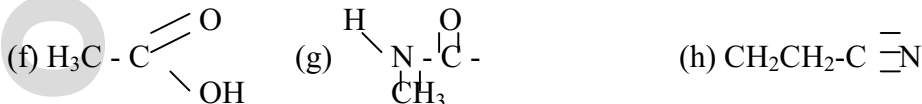
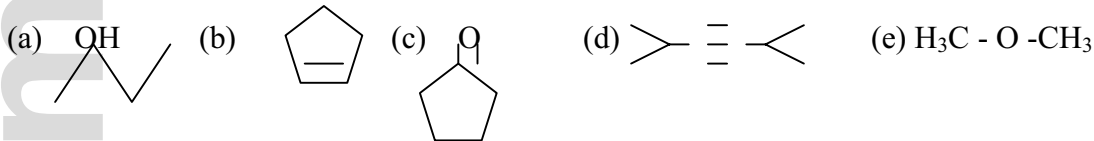


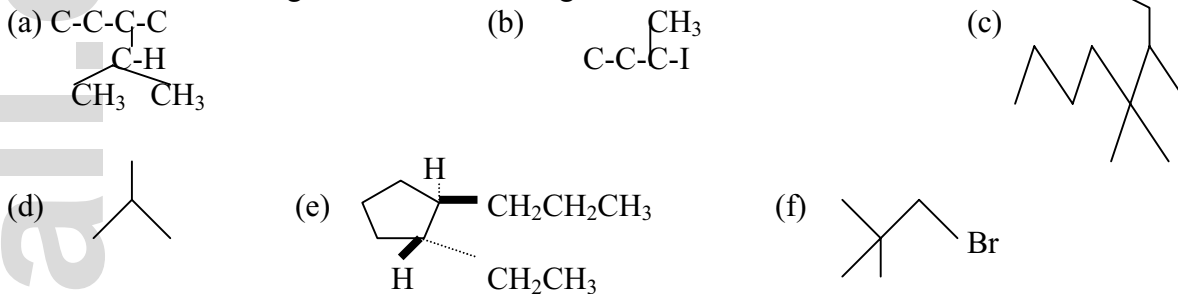
Review of Organic Chemistry

N.B. Any pair of vertical bars represent a double bond. Sometimes the lines are spread out. The same follows for angled and horizontal multiple bonds.

1. Circle and identify by name each of the functional groups in the compounds below:



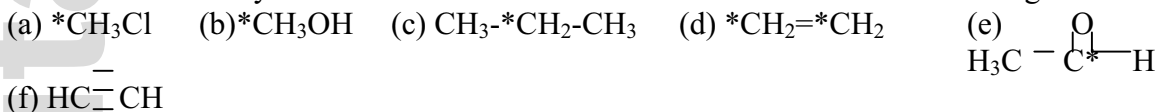
2. Name the following molecules according to the IUPAC.



3. Rank the following in order of increasing boiling point, justify your answer.

- (a) 2-methylhexane (b) heptane (c) 2,2-dimethylpentane
 (d) 2,2,3-trimethylbutane (e) butanol (f) amino-butane

4. Determine the hybridization of each C-atom marked with a * in the following:

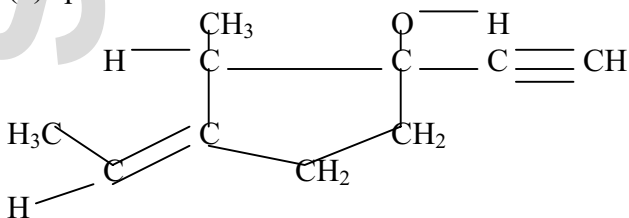


5. Explain sp^2 hybridization using C_2H_4

6. Construct as many isomers as you can of C_5H_{12} .

7. In the following structure label:

- (a) a highly polarized covalent bond
 (b) sp carbon atom
 (c) sp^2 c-atom
 (d) sp^3 c-atom



8. Draw the resonance forms of C_6H_6 and give 3 pieces of evidence for its structure.

9. Write equations, stating the conditions necessary for the reaction and giving products, also showing clearly the mechanisms for each of the following:

- (a) $CH_4 + Br_2$ (b) $CH_3CH_2CH_3 + HBr$ (c) $C_6H_6 + HNO_3$
(d) $C_6H_6 + Br_2$ (e) $CH_3CH_2OH + \{XS \text{ conc } H_2SO_4\}$
(f) $(CH_3)_3CBr + KOH_{(aq)}$ (g) $CH_3CH_2-CH_2Br + KOH_{(aq)}$
(h) $(CH_3)_3CBr + KOH \{hot, conc\}$

10. Which would you expect to be the stronger acid? Explain your reasoning.

- (a) $CH_2ClCOOH$ vs $CHCl_2COOH$
(b) CH_2FCOOH vs $CH_2BrCOOH$
(c) CH_2FCOOH vs CH_2FCH_2COOH
(d) CH_3CH_2OH vs C_6H_5OH

11. Predict the major product and mechanism (S_N1 , S_N2) for the reaction of:

- (a) 2-bromo-butane (b) 1-bromopropane
with (i) cold, aqueous, dilute KOH (ii) hot, conc. KOH

12. Explain how altering the conditions can affect the major product of the reaction of C_2H_5OH with

- (a) conc H_2SO_4 (b) $Cr_2O_7^{2-}/H^+$

13. Explain why C_2H_5OH is neutral, C_6H_5OH is a very weak acid, CH_3COOH is a weak acid and NO_2CH_2COOH is quite a strong acid.

14. The combustion of 0.146 g of compound B gave 0.374 g of CO_2 and 0.154 g H_2O . Assuming B contains C, H, and oxygen only, determine the empirical formula of B.

15. How could you distinguish between members of the following pairs using a simple chemical test? In each case give the reagent and state the results that you would expect in both cases:

- (a) Hexan-1-ol and cyclohexene
(b) C_2H_5OH and CH_3COOH
(c) C_2H_6 and C_2H_4
(d) CH_3CHO and CH_3COCH_3
(e) CH_3CHO and CH_3CH_2OH
(f) CH_3COCH_3 and CH_3CH_2COOH