# Inductive Effect

*Lesson 3*

**Dr. Erum A Hussain**
**Associate Professor**
**Chemistry Department, LCWU**

# Learning Objectives

- What is Inductive effect?
- How does it affect structure?
- Reactivity prediction
- Stability factor

# Inductive Effect

- The polarization of a σ bond due to electron withdrawing or electron donating effect of adjacent groups or atoms is called ***inductive effect***.

- In covalent compounds unlike atoms never share electron pair equally in forming sigma bond.

- The e flow is slightly towards more electronegative atom.

# Salient features

- * It arises due to electronegativity difference between two atoms forming a sigma bond.
- * It is transmitted through the **sigma bonds**.
- * The magnitude of inductive effect decreases while moving away from the groups causing it.
- * It is a **permanent** effect.
- * It influences the chemical and physical properties of compounds.

# Types of inductive effect

Negative Inductive Effect (-*I*)

**The electron withdrawing nature of groups or atoms is called as negative inductive effect.**

Positive Inductive Effect (+*I*)

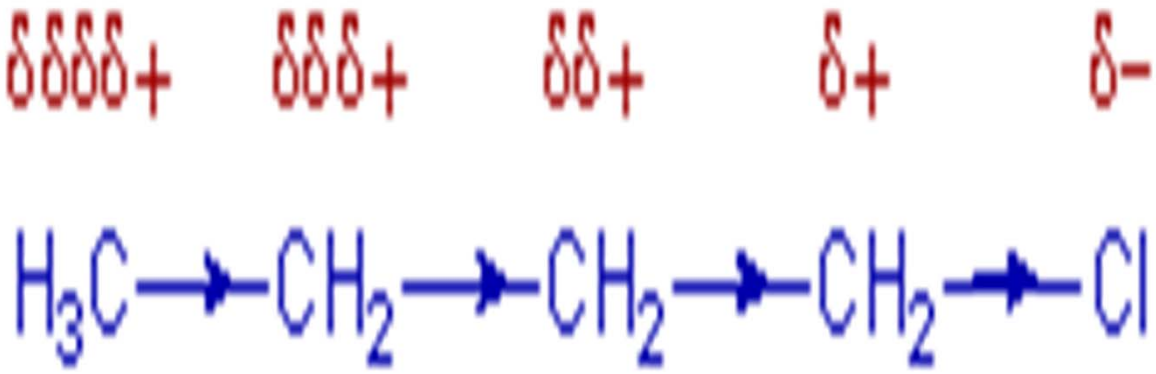
**The electron releasing nature of groups or atoms is called as negative inductive effect.**

# Some Electronegative groups

- **It is linear phenomenon, operates bond to bond.**

| **(-*I*) effect** | **(+*I*) effect** |
| --- | --- |
| Halides | Hydroxyl |
| Carbonyl | Amino |
| Sulfon, Nitro | Alkyl |

# How it operates?




The inductive effect weakens away along the chain and is not significant beyond 3rd carbon atom.

# Some facts…..

- The inductive effect is **less** influencing than other effects like **resonance** effect and **hyperconjugation**.

- **Exceptions**

- In halogens, the negative inductive effect is more dominating than positive resonance effect. This is observed in benzene.

# Let's do it!

- How it plays in predicting acidity of acetic acid and its analogues?
- Class activity