

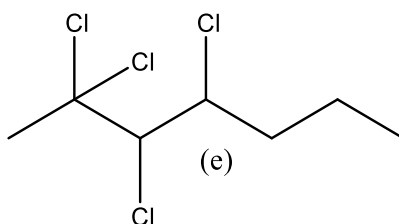
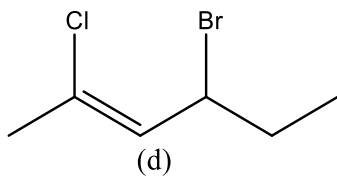
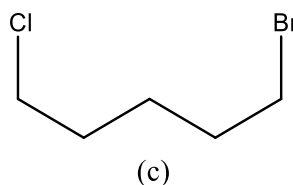
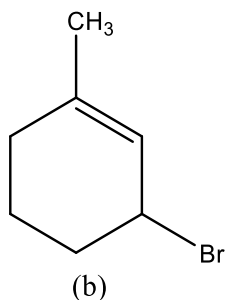
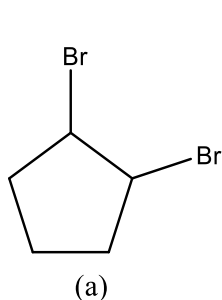
Name _____

Due 11:30 pm on 12/10/2020

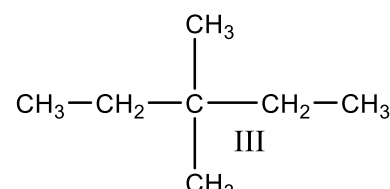
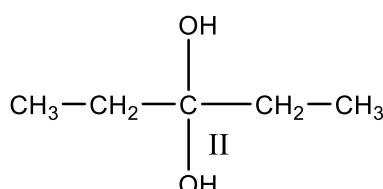
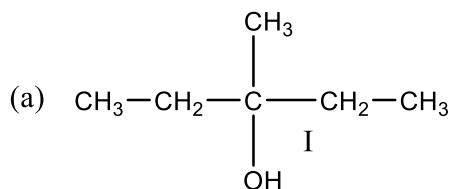
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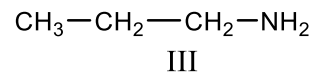
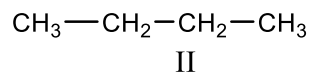
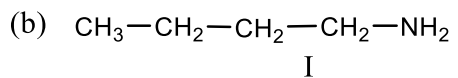
This exam is a problem-solving exercise which must be completed by 11:30 pm EDT on Thursday, December 10, 2020. Where applicable, show your work to receive full credit. Late assignments will be assessed a penalty of 10% of the overall grade per day late. Please do not consult anyone.

1. Give the correct IUPAC name for the following compounds: (5 pts)

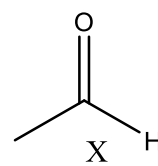
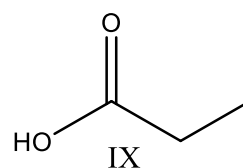
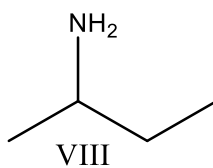
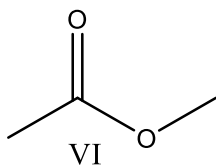
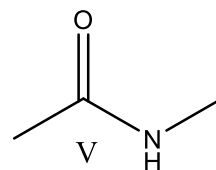
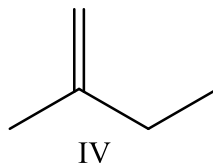
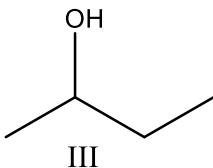
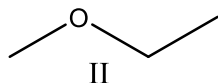
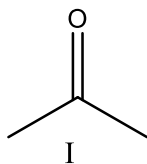


2. Rank the following compounds in order of increasing (lowest to highest) boiling point: (5 pts)

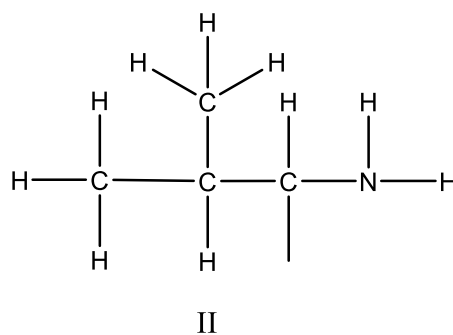
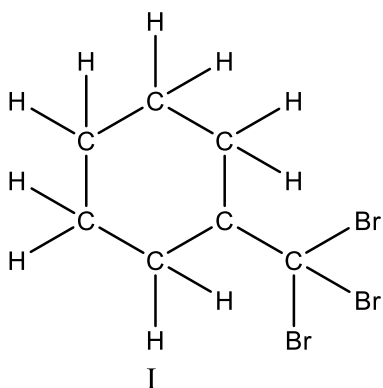




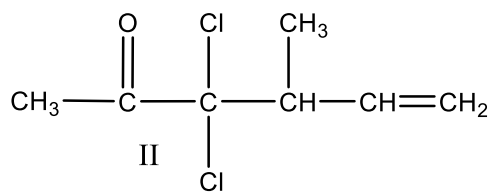
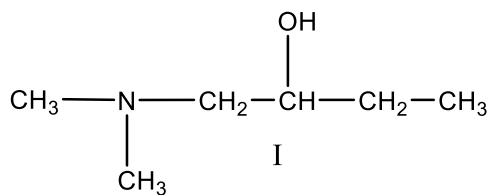
3. Identify each of the functional groups shown below. (5 pts)



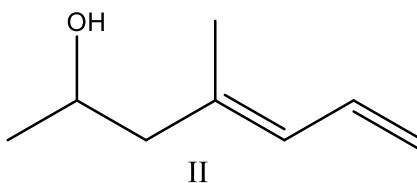
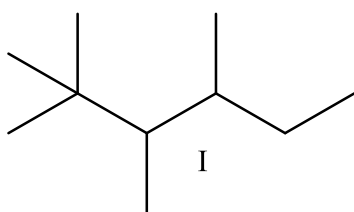
4. Draw condensed structural formulas for the following compounds: (3 pts)



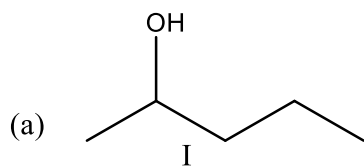
5. Draw line-angle structural formulas for the following compounds: (3 pts)



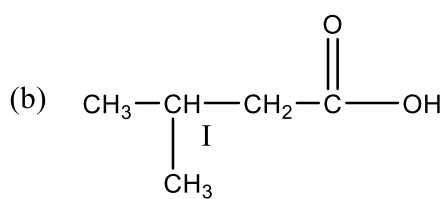
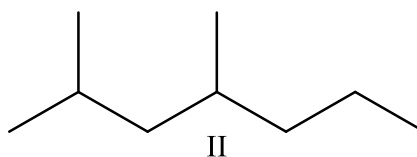
6. Draw a condensed structure for each of the following compounds: (3 pts)



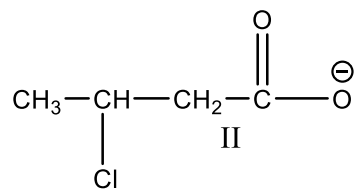
7. Which compound in each pair is more soluble in benzene? (3 pts)

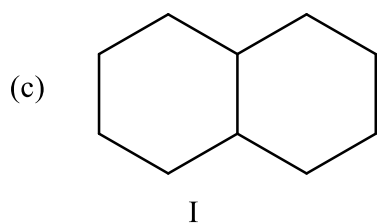


or

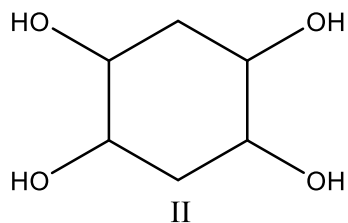


or





or



8. Draw structural formulas for the following compounds: (4 pts)

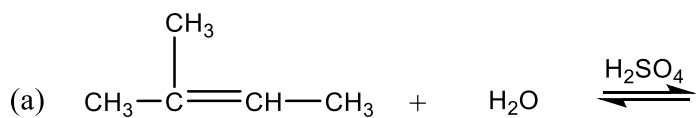
(a) 4-methyl-1-pentene

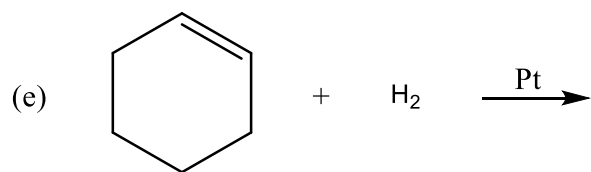
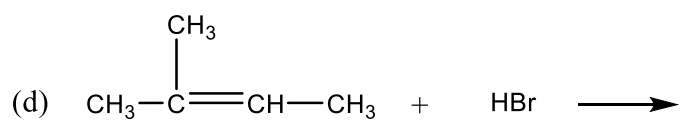
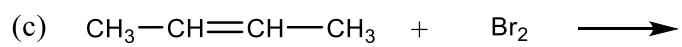
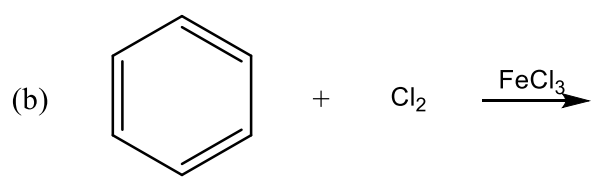
(b) Trans-6-methyl-2-heptene

(c) 1-ethyl-2-methylcyclohexane

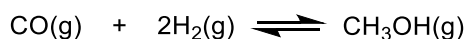
(d) 1,2,4-trimethylcyclopentane

9. Draw the major organic product for each of the following reactions: (5 pts)





10. How would each of the following changes affect the direction of the chemical equilibrium shown below? (3 pts)

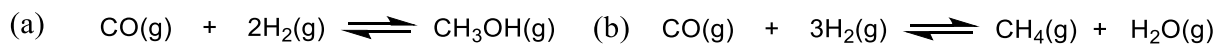


(a) Decreasing the concentration of CO.

(b) Increasing the concentration of H₂.

(c) Increasing the pressure.

11. Write the equilibrium constant expression for each of the following reactions: (4 pts)



12. Calculate the [H₃O⁺] of a solution that has a pOH of 8.15. Is the solution acidic or basic? Show your work. (5 pts)

13. Calculate the $[\text{OH}^-]$ and the $[\text{H}_3\text{O}^+]$ of a solution that has a pOH of 11.17. Show your work. (5 pts)

14. Calculate the $[\text{H}_3\text{O}^+]$ of a solution that has a pH of 4.45. Is the solution acidic or basic? (5 pts)

15. Calculate the $[\text{OH}^-]$ and the pOH of a solution that has a pH of 5.50. Show your work. (5 pts)

16. Use the Henderson-Hasselbalch equation to calculate the pH of a buffer that contains 0.23 M of the acid, HA, and 0.19 M of the conjugate base, A⁻. The K_a for the acid is 4.2×10^{-6} . Show your work and report the pH to two decimals. (5 pts)

17. Select a buffer system from the following acid-base combinations: (5 pts)

(a) HF and Cl⁻ (b) H₂SO₄ and HSO₄⁻ (c) H₂SO₃ and HSO₃⁻ (d) H₂CO₃ and HSO₄⁻

18. Determine whether aqueous solutions of the following salts would be acidic, basic, or neutral: (5 pts)

(a) LiNO₃ (Prepared from LiOH and HNO₃)

(b) LiF (Prepared from LiOH and HF)