

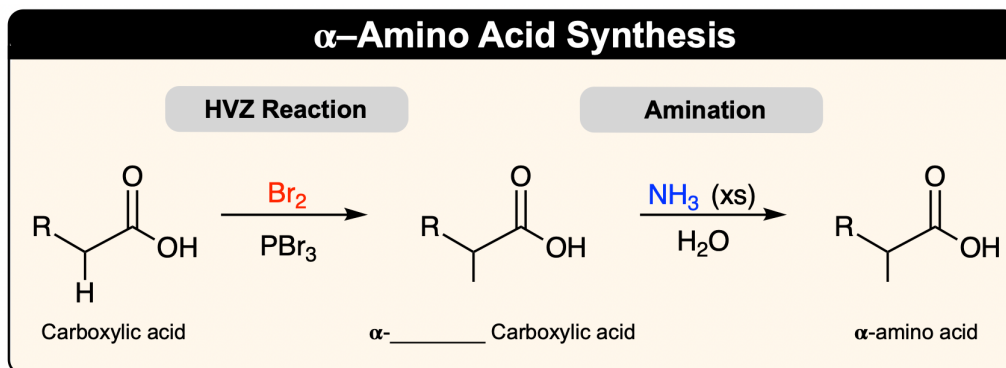
CONCEPT: AMINO ACID SYNTHESIS: HVZ METHOD

- The Hell-Volhard-Zelinsky (HVZ) Method = HVZ Reaction + _____.

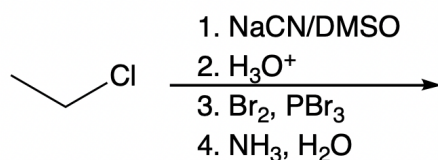
□ Takes place in ____ steps:

① **HVZ Reaction:** a ____ atom displaces the ____ atom of a carboxylic acid.

② **Amination:** Ammonia attacks the ____ atom in an ____ reaction.



EXAMPLE: Identify the amino acid formed from the following synthetic route.



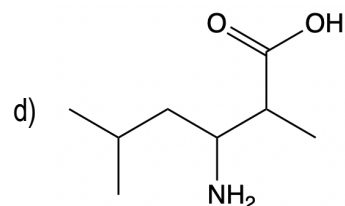
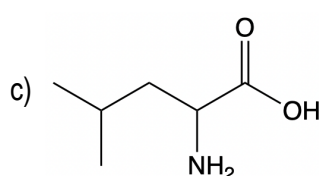
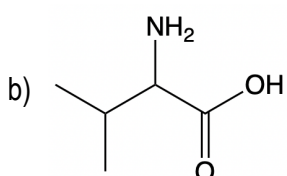
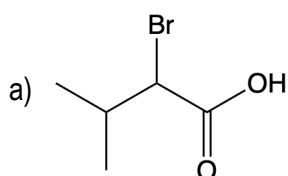
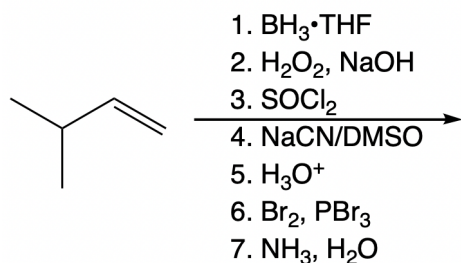
a) Glycine

b) Alanine

c) Aspartic acid

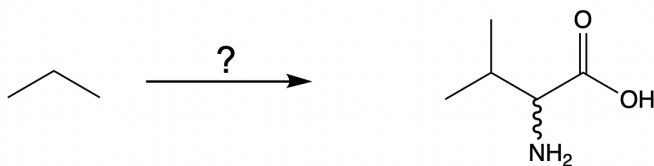
d) Lysine

PRACTICE: Predict the final product based on the list of reagents given.

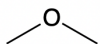


CONCEPT: AMINO ACID SYNTHESIS: HVZ METHOD

PRACTICE: Beginning from propane, select the best reagents provided to synthesize valine via the HVZ method.

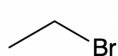


- a) 1. $\text{Br}_2/\text{h}\nu$
2. Mg, ether
3.



4. H_3O^+
5. $\text{KMnO}_4, \text{H}_2\text{O}$
6. $\text{Br}_2, \text{PBr}_3$
7. $\text{NH}_3, \text{H}_2\text{O}$

- b) 1. $\text{Na}_2\text{Cr}_2\text{O}_7$
2. H_3O^+
3.



4. $\text{Br}_2, \text{PBr}_3$
5. $\text{NH}_3, \text{H}_2\text{O}$

- c) 1. $\text{Br}_2/\text{h}\nu$
2. Mg, ether
3.



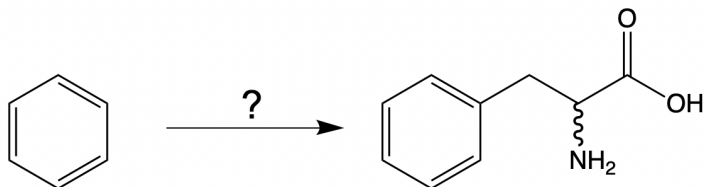
4. H_3O^+
5. $\text{Br}_2, \text{PBr}_3$
6. $\text{NH}_3, \text{H}_2\text{O}$

- d) 1. $\text{Br}_2/\text{h}\nu$
2. Mg, ether
3.



4. H_3O^+
5. $\text{KMnO}_4, \text{H}_2\text{O}$
6. $\text{Br}_2, \text{PBr}_3$
7. $\text{NH}_3, \text{H}_2\text{O}$

PRACTICE: Beginning from benzene, provide the chemical steps needed to prepare phenylalanine via HVZ method.



- a) 1. $\text{CH}_3\text{Br}/\text{AlBr}_3$
2. $\text{KMnO}_4, \text{H}_2\text{O}$
3. Mg, ether



5. H_3O^+
6. $\text{KMnO}_4, \text{H}_2\text{O}$
7. $\text{Br}_2, \text{PBr}_3$
8. $\text{NH}_3, \text{H}_2\text{O}$

- b) 1. $\text{CH}_3\text{Br}/\text{AlBr}_3$
2. Mg, ether
3.



4. H_3O^+
5. $\text{KMnO}_4, \text{H}_2\text{O}$
6. $\text{Br}_2, \text{PBr}_3$
7. $\text{NH}_3, \text{H}_2\text{O}$

- c) 1. $\text{CH}_3\text{Br}/\text{AlBr}_3$
2. $\text{Br}_2/\text{h}\nu$
3. Mg, ether



5. H_3O^+
6. $\text{KMnO}_4, \text{H}_2\text{O}$
7. $\text{Br}_2, \text{PBr}_3$
8. $\text{NH}_3, \text{H}_2\text{O}$

- d) 1. CH_3Br
2. $\text{Br}_2/\text{h}\nu$
3. Mg, ether



5. H_3O^+
6. $\text{KMnO}_4, \text{H}_2\text{O}$
7. $\text{Br}_2, \text{PBr}_3$
8. $\text{NH}_3, \text{H}_2\text{O}$