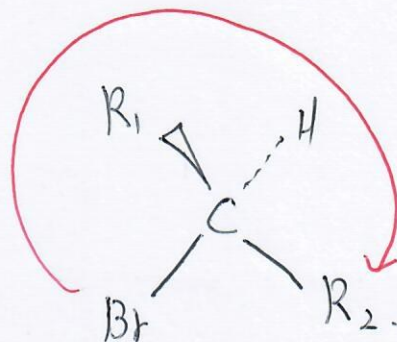
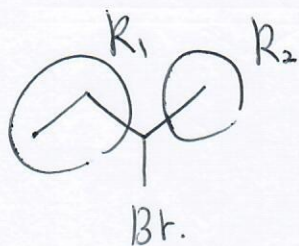


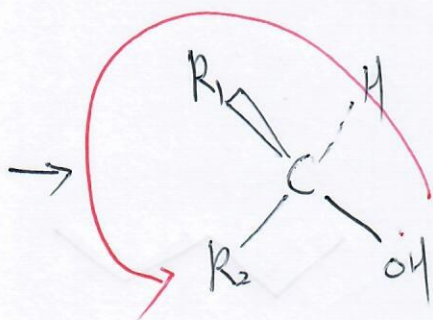
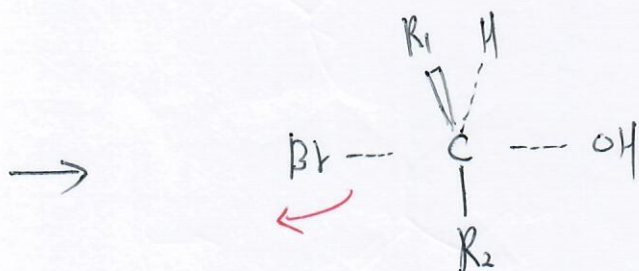
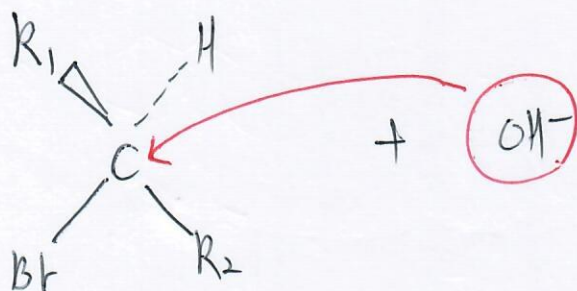
problem 11-2.



(R)-2-Bromobutane.

The priority is $\text{Br} > \text{R}_1 > \text{R}_2$.

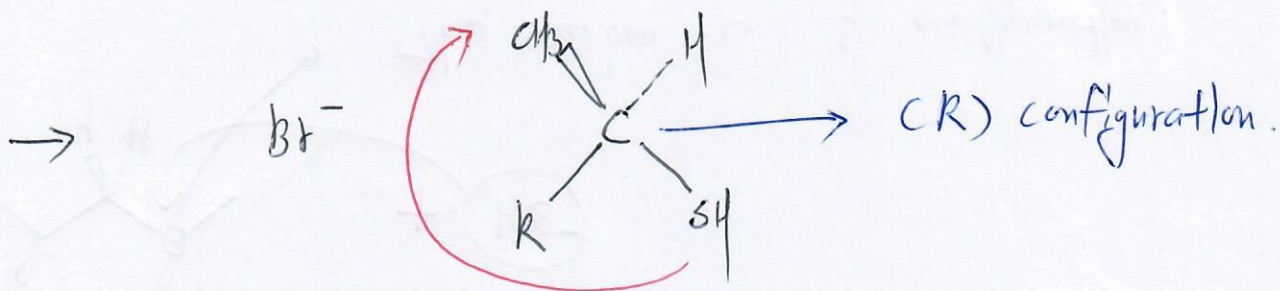
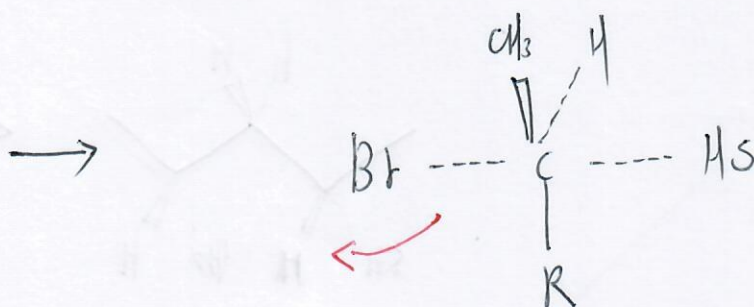
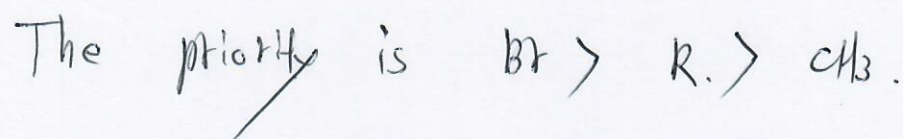
So the chiral carbon has (R) configuration.



The priority is

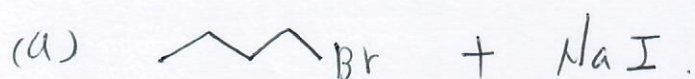
$\text{OH} > \text{R}_1 > \text{R}_2$

The chiral carbon has (S) configuration.

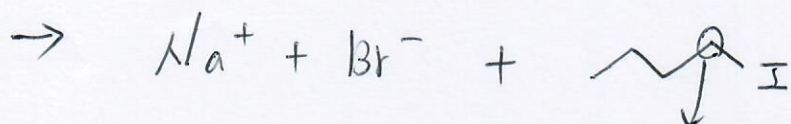
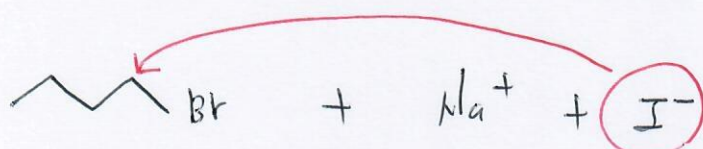
[illegible]

The priority is $SH > R > CH_3$

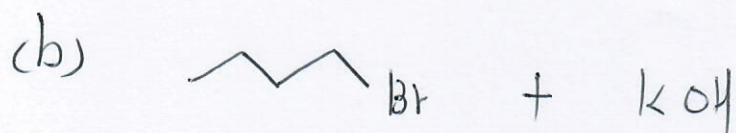
Problem 11-4 (1)



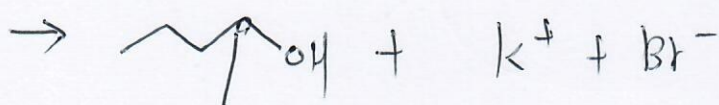
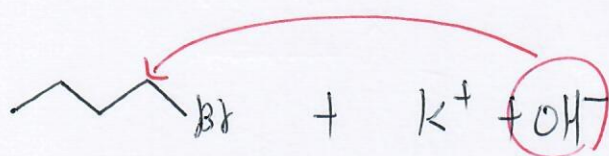
The halide reactivity order is



The configuration of this carbon is changed from (R) or (S) to (S) or (R).



The OH⁻ has high basicity that means ~~the high nucleophilicity~~ the high nucleophilicity.

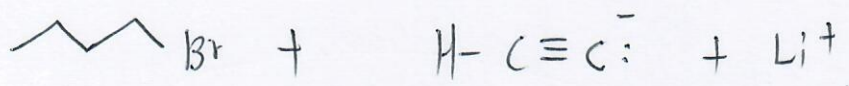


The configuration of this carbon is changed from (R) or (S) to (S) or (R).

Problem 11-4 (2)

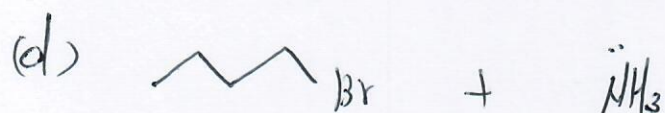
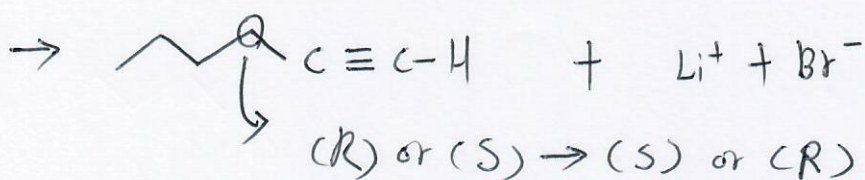
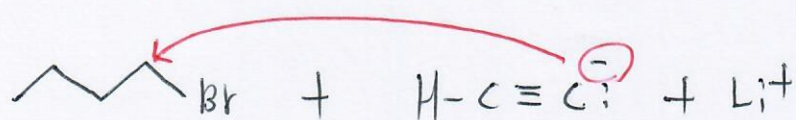


Li is ~~not~~ good leaving group



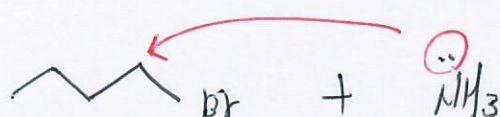
Acetylide anion is negative and has unshared pair of electrons.

So Acetylide anion can act as a nucleophile.



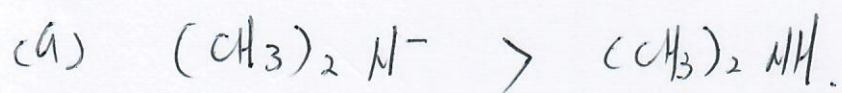
Amine has the unshared pair or lone pair.

So Amine can also act as a nucleophile.

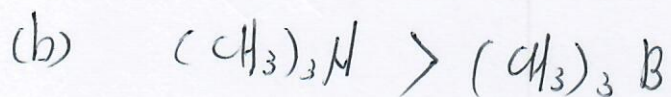


(R) or (S) \rightarrow (S) or (R)

Problem 11-5

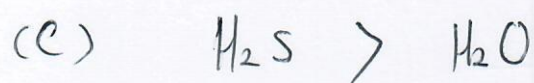


A negatively charged nucleophile is more nucleophilic than a neutral nucleophile.



$(\text{CH}_3)_3 \text{B}$ has no lone pair electrons.

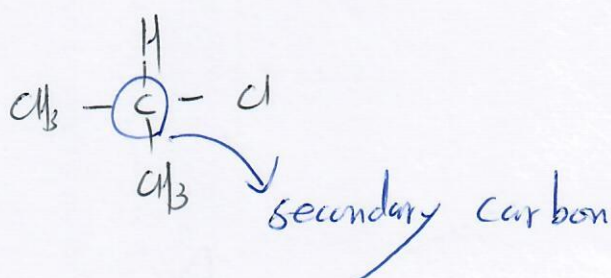
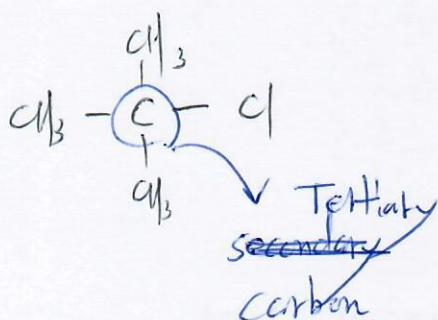
So $(\text{CH}_3)_3 \text{B}$ is non-~~re~~ nucleophilic.



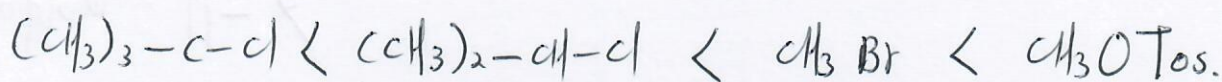
The nucleophilicity increases in going down a column of the periodic table.

Problem 11-6.

- 1) ~~The~~ The leaving group reactivity of Cl^- is 200 times higher than F^-
- 2) The leaving group reactivity of Br^- is 10,000 times higher than F^- .
- 3) The leaving group reactivity of TosO^- is 60,000 times higher than F^-



- 4) $\text{S}_{\text{N}}2$ reactivity of secondary carbon is higher than tertiary carbon.
- so.



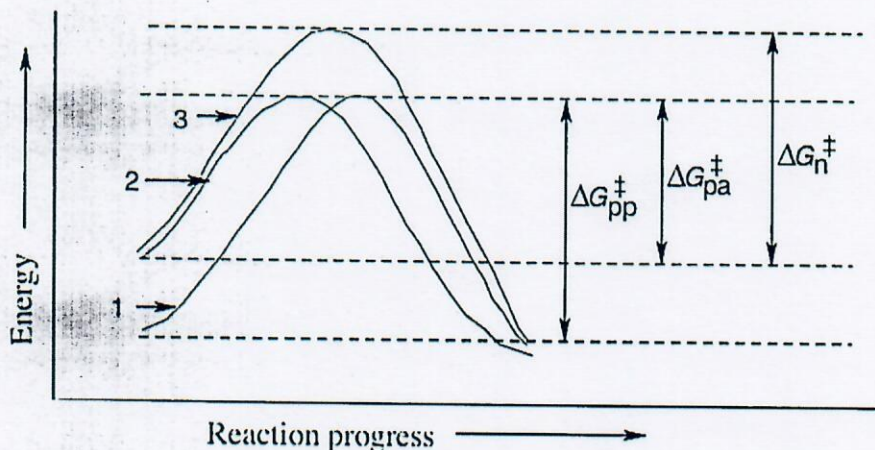
problem 11-7.

protic

Aprotic

polar nonpolar.

11.7



Polar protic solvents (curve 1) stabilize the charged transition state by solvation and also stabilize the nucleophile by hydrogen bonding.

Polar aprotic solvents (curve 2) stabilize the charged transition state by solvation, but do not hydrogen-bond to the nucleophile. Since the energy level of the nucleophile is higher, ΔG^\ddagger is smaller and the reaction is faster in polar aprotic solvents than in polar protic solvents.

Nonpolar solvents (curve 3) stabilize neither the nucleophile nor the transition state. ΔG^\ddagger is therefore higher in nonpolar solvents than in polar solvents, and the reaction rate is slower. Benzene, ether, and chloroform are in this category.

Polar protic solvents

: H_2O , $EtOH$, $MeOH$, propanol, ...

Polar aprotic solvent

: Acetonitrile, dimethylformamide, dimethyl sulfoxide, hexamethylphosphoramide, ...

Nonpolar solvent

: Benzene, ether, chloroform.