

DAWSON COLLEGE
DEPARTMENT OF CHEMISTRY AND CHEMICAL TECHNOLOGY
ORGANIC CHEMISTRY I 202-BZF-05
Fall 2009

Final Examination

Instructors: D. Adley, B. Seivewright, E. Cadieux, S. Holden, H. Khouri, & S. Mäkinen

Write your name here: _____

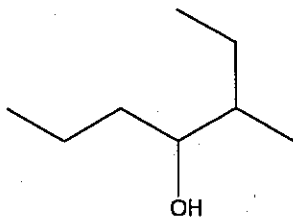
Sign your name here: _____

Instructions:

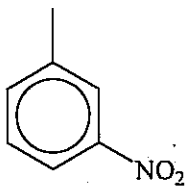
1. This examination package contains **19** questions and **16** pages. It is your responsibility to check that there are no pages missing.
2. Fill in your name before answering the questions.
3. Answer **ALL** questions in the **space provided**.

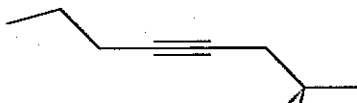
necessary. (2 pts each, total 12 pts)

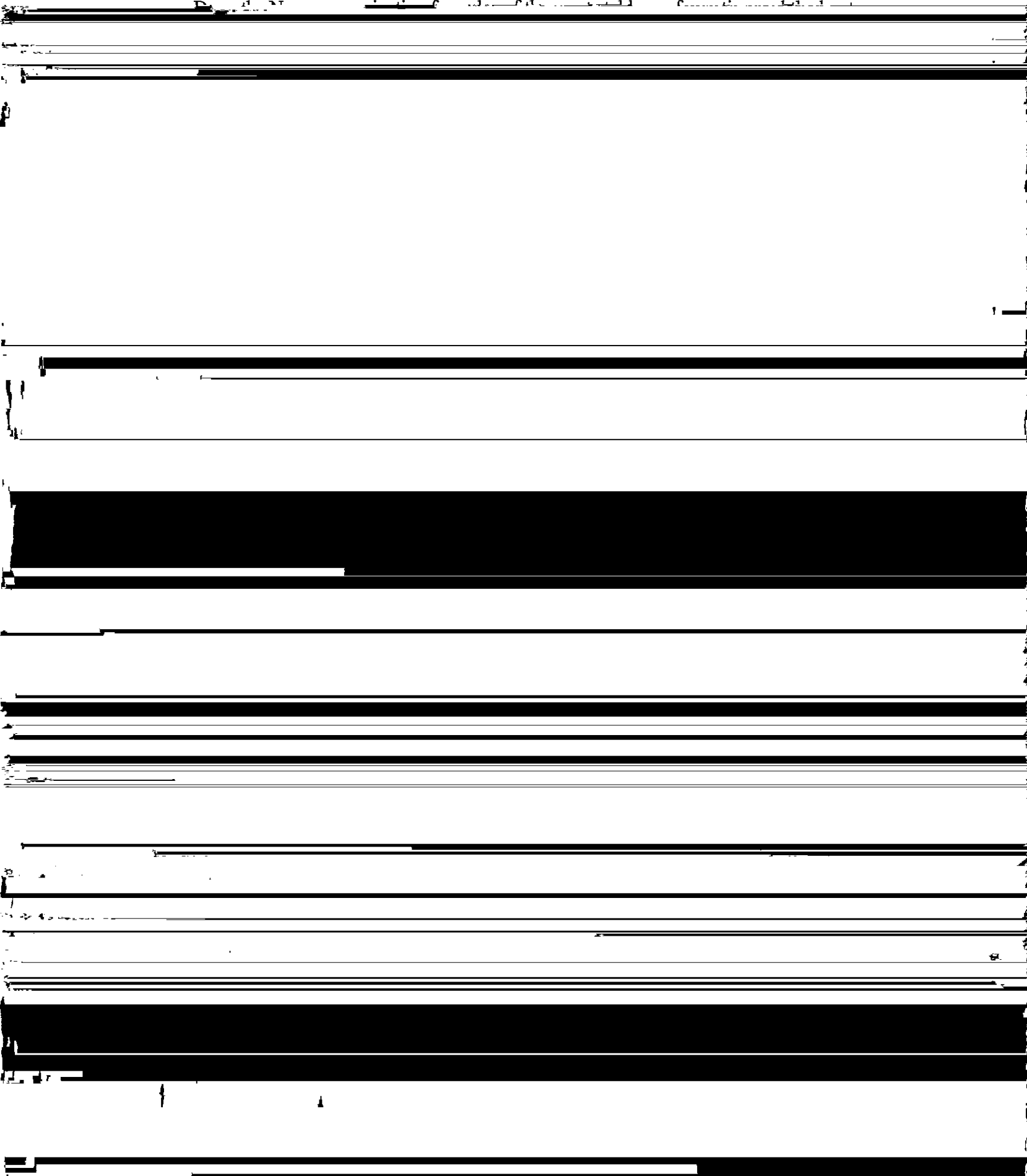
a.

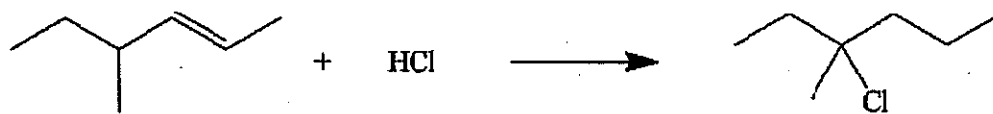


b.



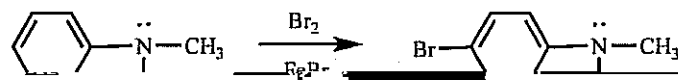




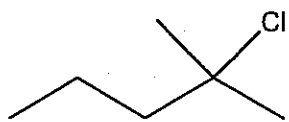


5.

- a. Draw the mechanism of the reaction below. Use the $\text{Br}-\text{Br}^+-\text{Fe}^-\text{Br}_3$ as the electrophile. Show all resonance structures of the carbocation (arenium ion) intermediate. (4 pts)



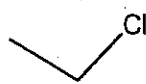
6. Arrange the following substrates in order of their increasing S_N2 reactivity with NaCN. (2 pts)



A



slowest



B

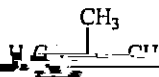


fastest



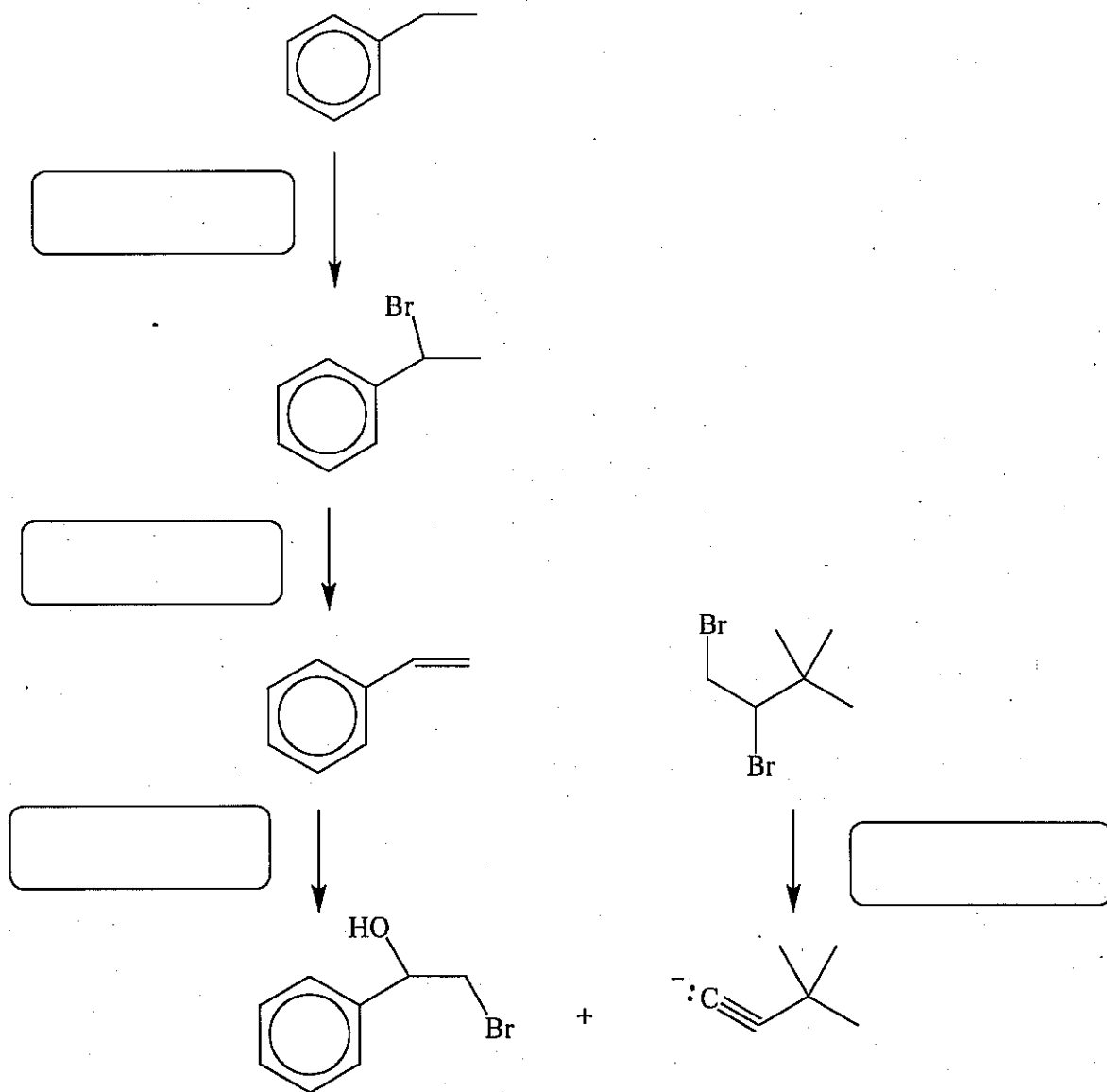
C

7. Draw the mechanism which accounts for the formation of the major organic product, when the two compounds are allowed to react. Draw in 3D when necessary. Use curved arrow notation. Draw and indicate clearly the structure of the major product. (4 pts)



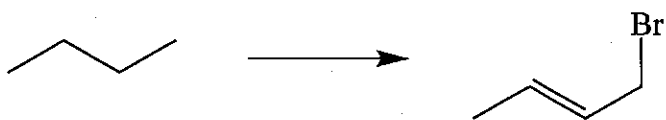
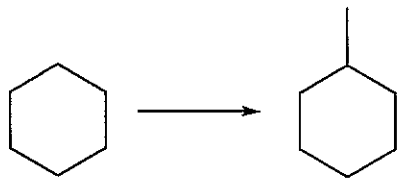
CH₃

8. Show the required reagents to synthesize the following compounds: Mechanisms are **not required**. Give the final product in the last box. (5 pts)

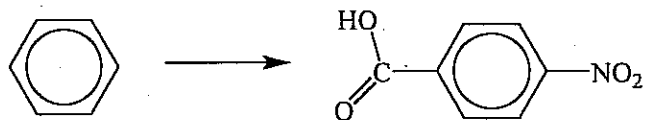


9. Show the required steps to synthesize the following compounds. Show all intermediate products. Use **any inorganic and organic reagents** necessary. Mechanisms are not required. (9 pts)

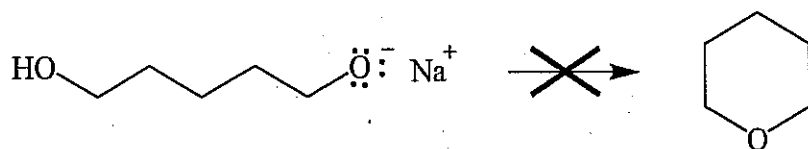
a.



c.



10. Explain why the following reaction does not occur. (1 pt)

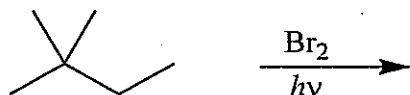


11.

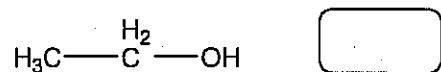
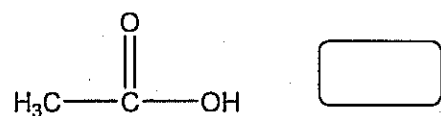
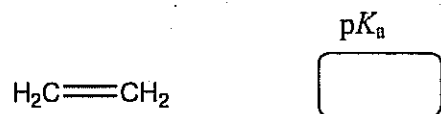
Give the structural formulae of all possible monobromination products for the following

11

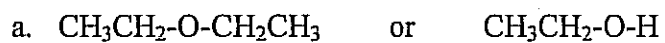
reaction. Circle the major product. (3 pts)



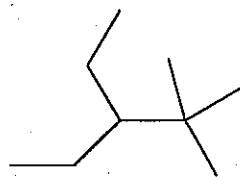
12. The compounds below have the pK_a values 4.7, 16, 45, and 62. Insert the correct pK_a value in the box for each compound. (4 pts)



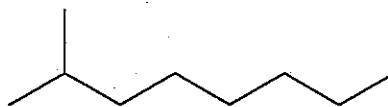
13. Which of the two compounds has a higher boiling point? Explain. (4 pts)



b.

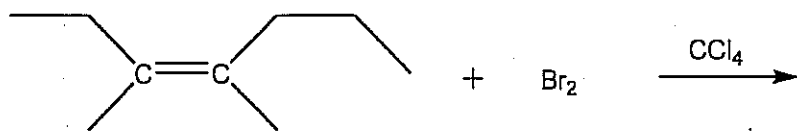


or



14.

a. Draw the 3D formulae of the products of the following reaction. (4 pts)

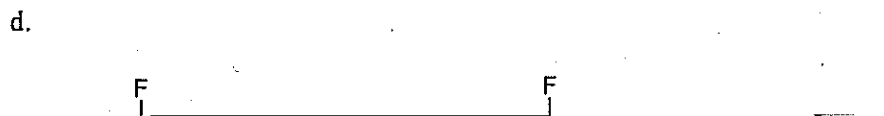
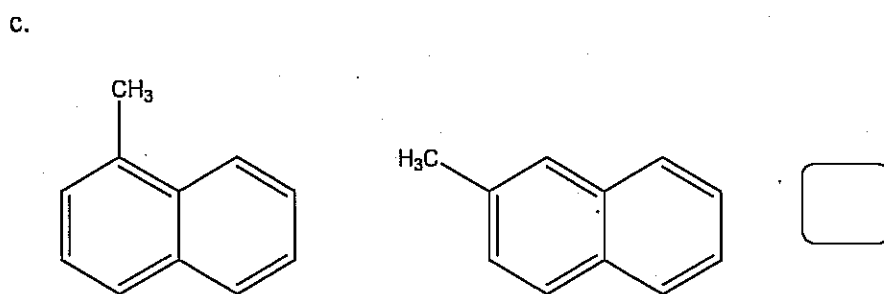
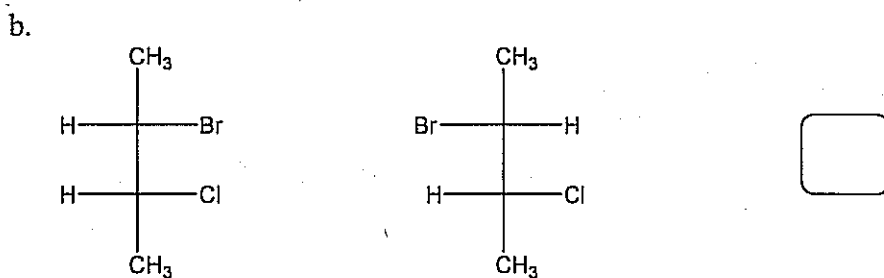
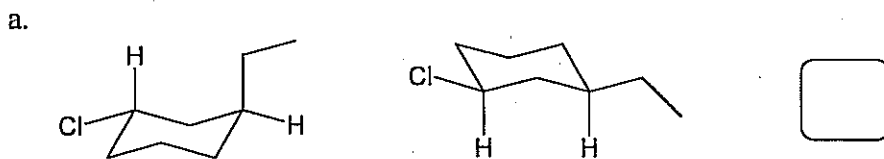


b. Will the final solution be optically active? (1 pt)

15. Give the absolute configuration of the chiral center in the following molecule.

16. What is the relationship between the following molecules? Place your answer in the box. (4 pts)

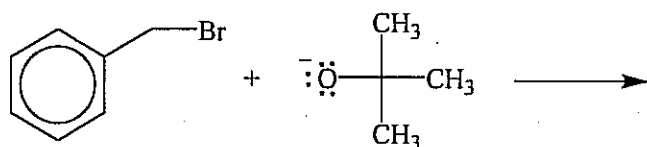
- i. enantiomers
- ii. diastereomers
- iii. constitutional isomers
- iv. same molecule
- v. none of the above



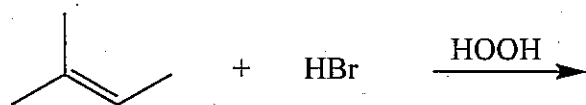
17. Give the structural formulas of the significant organic products for the following reactions.
For the reactions with more than one significant organic product, circle the major product.

Include stereochemistry where applicable. (2 pts each, total 10 pts)

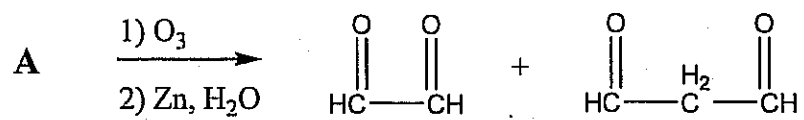
a)



b)



(C₅H₆) gives the following products: (2 pts)



What is the structure of compound A?

groups
elements

18
VIII

2	He Helium 4.0026	10	Ne Neon 20.180	18	Ar Argon 39.948	36	Kr Krypton 83.798	54	Xe Xenon 131.29	86	Rn Radon (222)												
8	F Fluorine 18.998	9	Cl Chlorine 35.453	17	Br Bromine 79.904	35	I Iodine 126.90	53	At Astatine (210)	85	Lr Lawrencium (262)												
6	Li Lithium 6.941	3	Na Sodium 22.990	11	K Potassium 39.098	19	Rb Rubidium 85.468	37	Cs Cesium 132.905	55	Ba Barium 137.327												
4	Be Beryllium 9.012	2	Mg Magnesium 24.305	12	Zn Zinc 65.38	20	Cd Cadmium 112.411	38	Hg Mercury 200.59	56	Pb Lead 207.2												
2	H Hydrogen 1.00794	1	Li Lithium 6.941	3	Na Sodium 22.990	11	K Potassium 39.098	19	Rb Rubidium 85.468	37	Cs Cesium 132.905	55	Ba Barium 137.327	81	Tl Thallium 204.38	83	Pb Lead 207.2	85	Bi Bismuth 208.98	87	Po Polonium (209)	89	Ac Actinium (227)
1	H Hydrogen 1.00794	2	He Helium 4.0026	10	Ne Neon 20.180	18	Ar Argon 39.948	36	Kr Krypton 83.798	54	Xe Xenon 131.29	86	Rn Radon (222)										

f block elements

71	Lu Lutetium 174.967	103	Lr Lawrencium (262)
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