assessed, and multiple attempts are OK!)

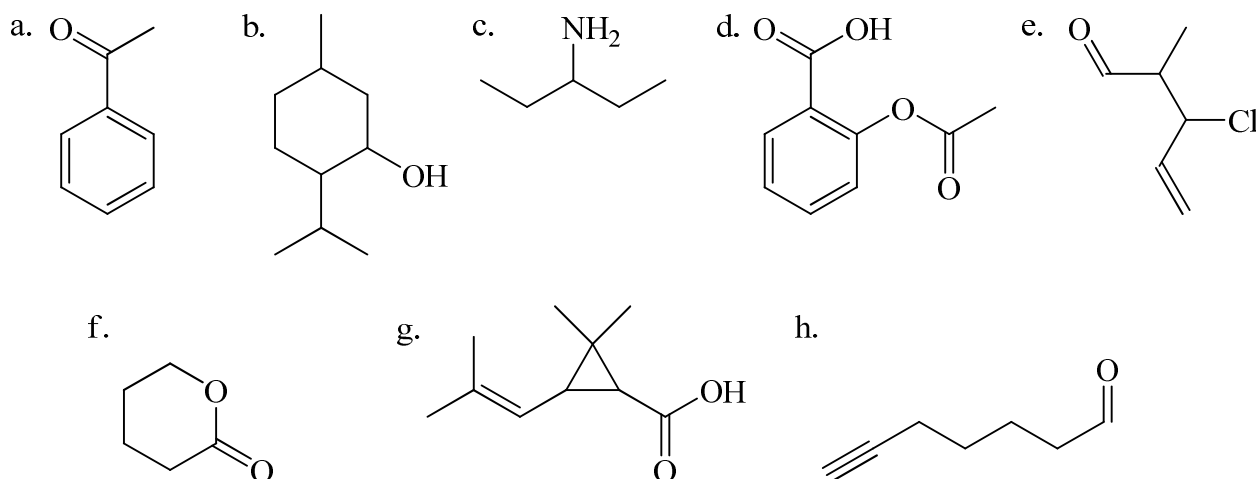
Work through the ChemCAL modules "Alkanes - Structure and Nomenclature" and "Organic Functional Groups".

1. Give condensed structural formulae and stick representations for these molecules. In the stick representations don't show the C-H bonds but try to represent the appropriate bond angles in the rest of the molecule. Acetone (propanone) is given as an example.

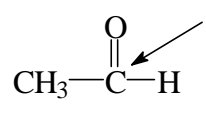
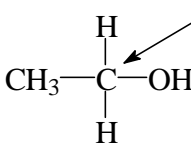
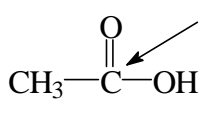
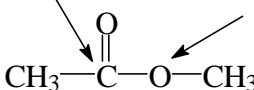
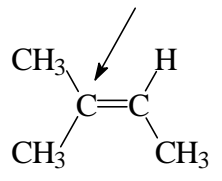
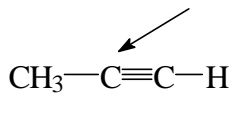
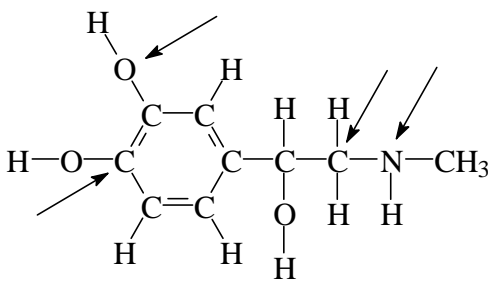
Compound	Condensed structural formula	Stick representation
CH ₃ COCH ₃		
CH ₃ CH ₂ CH ₂ CH ₂ OH		
CH ₃ CHBrCH ₂ Cl		
(CH ₃) ₂ CHCH(CH ₃) ₂		
(CH ₃) ₂ CCH ₂		
CH ₃ CH ₂ COOH		
CH ₃ COOCH ₂ CH ₃		

$\text{CH}_3\text{COOCOCH}_3$		
benzamide ($\text{C}_6\text{H}_5\text{CONH}_2$)		

2. Determine molecular formulae and identify the functional groups in the following compounds.



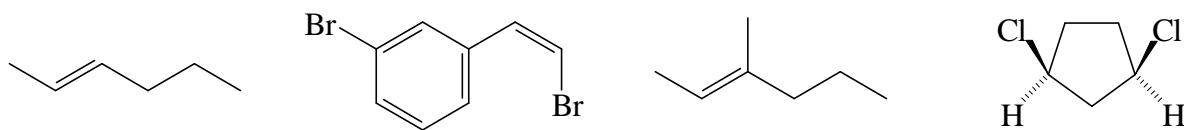
3. For each of the following compounds, give the hybridization and approximate bond angles at the atoms indicated by the arrows and re-draw the structures in stick representations.

(a) 	(b) 	(c) 	(d) 
(e) 	(f) 	(g) 	

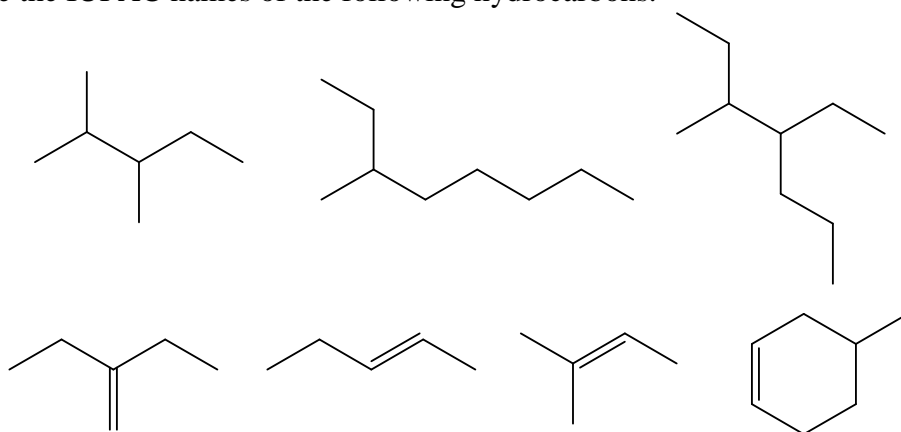
4. Give the stick structures of the following compounds.

- (a) 2,3,5-trimethyl-4-bromooctane
(b) *cis*-1,3-dimethylcyclobutane
(c) 2-methyl-2-pentene

5. Give one example of a stereoisomer and two examples of constitutional isomers of each of the following molecules.



6. Give the IUPAC names of the following hydrocarbons.



7. Draw the structures of the following compounds.

- 3-chloro-2,3-dimethyl-1-butene
- 3-ethyl-3-hexene
- (Z)-2-butene
- (E)-2-butene
- (Z)-2-methyl-3-hexene