

DCS DIGITAL ASSIGNMENT-1

PART(A)

SECTION-I

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Q) Look around, observe and describe a non-linear phenomenon. Describe, IN YOUR OWN words, the phenomenon, why do you think it's non-linear. This portion of the answer must be from personal observation, analysis and/or experience. And it has to be scientific in nature. (Not something that is personal/emotional in nature). Describe your thought process in arriving at the conclusion that you reach about the non-linear nature of the phenomenon. Confirm this with already existing material. Make sure you give the sources for whatever material you refer to confirm the process.

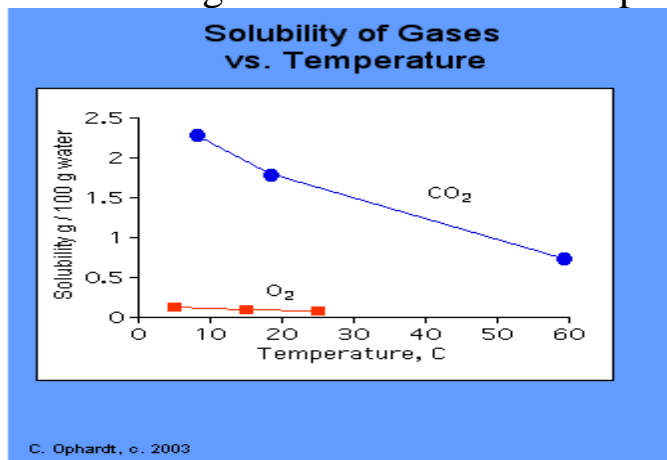
A)

- I brought a chilled coke and drank a little portion of it and left it alone. after a sometime drank the remaining portion of the coke but it tasted "flat".
- The "flat" taste is due to the escape of CO_2 gas molecules in the softdrink .
- The softdrinks like coke and thumbs up are carbonated drinks .carbonated drinks are beverages that are dissolved with carbondioxide in them.

- The carbondioxide dissolved in the carbonated drinks , influences the activity of taste receptors in the mouth.
- We have a law in chemistry that as the temperature increases the solubility level of gas decreases.we can say that temperature is inversely proportional to solubility of gas.

$\text{Solubility of gases} = K \cdot 1/\text{Temperature}$

- The carbondioxide(gas) solubility levels in the softdrinks decreases in increasing the temperature of the surroundings. Indicating a non-linear relationship between the temperature and solubility of gases.
- The reason to for this relationship is as the temperature increases ,it also increases the kinetic energy of the gas molecules. So the molecules move more rapidly and break the intermolecular bonds between them and escapes from the solution .
- From this we can conclude that temperature v/s solubility of gases is an non-linear phenomenon.
- Plot showing the curve between temperature v/s solubility of gases



- By observing the above graph, we can say that solubility of gases v/s temperature is non-linear .

SECTION-B:

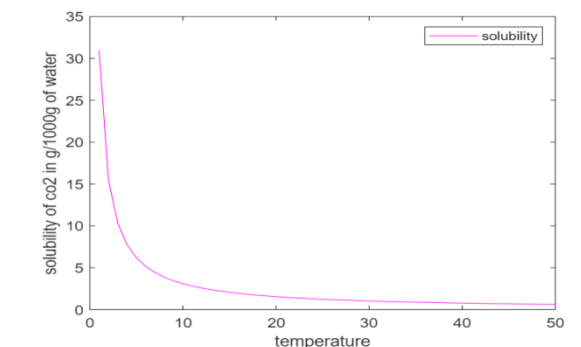
The phenomenon described is carbondioxide(gas) solubility levels in the softdrinks decreases in increasing the temperature of the surroundings. Indicating a non-linear relationship between the temperature and solubility of gases (co2).

The reason to for this relationship is as the temperature increases ,it also increases the kinetic energy of the gas molecules. So the molecules move more rapidly and break the intermolecular bonds between them and escapes from the solution .

For recording the temperature we can use Thermistor. A thermistor is a thermally sensitive resistor that exhibits a large, predictable and when there is a precise change in resistance, it is correlated to variations in temperature. We have used Thermistor ,because it has better sensitivity, as we are checking for change in room temperature, sensitivity plays significant role. for recording the co2 solubility in softdrinks ,we use Electrochemical sensors for the CO2 measurement in aqueous media. Electrochemical CO2 sensors based on the Severinghaus principle and solid electrolyte sensors operating at high temperatures and they are widely used because of their simple setup, But the problems we face using it for the recording is that a detailed knowledge of the basic detection principles are to be known. we can use calculate solubility of co2 in other way by the theoretical formula, I.e

$$\text{Solubility of gases} = K \cdot 1/\text{Temperature}$$

In this way we can record the data of the phenomenon, After that we plot them to cross check that they follow NON-LINEAR characteristic and it clearly follows non-linear characteristic as shown in Figure(1).



Figure(1)-showing the non-linear phenomenon

For digitalizing the data we need to Quantize the sampled output we get from the plot, Here, I have used uniform Quantization ,since there is no unequal quantization levels, all the levels are equally uniform spaced. Yes ,the sampling captures the true characteristics of the phenomenon, which is clearly observed in Figure(2).

