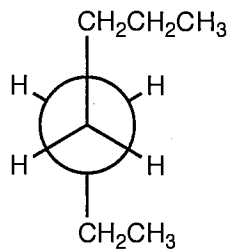
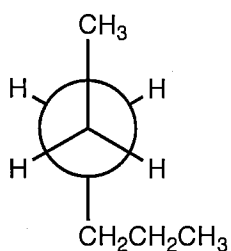


PICK THE MOST ACCURATE ANSWER FOR EACH QUESTION

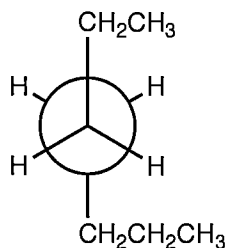
1. Which one of the following is the correct Newman projection for the most stable conformer (Anti) of octane?



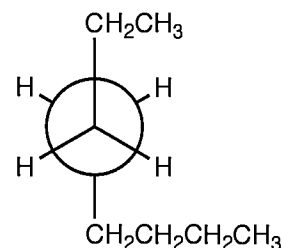
A



B



C

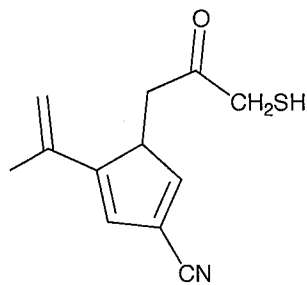


D

2. How many valence electrons are there in a Krypton (Kr) atom?

A) 1 B) 2 C) 3 D) 4 E) 5 F) 6 G) 7 H) 8

Use Molecule A, below to answer questions 3 thru 7



Molecule A

3. What is the hybridization of Sulfur in **Molecule A**?

A) SP B) SP² C) SP³ D) SP⁴

4. What is the hybridization of nitrogen in **Molecule A**?

A) SP B) SP² C) SP³ D) SP⁴

5. What is the hybridization of oxygen in **Molecule A**?

A) SP B) SP² C) SP³ D) SP⁴

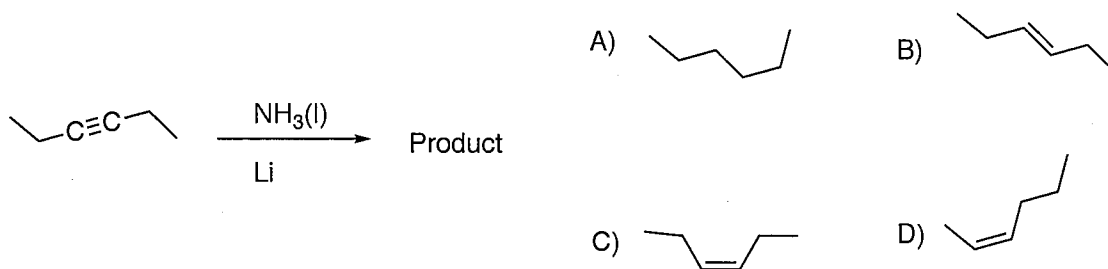
6. How many pi-bonds are there in **Molecule A**?

- A) 4 B) 5 C) 6 D) 7 E) 8 F) 9 g) 10

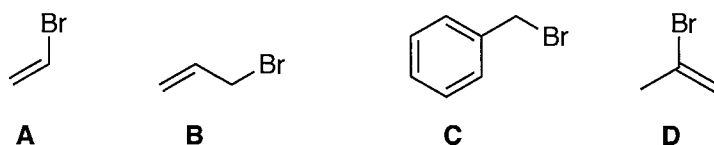
7. Which of the following is the correct molecular formula for **Molecule A**?

- A) $C_{11}H_{11}NOS$ B) $C_{11}H_{13}NOS$ C) $C_{11}H_{12}NOS$ D) $C_{12}H_{13}NOS$

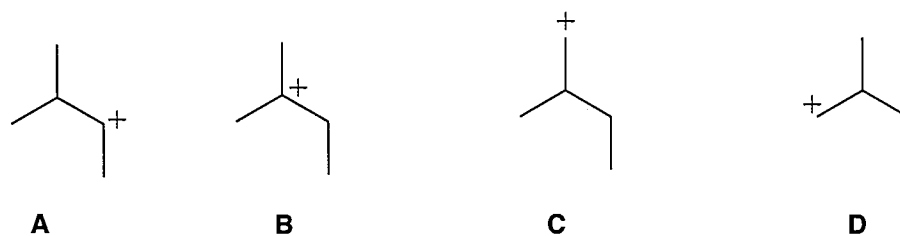
8. What is the correct product of the following reaction?



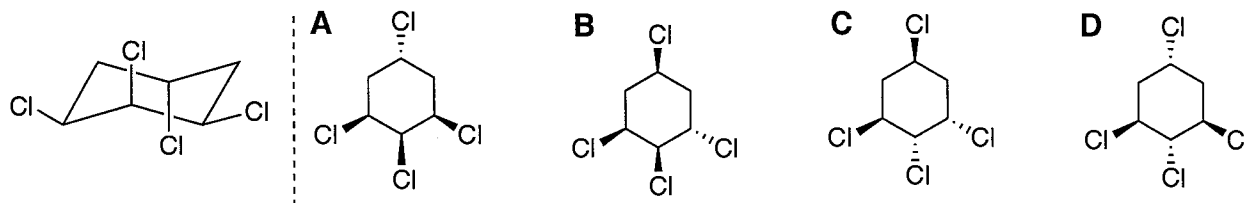
9. Which of the following is the correct structure of vinyl bromide?



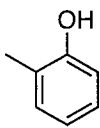
10. Which of the following is a the most stable carbocation among the following?



11. What is the correct representation of the **chair structure** on the left?



12. Which of the following is the correct name of **compound B**?



Compound B

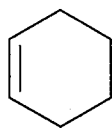
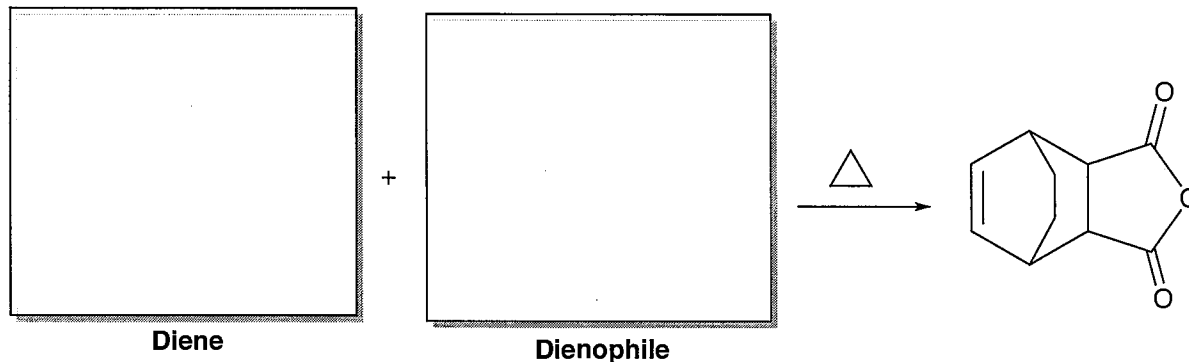
A) ortho-hydroxyphenol

B) ortho-methylphenol

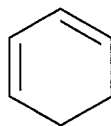
C) meta-hydroxyphenol

D) meta-methylphenol

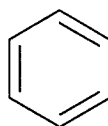
13. Choose the **Diene** that is responsible for the following Diels–Alder reaction?



A



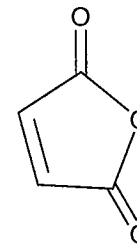
B



C

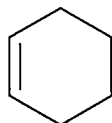


D

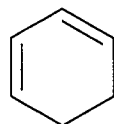


E

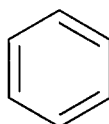
14. Which of the following is the **Dienophile** in the above Diels–Alder reaction?



A



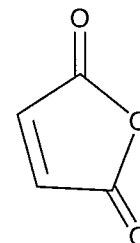
B



C

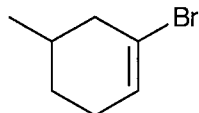


D



E

15. Which of the following is the correct names for **Compound C**?



Compound C

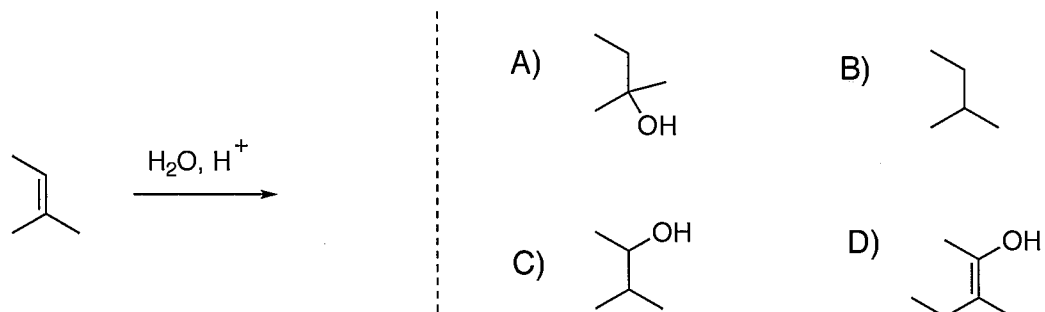
A) 1-Bromo-5-methylcyclohexene

B) 2-Bromo-4-methylcyclohexene

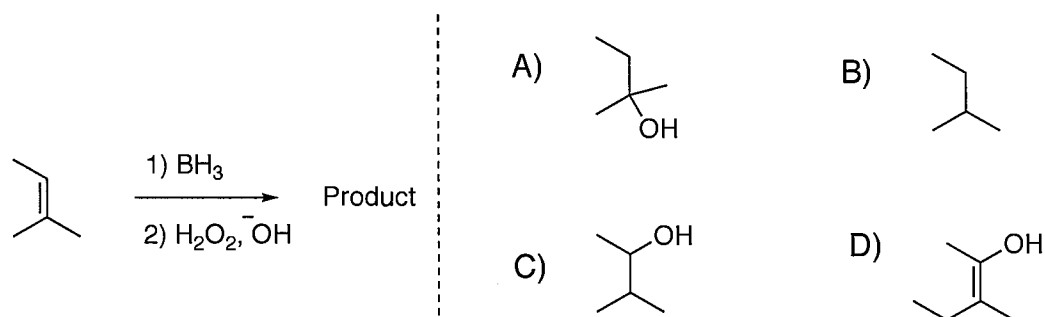
C) 1-Bromo-3-methylcyclohexene

D) 3-Bromo-4-methylcyclohexene

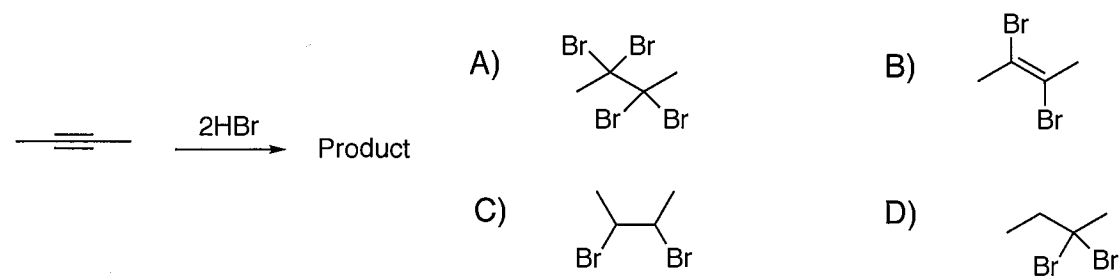
16. What is the correct product of the following reaction?



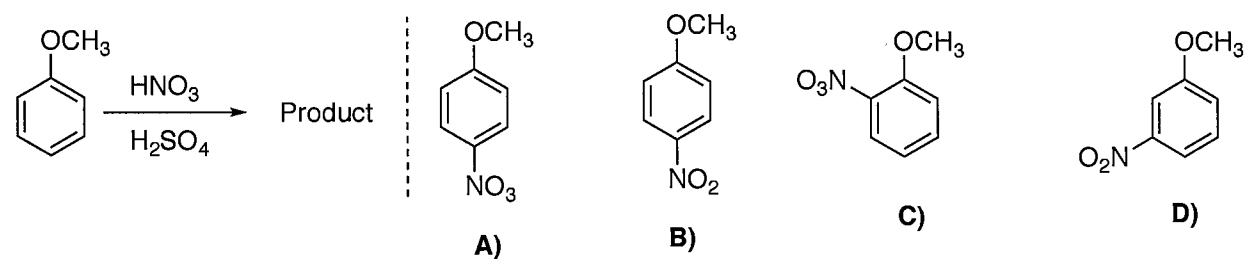
17. What is the correct product of the following reaction?



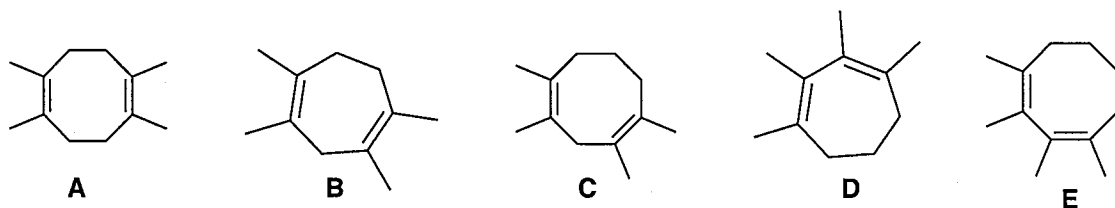
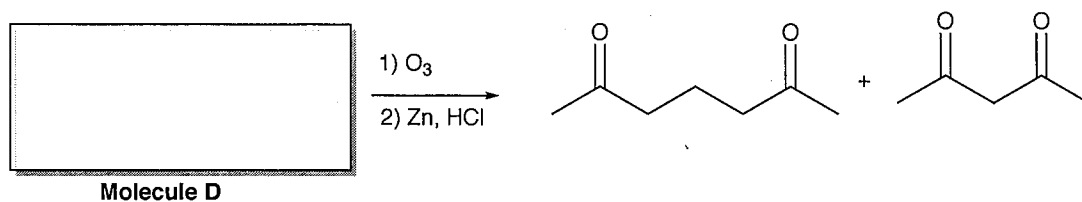
18. What is the correct product of the following reaction?



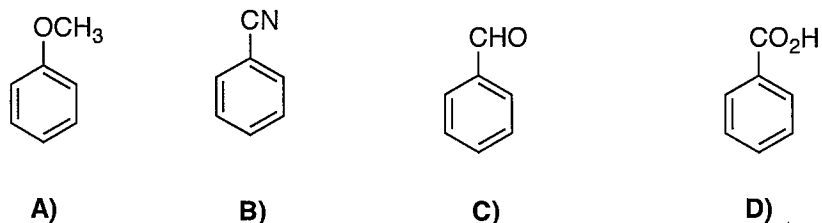
19. What is the correct product of the following reaction?



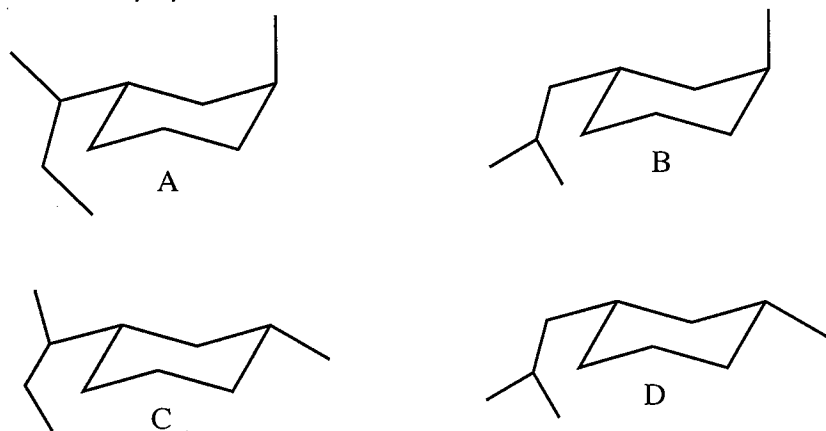
20. What is the identity of **Molecule D** in the following Ozonolysis reaction?



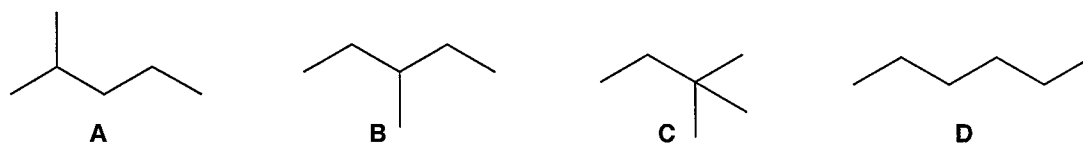
21. Which of the following compound is benzonitrile?



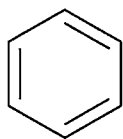
22. Which of the following compounds represent the most stable chair conformer of cis-1-sec-butyl-3-methylcyclohexane?



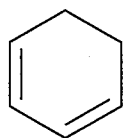
23. Which of the following alkanes has the highest boiling point among the following?



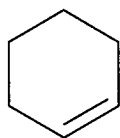
24. Which of the following hydrocarbons is the most stable one among the following?



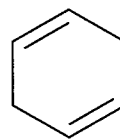
A



B

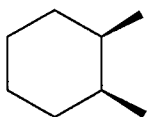
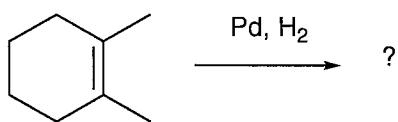


C

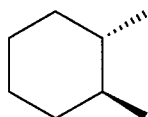


D

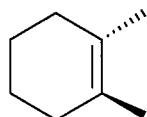
25. Which of the following is the product of the reaction below?



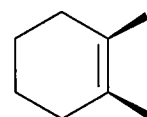
A



B



C



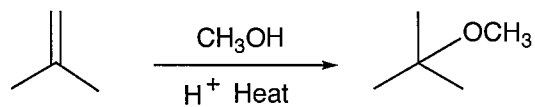
D

Bonus Question: (10 Points)

Name:

PID:

MTBE is a fuel additive for enhancing the octane number in gasoline. It is made in industry by reacting isobutene with methyl alcohol in presence of a mineral acid as below.



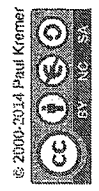
1. (5 points) Draw the structure of all reaction intermediates for the above reaction.
2. (5 Points) Provide an energy diagram for the above reaction, indicating the position of reactant, products, carbocation intermediate, energy of activations, transition states, enthalpy, and Gibbs free energy assuming an exothermic process.

ChemGlobe - Periodic Table of Elements

<http://chemglobe.org/periodictable>

18

			Atomic number			Electron configuration			Symbol			Melting point (°C)			Boiling point (°C)			Density [g/cm³] for gases [g/l] (0°C, 1013mbat)			Oxidation states			Radioactive		
1	1	1.01	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	2	6.94	3	4	9.01	2	2A	2	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
1	2	2.016	3	4	9.01	2	2A	2	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
1	2	7.00	3	4	9.01	2	2A	2	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
1	2	7.00	3	4	9.01	2	2A	2	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
1	2	9.01	3	4	9.01	2	2A	2	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
1	2	9.01	3	4	9.01	2	2A	2	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
1	2	11.0	3	4	9.01	2	2A	2	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
1	2	11.0	3	4	9.01	2	2A	2	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
1	2	22.99	11	12	24.31	10	10A	10	11	11	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
1	2	22.99	11	12	24.31	10	10A	10	11	11	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
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1	2	22.99	11	12	24.31	10	10A	10	11	11	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
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1	2	22.99	11	12	24.31	10	10A	10	11	11	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12



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