

Gas chromatography – an overview

[Science](#), [Physics](#)



Chromatography is a physical method used in lab for separation of a mixture of chemical substances into its individual components, so that the individual components can be thoroughly analyzed. It has numerous applications in biological and chemical fields. It is widely used in biochemical research for the separation and identification of chemical compounds of biological origin.

Chromatography consists of two phases; a mobile phase (a liquid or a gas), which flows through the stationary phase, and a stationary phase (a solid). The stationary phase has certain physical and chemical characteristics that allow it to interact in various ways with different compounds.

A common type of stationary phase is ion exchange chromatography, Affinity Chromatography, Gas Chromatography, liquid Chromatography... etc.

Gas Chromatography Gas Chromatography (GC) or, gas-liquid chromatography (GLC) is a useful tool technique that allows us to separate and identify individual components in the mixture. Also, Gas Chromatography can measure the concentration of various components in the mixture for samples that have volatile components and separate mixture by adherence to a surface.

Method: 3590925369570000 A gas chromatograph uses a flow-through narrow tube known as the column, through which different chemical constituents of a sample pass in a gas stream (carrier gas, mobile phase) at different rates depending on their various chemical and physical properties and their interaction with a specific column filling, called the stationary phase. As the chemicals exit the end of the column, they are detected and identified electronically.

The function of the stationary phase in the column is to separate different components, causing each one to exit the column at a different time (retention time). Other parameters that can be used to alter the order or time of retention are the carrier gas flow rate, For example, internal standards it is commonly used way in Gas Chromatography to calculate the concentration of an analyte. for any particular detector, the relative response factor for the analyte compared to the internal standards must be determined first. calibrating the linearity of the response factor for the analyte compared to the internal standards requires making a series of the solutions with the same concentration of the standards, and a varying concentration of analyte.

Plotting the response of the analyze relative to the standard (peak area of analyte/peak area of standards) versus the concentration of the analyte relative to the standard ($\frac{[\text{analyte}]}{[\text{standard}]}$) should produce a straight - line graph whose slope in the response factor. $\text{C} + \text{O}_2 \rightarrow \text{CO}_2 + \text{heat}$ This is a fast reaction and there a lot of physical method to slow down and stop fast reactions for example:

1. Reducing the temperature at which a reaction occurs i. e. cool things down.
2. adding a reagent which will react with the remaining reactant
3. Using reagents that have a small surface area i. e. the substance is in large lumps.
4. Using a catalyst - the right catalyst can slow down the rate at which a chemical reaction occurs.

The rate of reaction for a concentrated strong acid with a concentrated strong base is most affected by what three things the use of a catalyst, a change in temperature, a change in reactant concentration. We are going to use temperature temperature normally speed the reaction and it also slow it down by lowering the it because the rate and the temperature has a Positive relationship so if temperature is high the reaction speed increase and if the temperature is low the reaction speed decrease and that is according to van't Hoff's law, an increase in temperature will cause an increase in the rate of an endothermic reaction.

The effect of the temperature can be explained by the fact that increasing temperature will move the particles at higher speeds and the impact of the collisions leading to the interaction is large, which increases the speed of the reaction and also, at higher temperatures, higher percentages of collisions produce a chemical reaction because higher percentages of molecules have greater velocity, and enough energy is available to react.

Explanatory examples tell the effect of temperature on the rate of chemical reaction rate

- Increased temperature helps to speed the maturity of food.
- Increasing the pressure in the pressure vessels leads to an increase in temperature inside the so the food is cooked very quickly.
- Keeping food in the refrigerator help not to spoil it because the temperature of the refrigerator is low, and this leads to a decrease in the speed of geochemical reactions that cause food corruption.

The temperature change in the chemical balanced reaction, leading to the interaction in the opposite direction, which cancels the effect of this change

Interpretation In the case of heat-reactive reactions I-Reduce the temperature

The interaction is facilitated in the direction that reduces the effect of lowering the temperature (which reduces the effect of this effect), ie, the reaction in the direction that causes the increase in temperature is the random direction II-when raising the temperature.

The interaction in the direction that reduces the effect of raising the temperature (which reduces the effect of this effect) is facilitated by the interaction in the direction that causes the temperature reduction and is the reverse direction So, in the reaction I did chose it is a exothermic so when we raising the temperature it will slow down the reaction because it is exothermic and when it dose slow down the molecules in the reaction will be slower in moving and the collisions and if it was endo thermic the opposite will happen. And we cannot calculate the rate law because it is experimentally calculated so we can only write the rate low for the reaction

$$C + O_2 \rightarrow CO_2 + \text{heat}$$

Rate low

References

- Page 1 ^ " Gas Chromatography". Linde AG. Archived from the original on 3 March 2012. Retrieved 11 March 2012. ^ Jump up to: a b c d e f g h i j k l m n o p Harris, Daniel C. (1999).
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