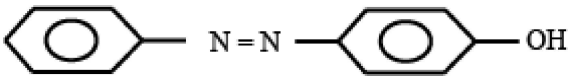
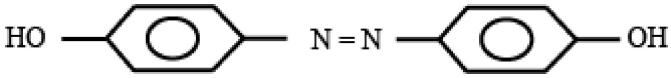
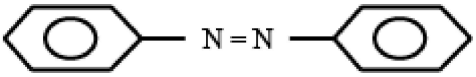
1. The product C in the following reaction is

$$C_6H_5 - NO_2 \xrightarrow{Fe/HCl} A \xrightarrow[273K]{HNO_2} B \xrightarrow{C_6H_5OH} C,$$

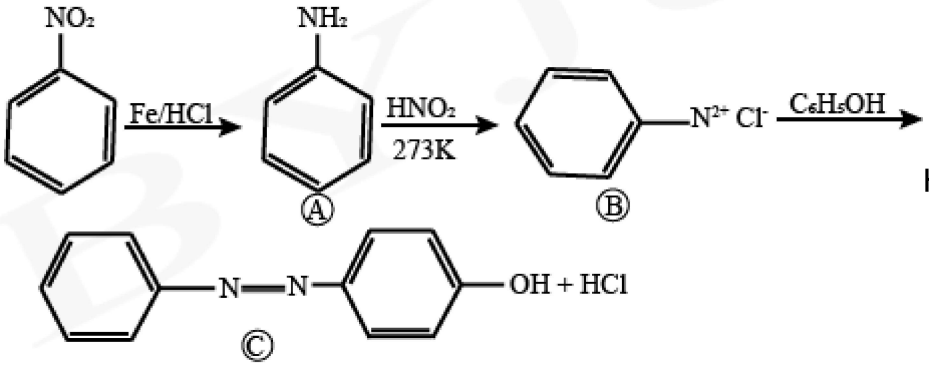
✔ **A.** 

✘ **B.** 

✘ **C.** 

✘ **D.** 

In the first step, there is reduction of nitro group and then in the second step, there is formation of diazonium salt as product B. In the third reaction, coupling reaction takes place between benzene diazonium salt and phenol to p-Hydroxyazobenzene (an orange dye) as product C. The reaction is as follow:



Hence, the correct option is (a).

2. Which of the following compounds will not undergo azo coupling reaction with benzene diazonium chloride?

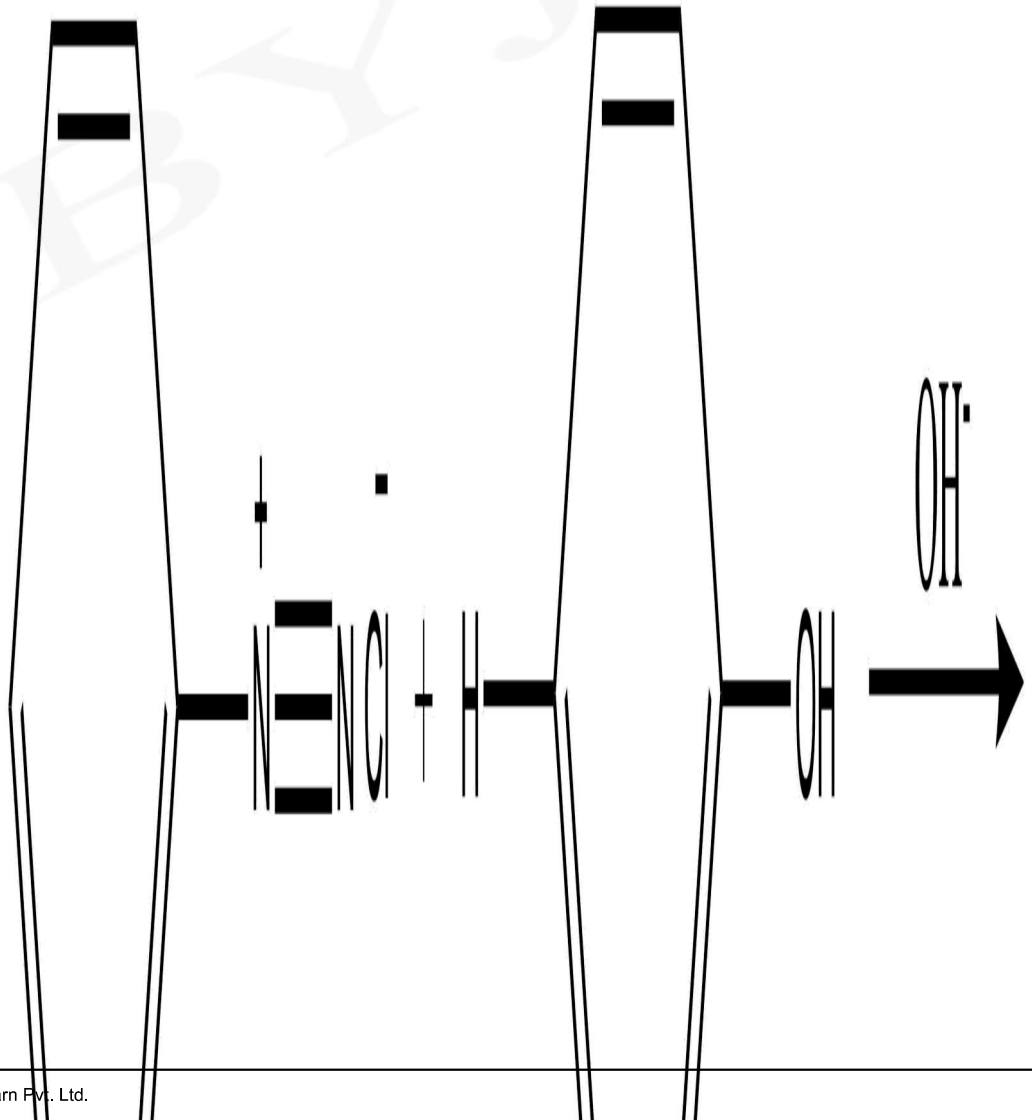
A. Aniline

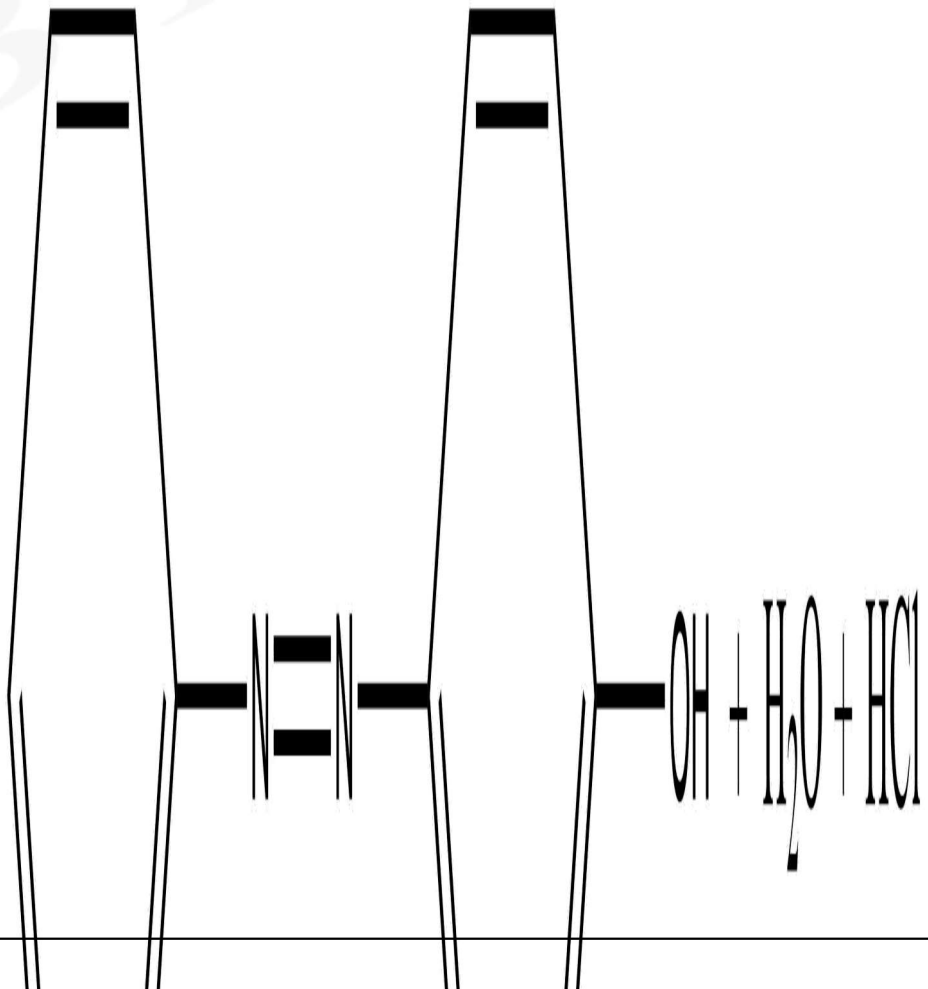
B. Phenol

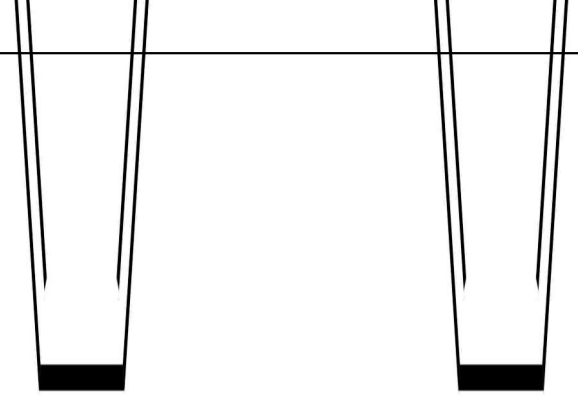
C. Nitrobenzene

D. None of the above

Diazonium salt is a weak electrophile and hence it reacts with electron-rich compounds containing electron donating groups such as $-OH$, $-NH_2$ and OCH_3 groups and not with compounds containing electron-withdrawing groups such as $-NO_2$, etc to form coupling product. It is called coupling reaction.
Coupling reaction takes place between benzene diazonium salt and phenol to p-Hydroxyazobenzene (an orange dye)



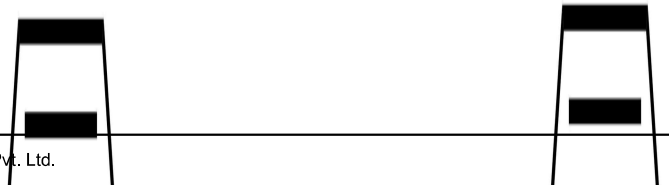


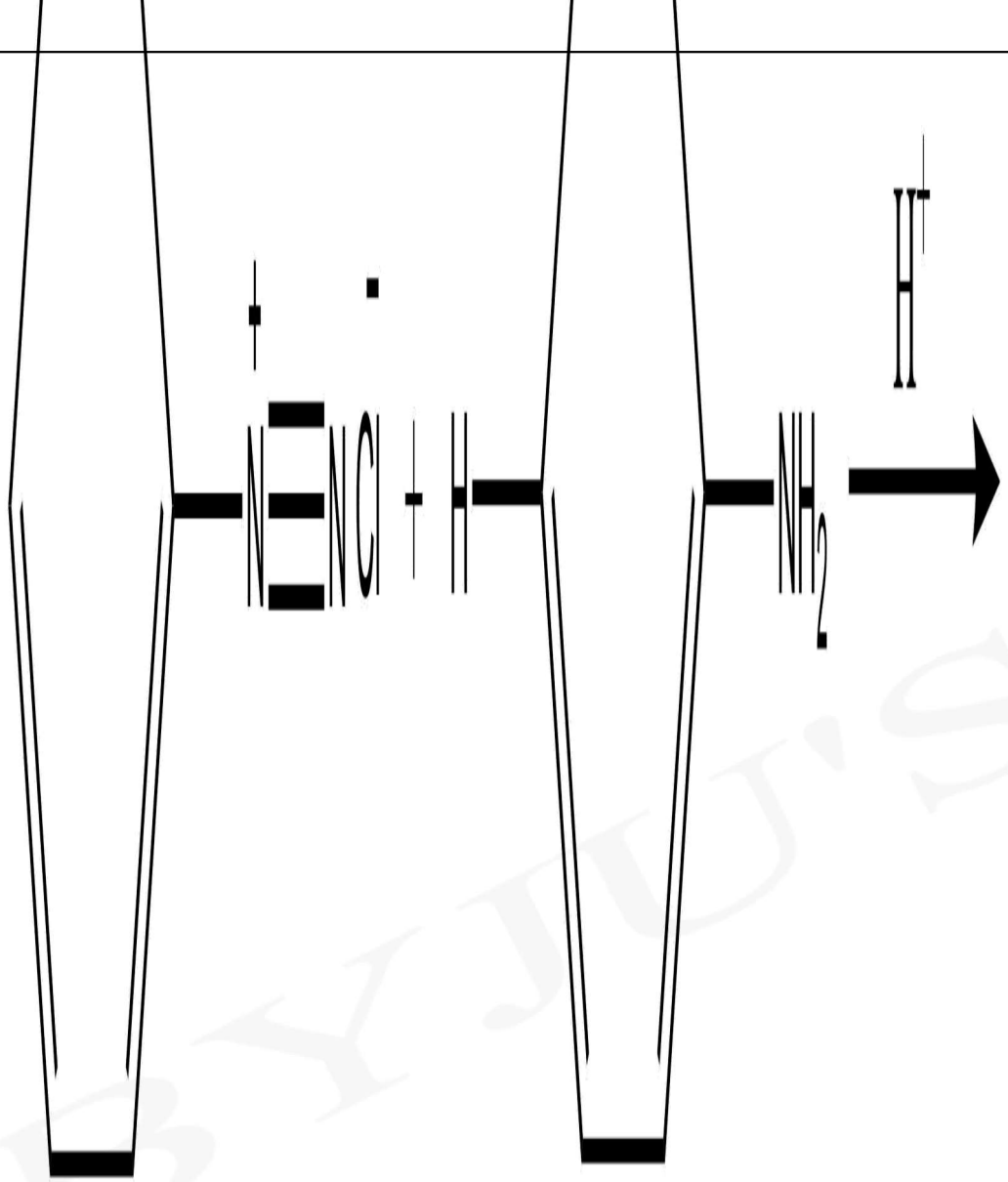


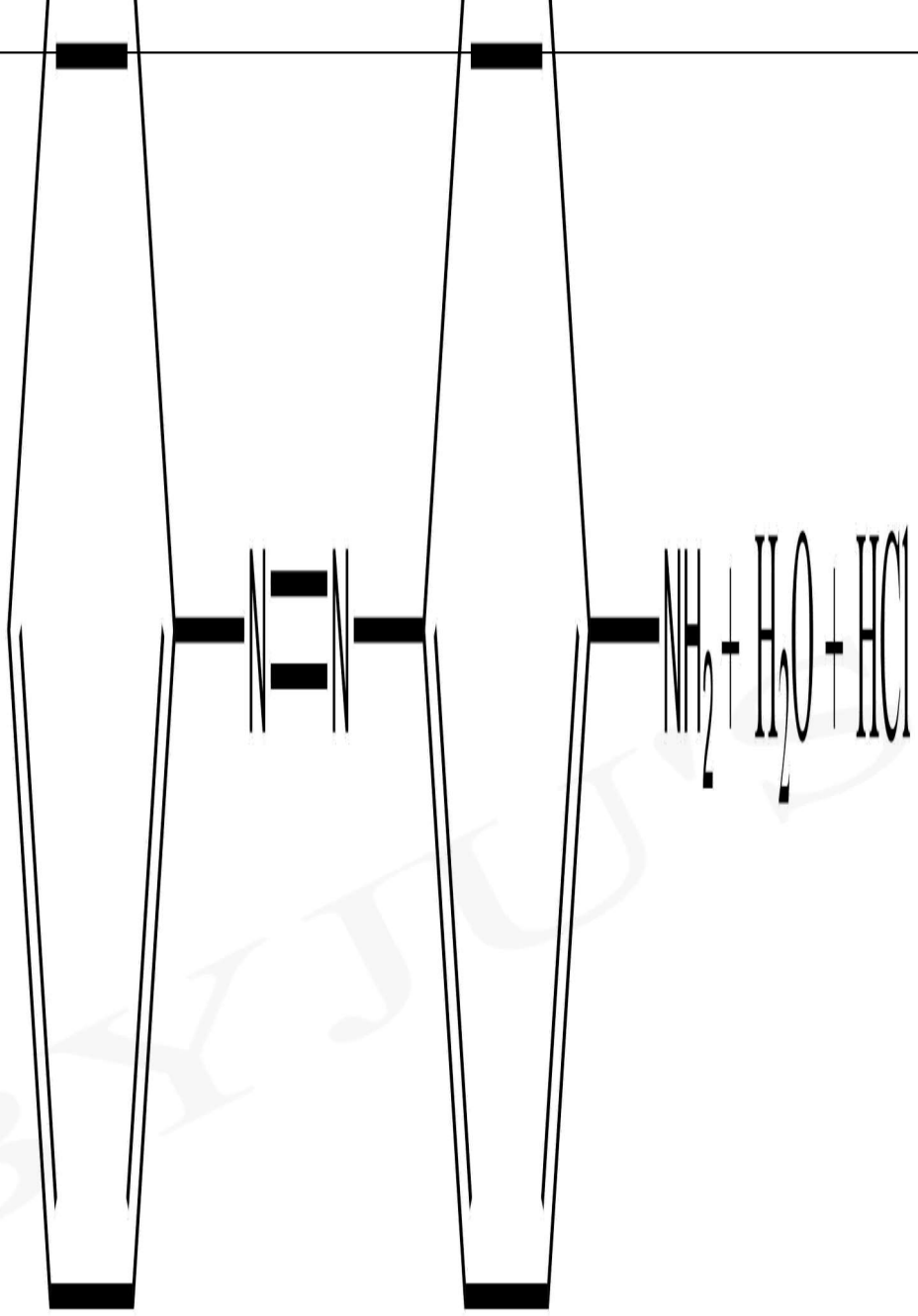
p-Hydroxyazobenzene

Orange dye

Coupling reaction takes place between benzene diazonium salt and aniline to p-aminobenzene (a yellow dye).



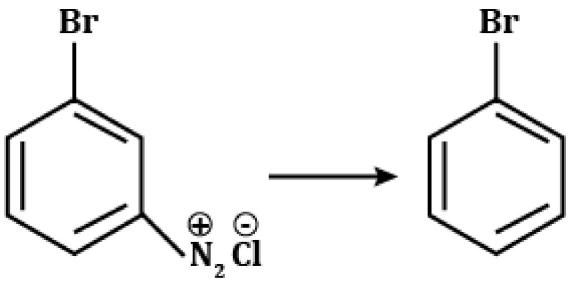




p-Aminoazobenzene

Hence, option (c) is correct.

3. For the following transformation, the reagent used is:



A. $LiAlH_4$

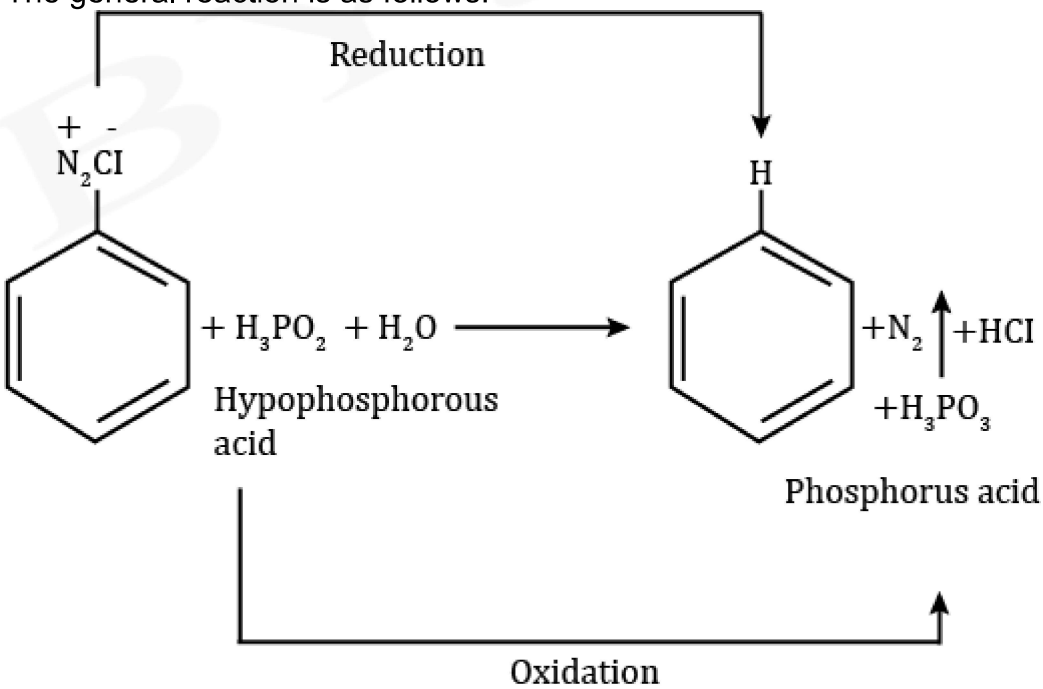
B. H_3PO_2

C. H_3O^+

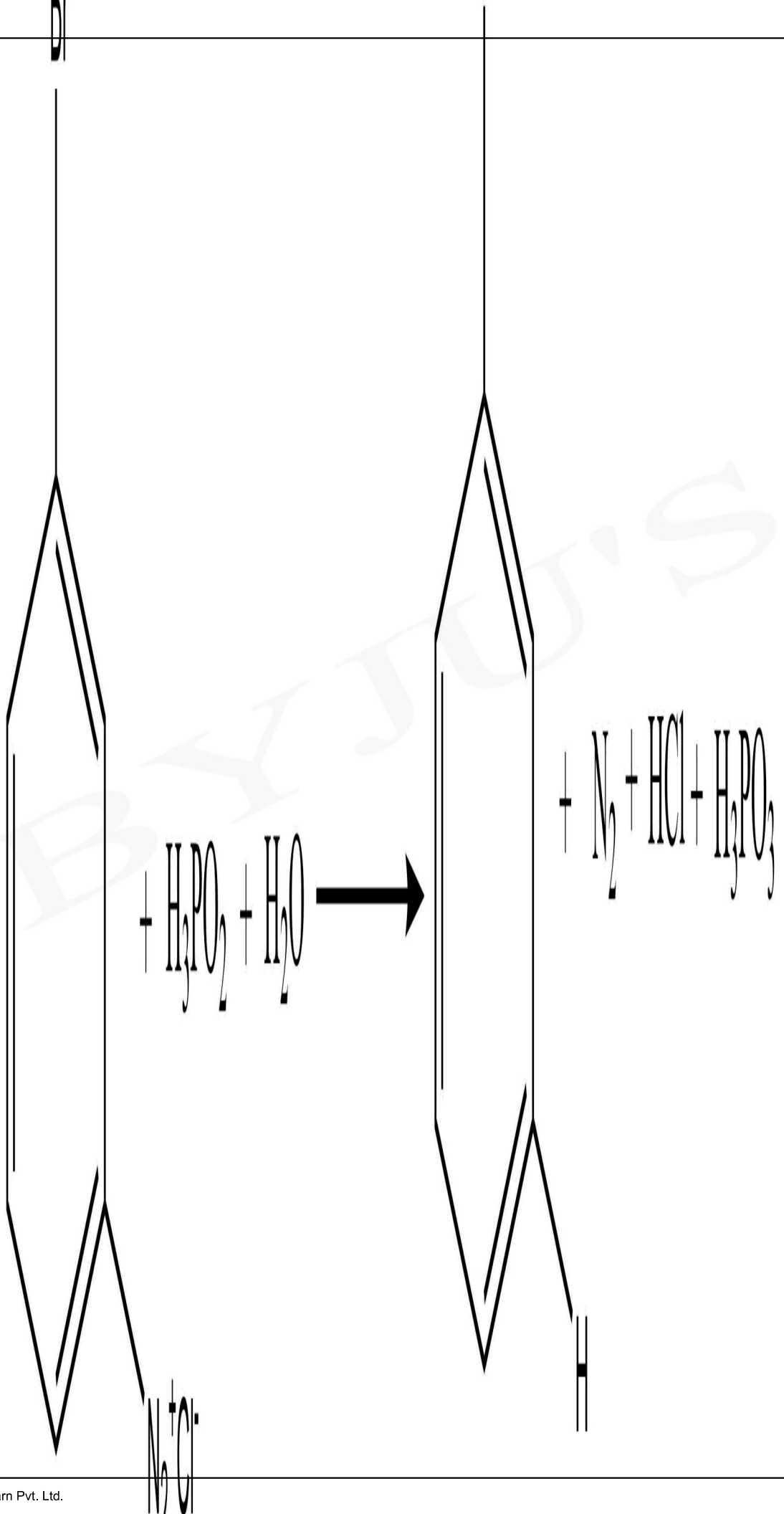
D. H_2/Pt

H_3PO_2 is the reagent that converts $N_2^+Cl^-$ group into H. During this process N_2 and HCl gases are released.

The general reaction is as follows:



The reaction is as follows:



4. $C_6H_5N_2^+Cl^- \xrightarrow[H_2O]{H_3PO_2} X + N_2 \uparrow + HCl + H_3PO_3$

The compound X is :

A. C_6H_5Cl

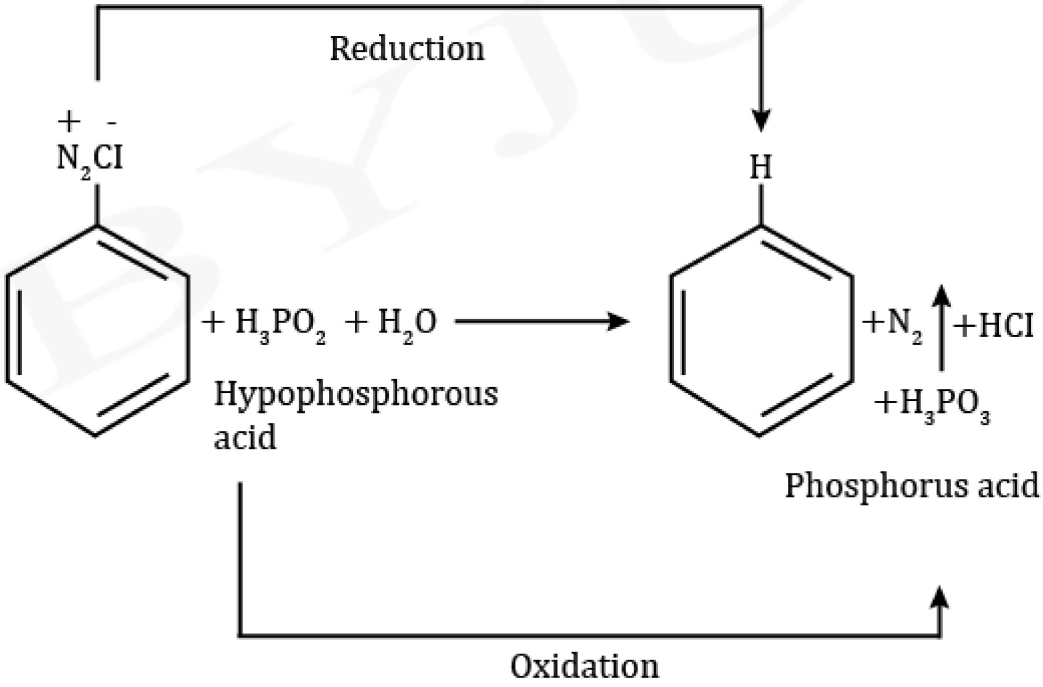
B. $C_6H_5NHNH_2$

C. C_6H_6

D. $C_6H_5NO_2$

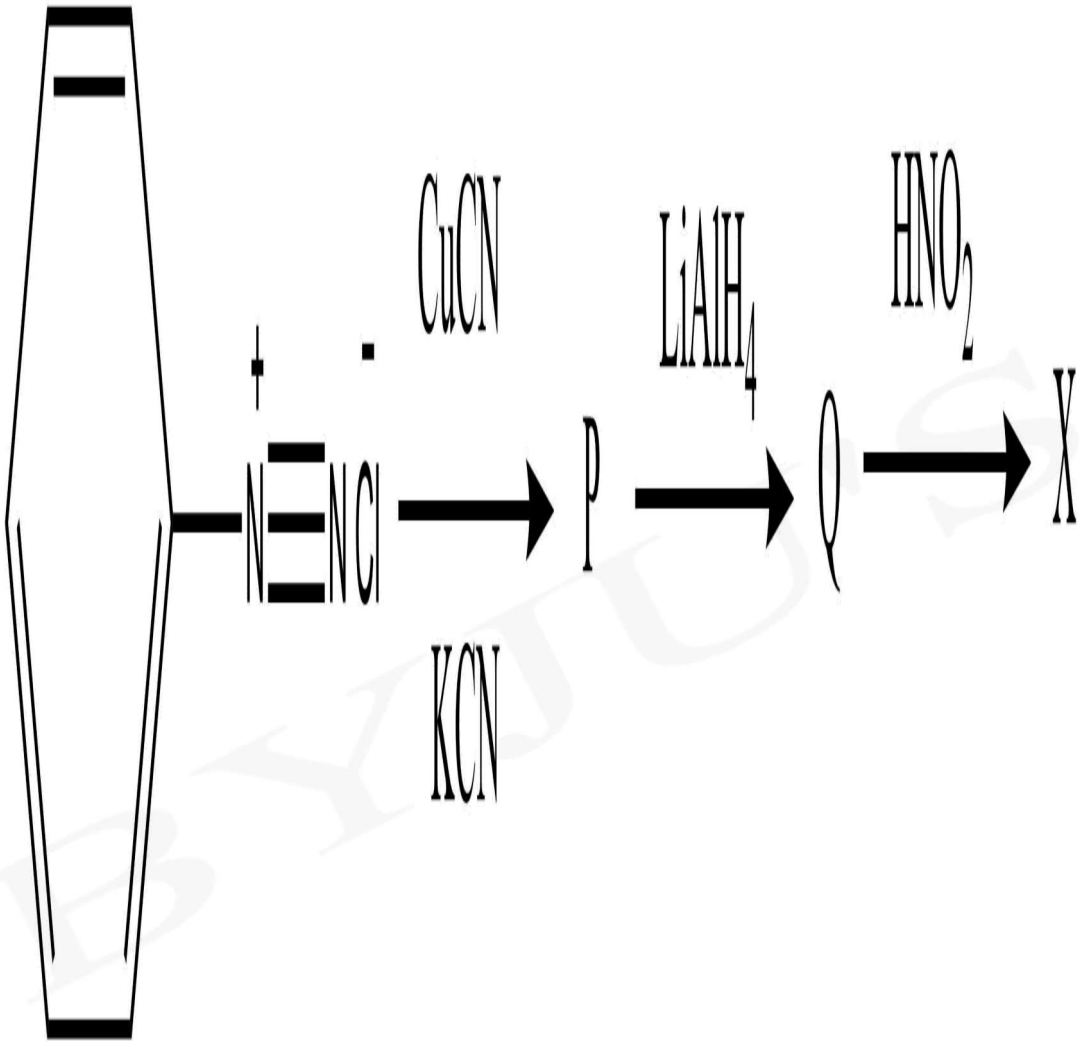
H_3PO_2 is the reagent that converts $N_2^+Cl^-$ group into H. During this process N_2 and HCl gases are released.

The reaction is as follows:



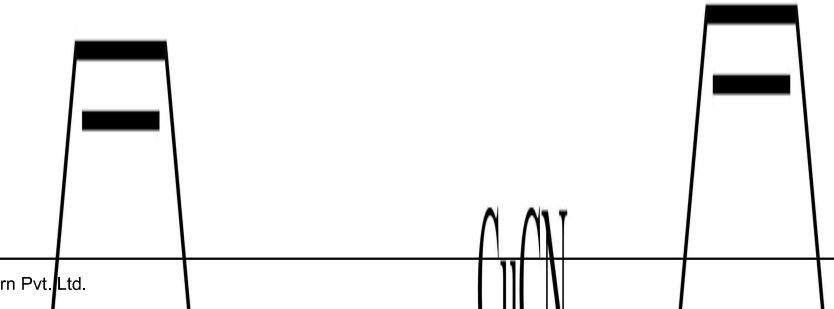
Hence, the correct answer is option (c).

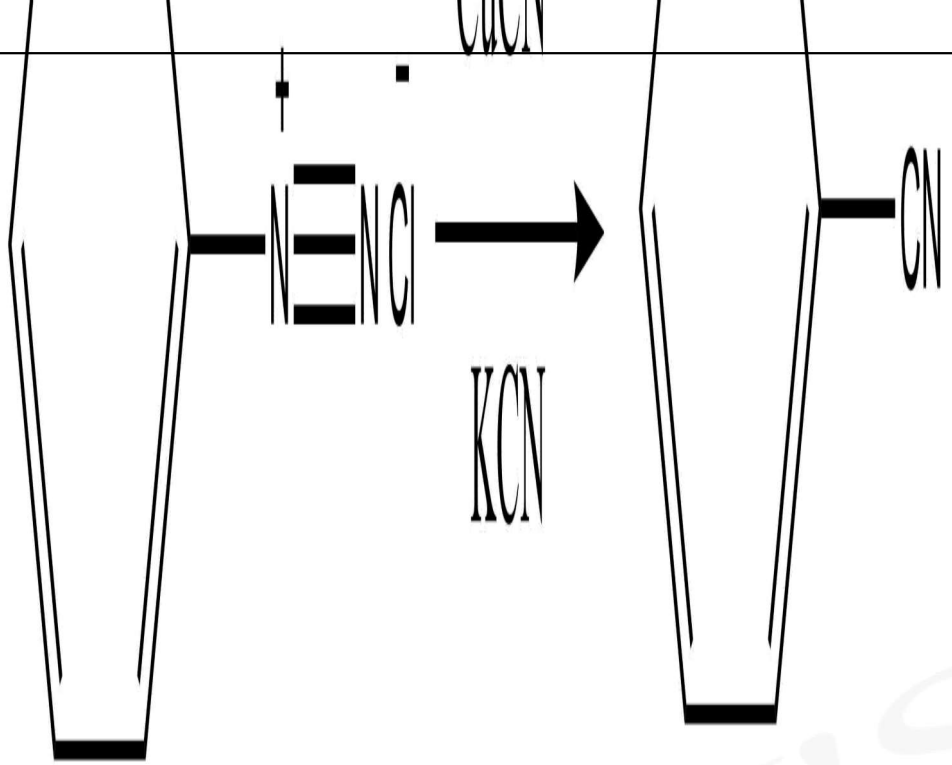
5. Identify 'X' in the following sequence of reaction:

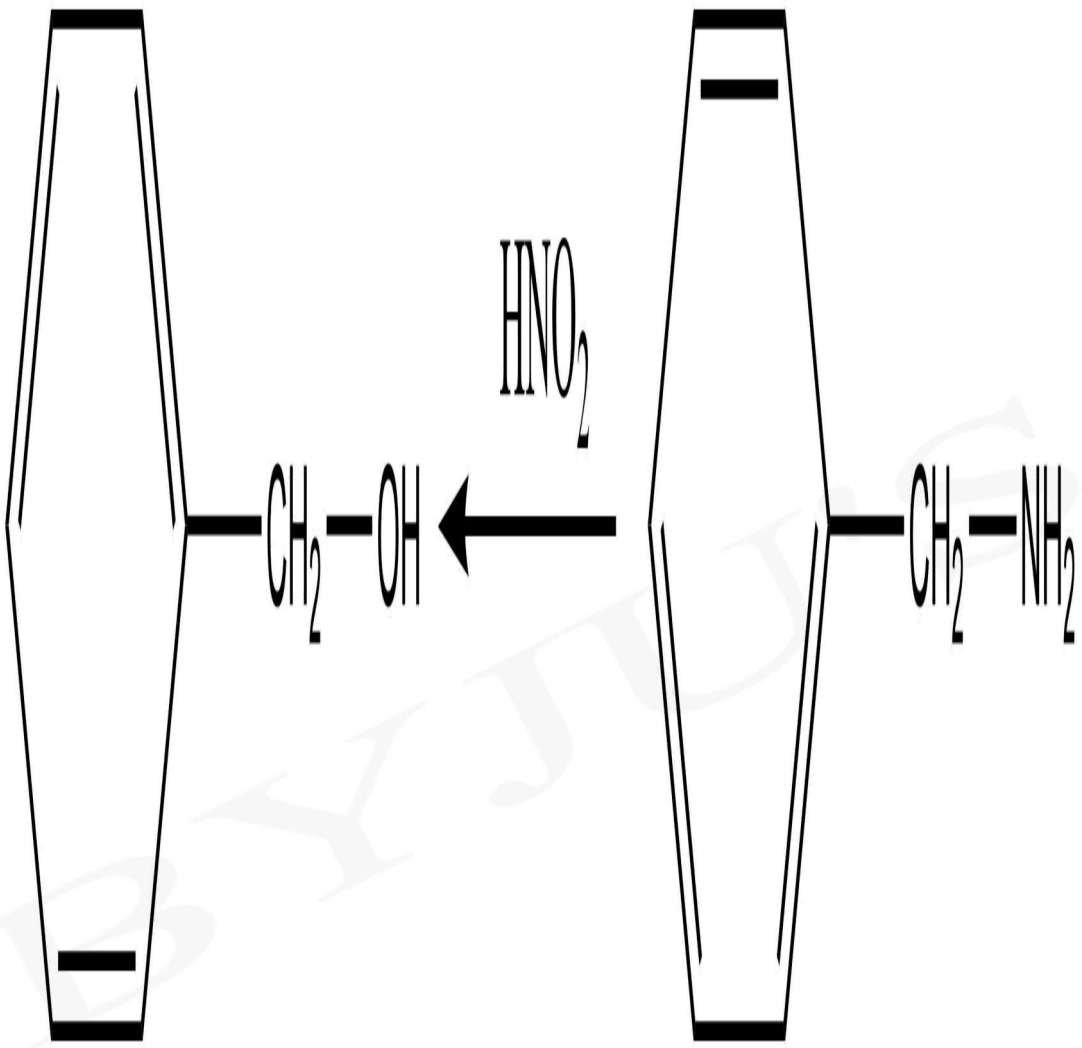


- A. Benzoic acid
- B. Phenyl acetic acid
- C. Benzyl alcohol
- D. Benzamide

The reaction is as follows:







So, the correct option is (c).