Key

Chemistry 2541, Fall 2015
Midterm Exam 3

(100 points)

Important notes:

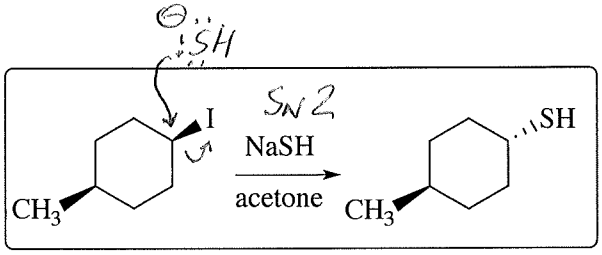
- Please use the provided Scantron form for your answers; you can keep the sheet with the questions and can use it as scratch paper
- Do not forget to write your name on the Scantron form
- You will not receive credit for unmarked answers or for more than one mark on answer line
- Your scores will be posted on eGradebook; graded Scantron forms will not be returned to students.

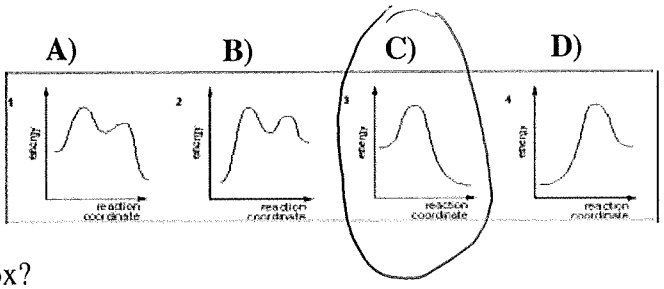
Questions 1-28 (84 pts): Please mark the appropriate box on the front of the Scantron form (3 pts each).

1. What is the common name of **3-chloropropene**? $CH_2=CH-CH_2-Cl$

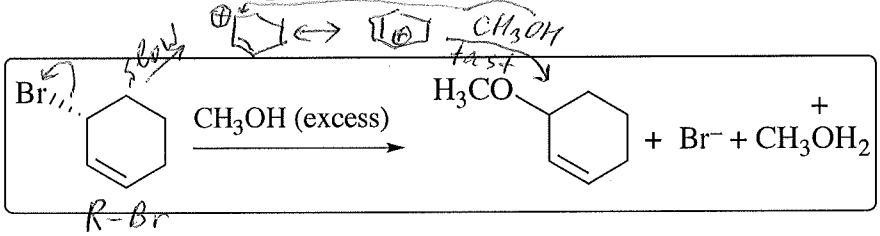
A) propenyl chloride (B) allyl chloride C) vinyl chloride D) methylene chloride

2. What is the **energy diagram** for the reaction in the box:



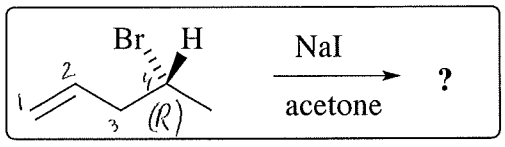


3. What is the **rate equation** for the reaction in the box?



A) Rate = k [RBr][CH_3OH]
(B) Rate = k [RBr] 1st order
C) Rate = k [RBr][Br^-]
D) Rate = k [CH_3OH]

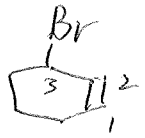
4. What is the IUPAC name of the major **product** for the reaction shown in the box?

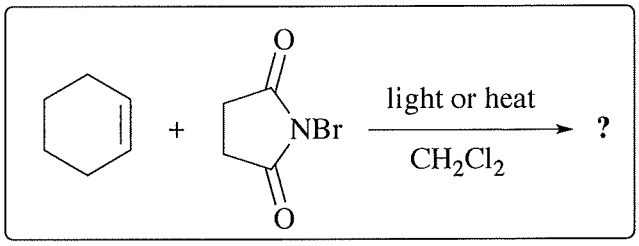


A) (*S*)-2-iodopentane B) (*R*)-2-iodopentane
(C) (*S*)-4-iodo-1-pentene D) (*R*)-4-iodo-1-pentene

SN2 - inversion

5. What is the IUPAC name of the major **product** for the reaction shown in the box?

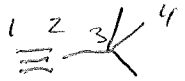


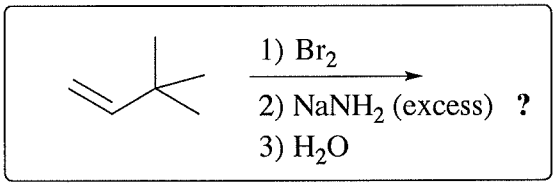


A) 1-bromocyclohexene B) 2-bromocyclohexene

C) 3-bromocyclohexene D) bromocyclohexane

6. What is the IUPAC name of the major **product** for the reaction shown in the box?

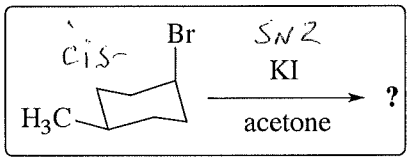




A) 3,3-dimethyl-1-butyne B) 4,4-dimethyl-2-pentyne

C) 4,4-dimethyl-1-pentyne D) 3,3-dimethyl-1-pentyne

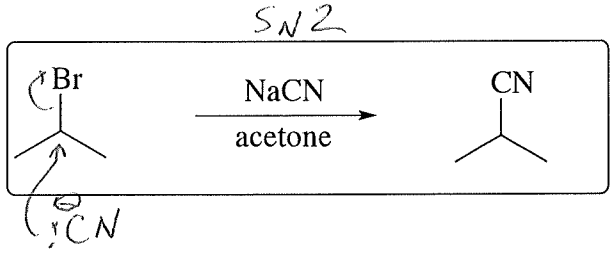
7. What is the IUPAC name of the major **product** for the reaction shown in the box?

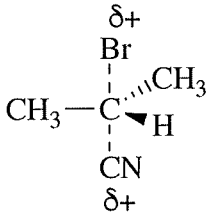


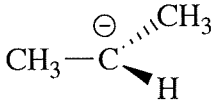
A) *cis*-1-iodo-4-methylcyclohexane B) *trans*-1-iodo-4-methylcyclohexane

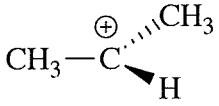
C) *cis*-4-bromo-1-methylcyclohexane D) *trans*-4-bromo-1-methylcyclohexane

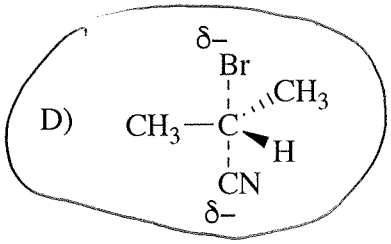
8. Which structure best represents the **transition state** for the reaction in the box?



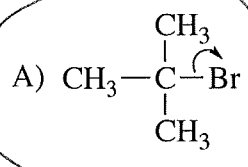
A) 

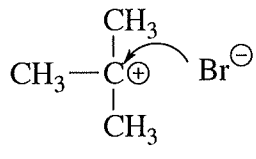
B) 

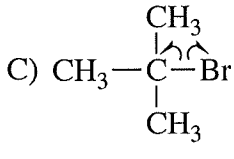
C) 

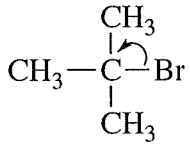
D) 

9. Which best describes the rate-limiting step in the S_N1 mechanism?

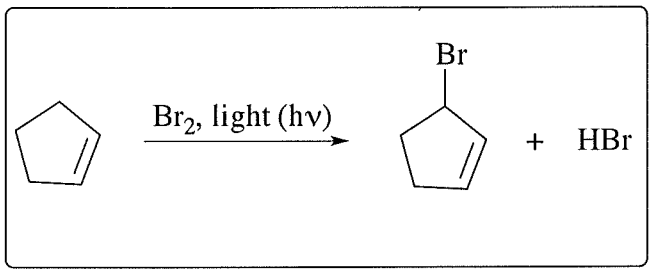
A) 

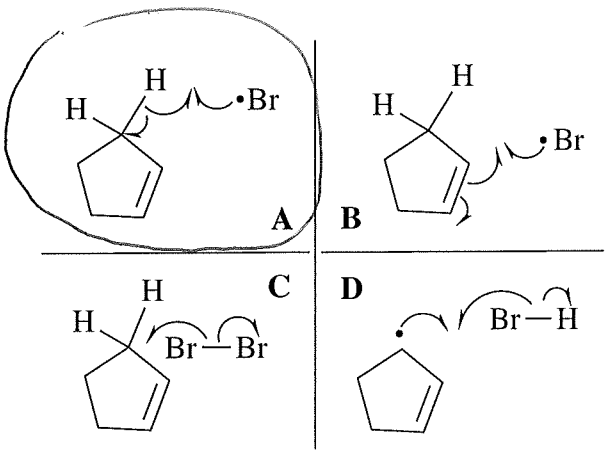
B) 

C) 

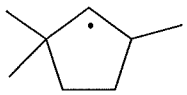
D) 

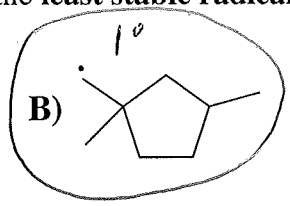
10. Which one of the following four schemes (**A-D**) represents a **step** in the **mechanism** of the reaction in the box?

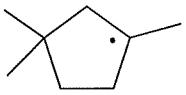


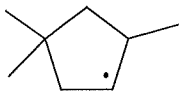


11. Which of the following is the **least stable radical**?

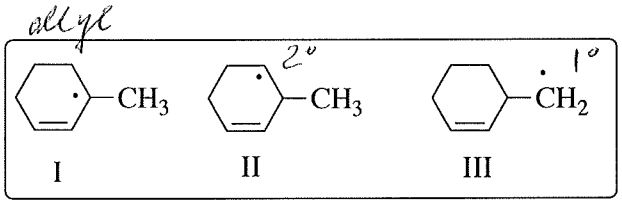
A) 

B) 

C) 

D) 

12. Arrange the **radicals** shown in the box in order of increasing stability.

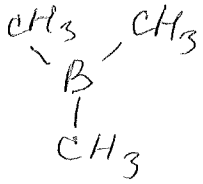


A) (least stable) I < III < II **B)** (least stable) II < I < III

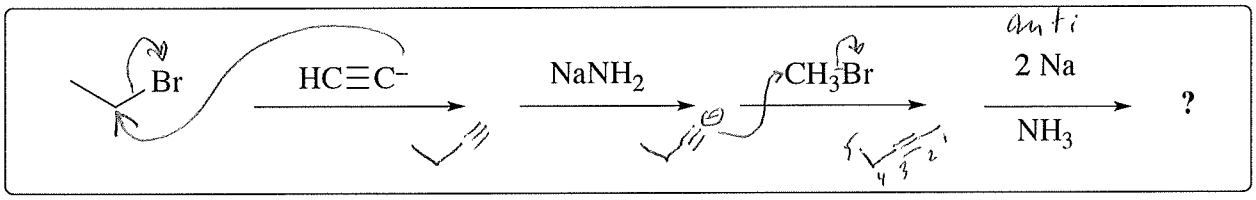
C) (least stable) III < I < II **D)** (least stable) III < II < I

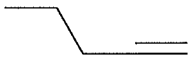
13. Which of the following compounds is **not a nucleophile**?

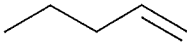
A) H_2O **B)** CH_3OH **C)** $(CH_3)_3N$: **D)** $(CH_3)_3B$

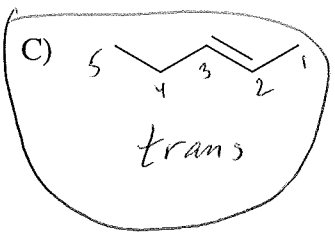


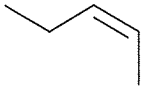
14. What is the main **product** of the reaction sequence shown in the box?



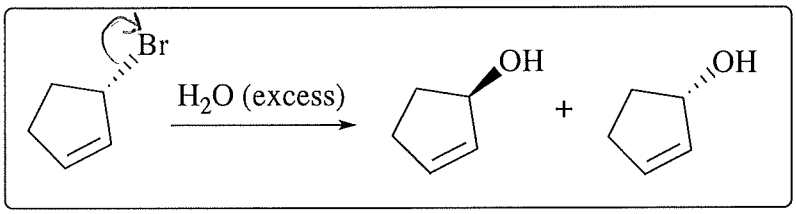
A) 

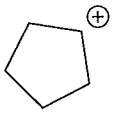
B) 

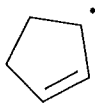
C) 

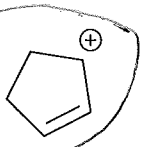
D) 

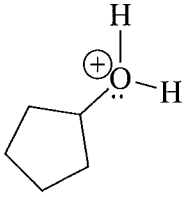
15. What is the structure of an **intermediate** in the reaction shown in the box?



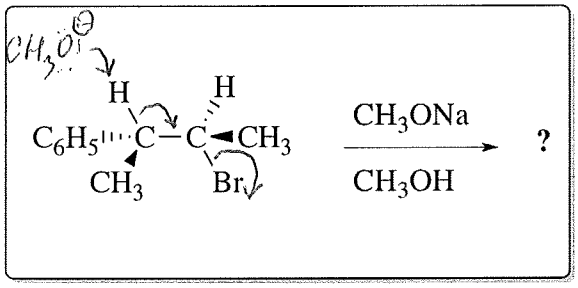
A) 

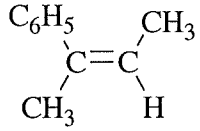
B) 

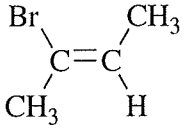
C) 

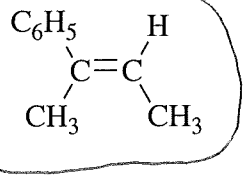
D) 

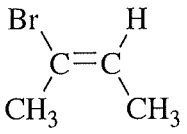
16. What is the main **product** of the **E2-elimination** reaction shown in the box?



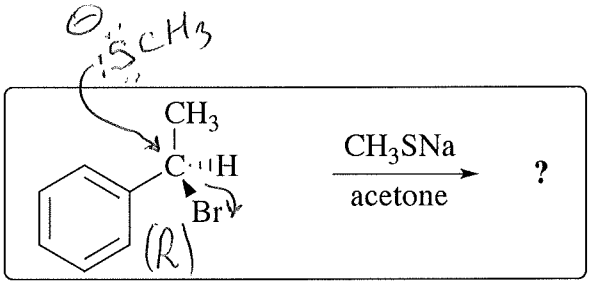
A) 

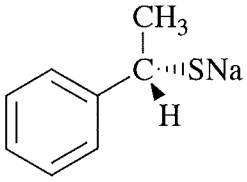
B) 

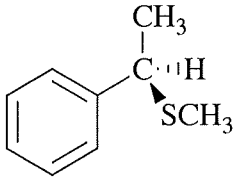
C) 

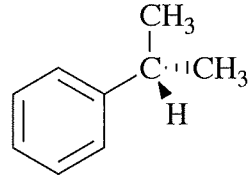
D) 

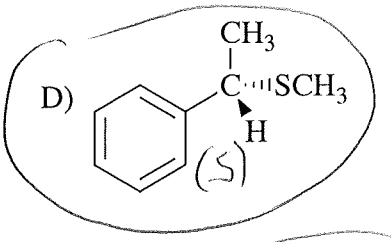
17. What is the main **product** of the reaction shown in the box?



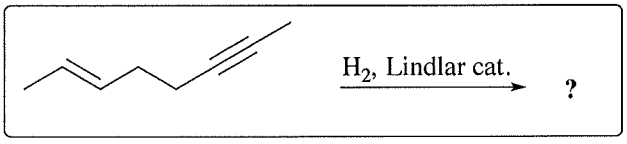
A) 

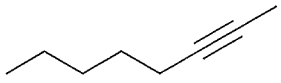
B) 

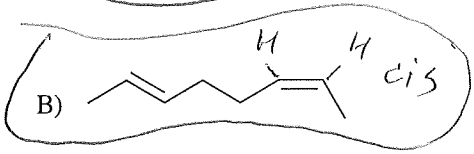
C) 

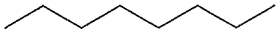
D) 

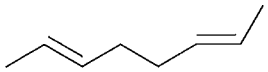
18. What is a main **product** of the reaction shown in the box?



A) 

B) 

C) 

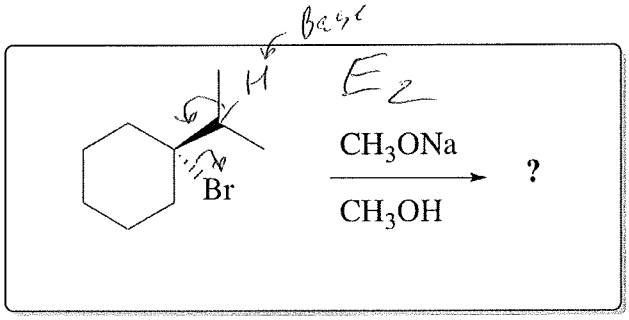
D) 

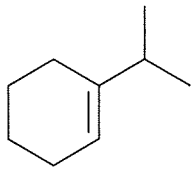
19. Which one of the following compounds has the **best leaving group**?

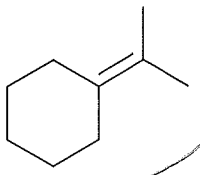
A) cyclohexanol B) bromocyclohexane C) chlorocyclohexane D) fluorocyclohexane

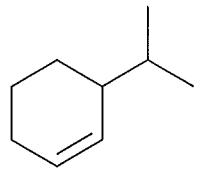
20. What is the main **product** of the reaction shown in the box?

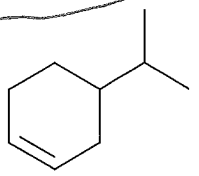
4 subst, most stable



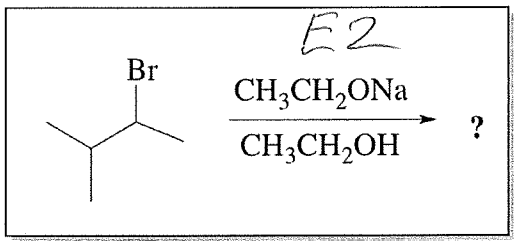
A) 

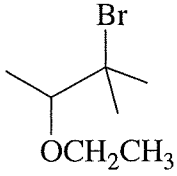
B) 

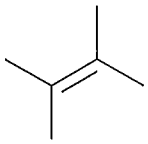
C) 

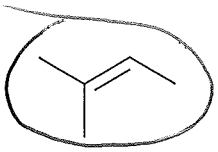
D) 

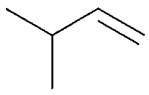
21. What is the main **product** of the reaction shown in the box?



A) 

B) 

C) 

D) 

S_N2

22. Which of the following bromoalkanes reacts the **fastest** with sodium cyanide, **NaCN**, in **acetonitrile**?

1° 3° 2° 2°

A) bromoethane B) 2-bromo-2-methylbutane C) 1-bromo-3-methylcyclobutane D) bromocyclohexane

23. In which of the following **solvents** would the reaction of **1-bromobutane** with sodium azide, NaN_3, proceed the **fastest**? S_N2

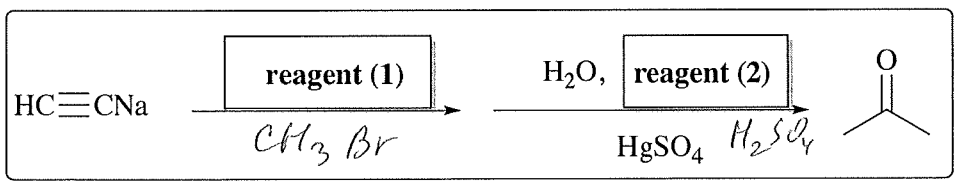
A) methylene chloride **B)** methanol **C)** chloroform **D)** DMSO

24. Which one of the following compounds is the **best** choice as a **reagent** for an **E2** reaction?

A) *t*-BuCl B) C_2H_5ONa C) NaI D) $C_2H_5OCH_3$

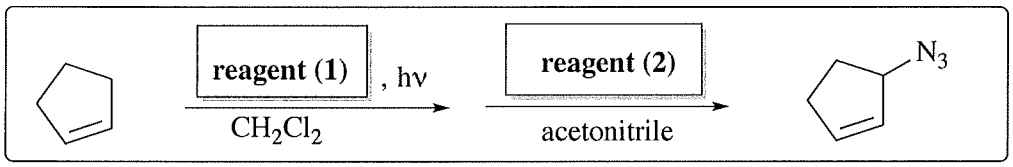
base

25. Which sequence of **reagents** can be used for the reaction shown in the box?



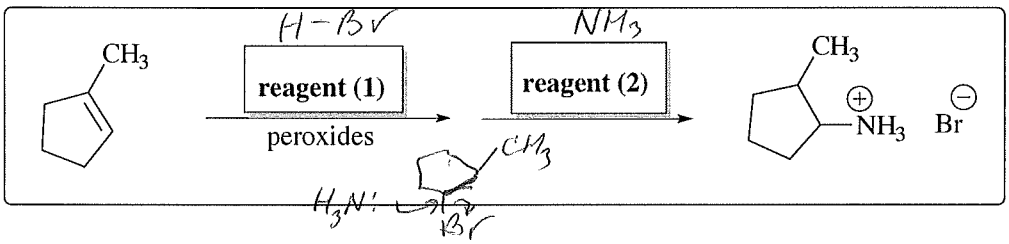
A) (1) CH_3Br, (2) $(sia)_2BH$
B) (1) Na, (2) $(sia)_2BH$
C) (1) $NaNH_2$, (2) H_2SO_4
D) (1) CH_3Br, (2) H_2SO_4

26. Which sequence of **reagents** can be used for the reaction shown in the box?



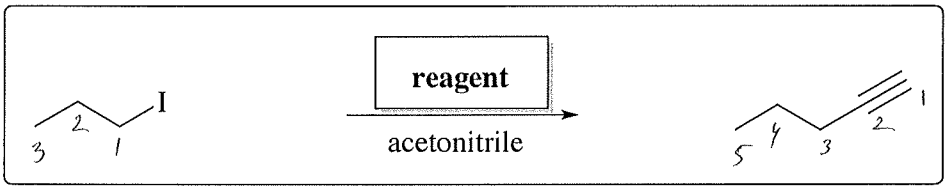
A) (1) HBr, (2) NaN_3
B) (1) NBS, (2) NaN_3
C) (1) $NaNH_2$, (2) Br_2
D) (1) NaNH, (2) CH_3Br

27. Which sequence of **reagents** can be used for the reaction shown in the box?



A) (1) NBS, (2) NH_3
B) (1) HBr, (2) CH_3NH_2
C) (1) HBr, (2) NH_3
D) (1) Br_2, (2) CH_3NH_2

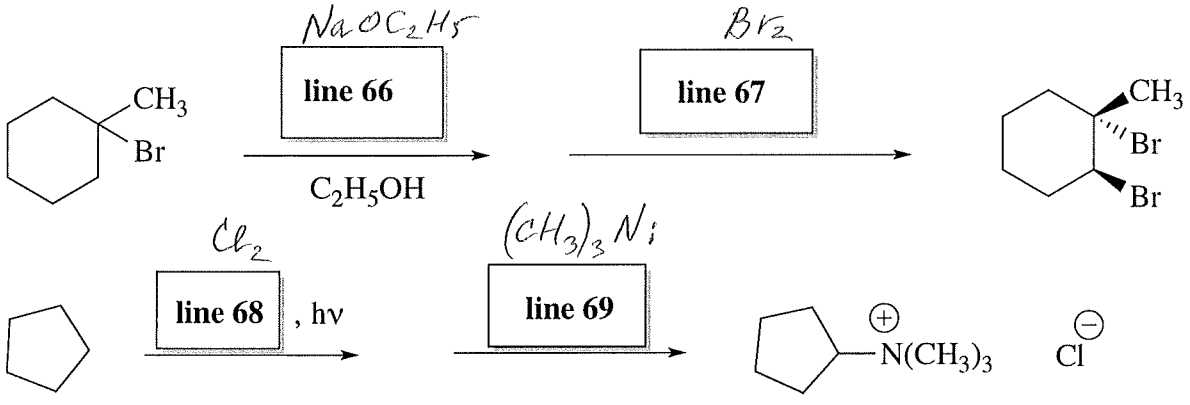
28. Which **reagent** can be used for the reaction shown in the box?



A) NaCN B) $HC{\equiv}CNa$
C) NaN_3 D) $CH_3C{\equiv}CNa$

Question 29: Please write your answers into the appropriate space on the back of the Scantron form

29. Provide the **reagents** that give indicated products in high yield (4 pts each):



3° amine