

Chemistry 1110 R10 Fall 2023 Test 3

Thursday, November 23, 2023

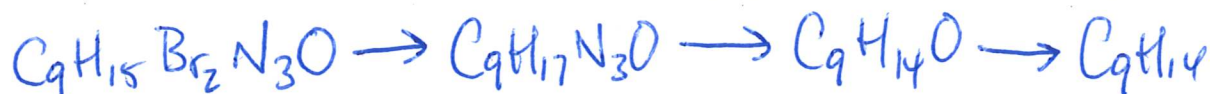
Time: 1 hour 50 minutes

Name: ANSWERS

Student #: _____

This test consists of **six** pages of questions, a page containing information about the functional groups, and a periodic table. Please ensure that you have a complete test and, if you do not, obtain one from me **immediately**. There are **57** marks available. Good luck!

- 1) [2 marks] A compound of formula $C_9H_{15}Br_2N_3O$ is known to have no double or triple bonds of any kind, meaning it can have only rings in its structure. How many rings must it have?



$$2(9) + 2 = 20, \text{ so IHD} = \frac{1}{2}(20 - 14) = 3 \quad \boxed{3 \text{ rings}}$$

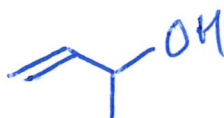
- 2) [2 marks] Draw a compound of formula C_4H_8O that has no double bonds and that cannot have any positional isomers.



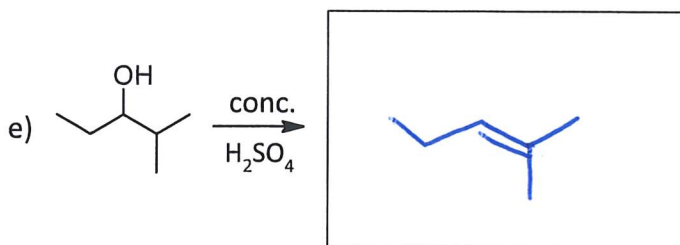
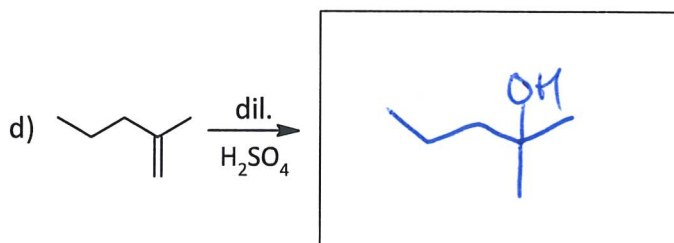
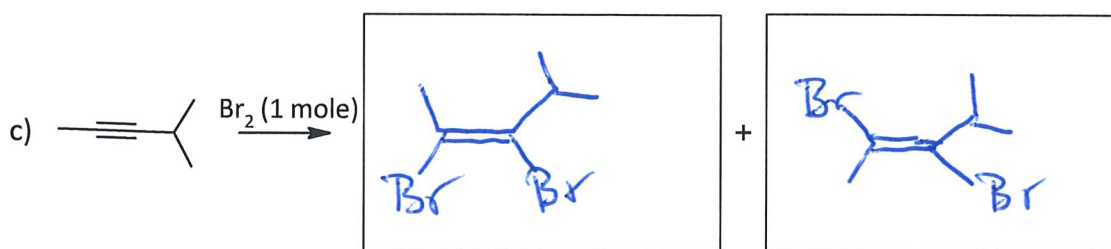
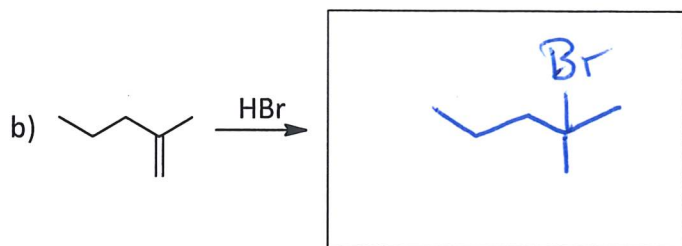
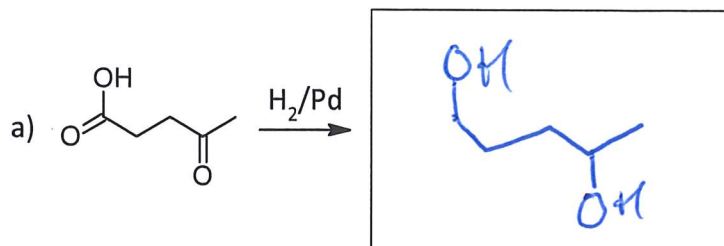
- 3) [2 marks] Draw a compound of formula C_4H_8O that has no double bonds but that *does* have geometric isomers.

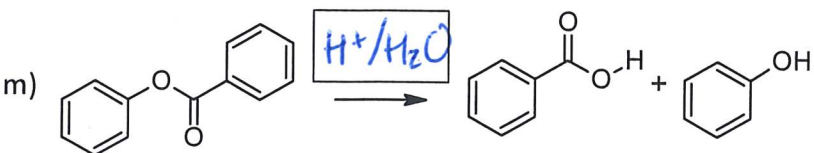
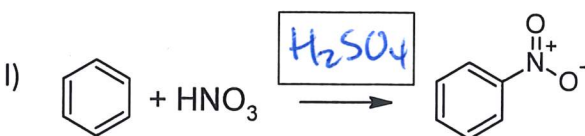
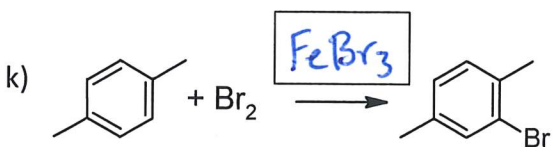
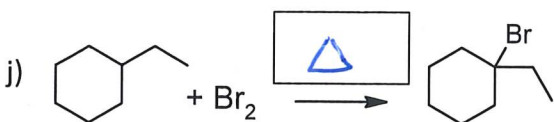
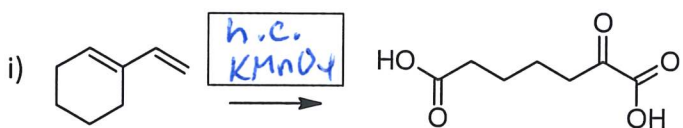
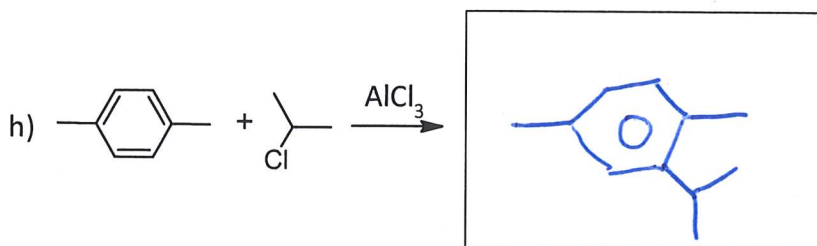
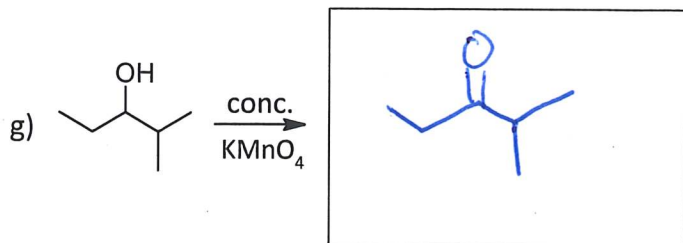
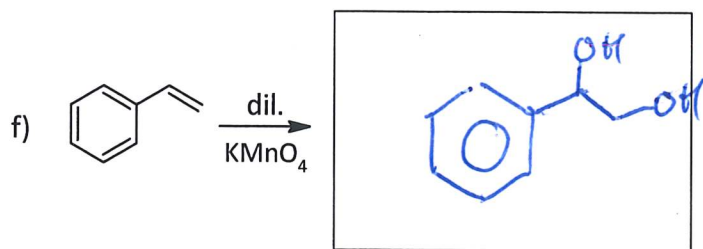


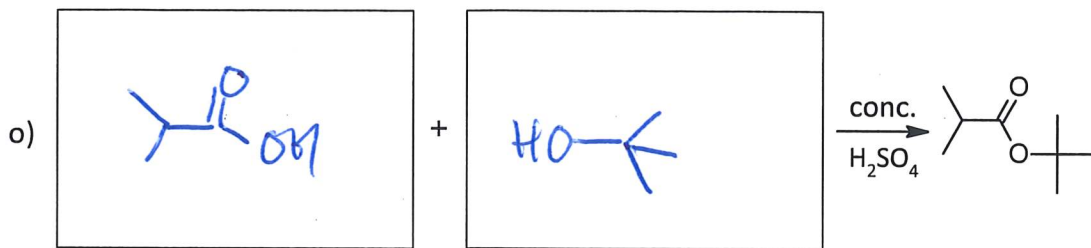
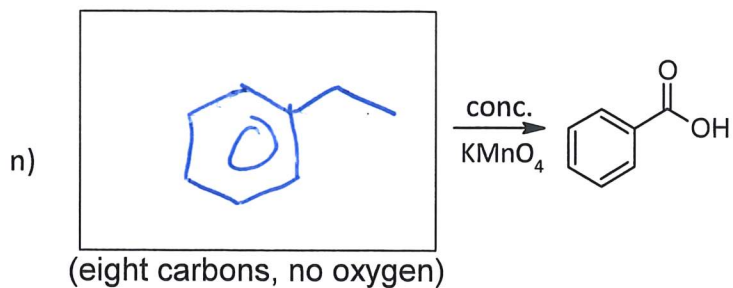
- 4) [2 marks] Draw a compound of formula C_4H_8O that has double bonds and that can have optical isomers (is chiral).



5) [17 marks] Fill in the boxes with the appropriate missing chemical or reaction condition (as appropriate).

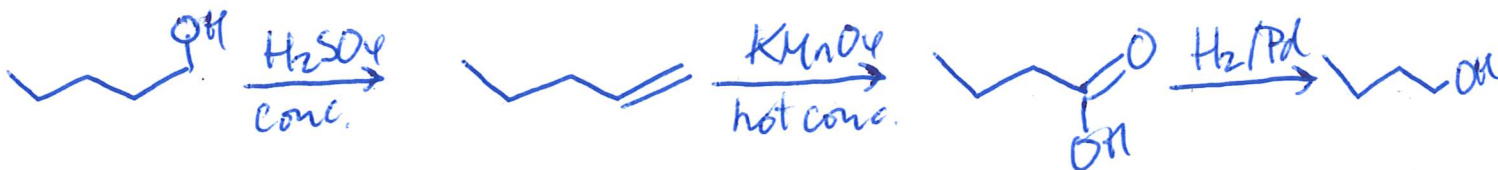




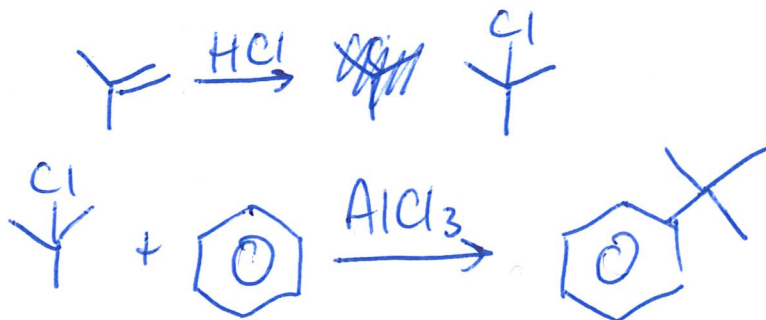


6) [6 marks] Show how you would perform the following syntheses.

a) 1-butanol from 1-pentanol



b) t-butylbenzene from benzene and 2-methylprop-1-ene



7) [20 marks] Complete the following table. The central atom is underlined for you. The Lewis structure you draw should be the "best" one for the species.

Species	Lewis Structure	Shape Name	Polar? (yes or no)	# of σ bonds	# of π bonds
<u>S</u> F ₄		See-saw	yes	4	0
Cl ₃ ⁻		linear	no	2	0
<u>O</u> F		bent	yes	2	0
<u>N</u> O ₂ ⁺		linear	no	2	2

8) [3 marks] Place the following boiling points (-37°C, 15°C, 38°C) next to the appropriate compound:



9) [3 marks] Place the following boiling points (2°C, 36°C, 49°C) next to the appropriate compound:

