

Solubility of CO_2 in water essay sample

[Environment](#), [Water](#)



Aim: To decarbonate a bottle of soft drink and find out the amount of CO₂ in the drink. * Principle: The reaction between carbon dioxide and water is an example of an equilibrium reaction:

Materials:

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- * 3 soft drink bottles (300ml)
- * 6g of salt (NaCl)
- * Triple beam balance scale
- * Thermometer
- * Digital scale
- * Watch glass
- * Electric hotplate

Method:

Standing up method

1. An unopened bottle of carbonated drink was weighted.
2. The cap was removed slowly with care, controlling the release of bubbles so that the soda water does not form out the top and lose soda water.
3. The opened bottle was left for 1 hour and reweighted. Warming method (uses the reduced water solubility of gas with temperature rise)
1. The open bottle stood carefully on an electric hotplate, and stirred using the thermometer to release the gas bubbles.
2. The soda bottle was heated to about 37°C.
3. The bottle and its cap were reweighted.
4. The change in weight was calculated due to loss of CO₂ gas to the air.

Salting method (uses the addition of ions which attract water molecules and

reduce the availability of water able to dissolve gas) 1. 6g of salt was weighted.

2. The salt was added very slowly and carefully to the soda water so that the water does not degas too quickly. 3. The bottle and its cap were reweighted. 4. The change in weight was calculated due to loss of CO₂ gas to the air, allowing the salt added to the soda water.

Results:

Method type | Weight before | Weight after | Change in weight (amount of CO₂ loss) | Standing up| 338g| 337. 5g| 0. 5g|

Warming | 353. 5g| 352. 2g| 1. 3g|

Salting | 338. 2g| 342. 6g| 1. 5g|

* Calculate the loss of CO₂ in (a) gram, (b) moles. (molar volume of a gas at 25oC and 101. 3KPa pressure is 24. 5L)

Discussion

1. Compare the volume of gas released with the volume of liquid soda water which contained that amount of gas.

2. What do these volumes illustrate about the distance between CO₂ particles in gas phase compared with the distance between CO₂ particles in solution? In a liquid, particles have more energy, are less tightly packed than solid, and can move freely. Liquids have definite volume but no definite shape. The particles in a gas have the most energy and are free to move around and so they spread out rapidly.

3. Explain why bubbles of CO₂ gas escape from solution in a bottle when cap is undone. Carbonated soft drinks contain CO₂ gas dissolved in water and as these bottles are sealed the pressure of the sealed bottle prevents the gas from escaping the liquid, and when you open the bottle pressure released with force out of CO₂ gas.

4. Explain why the bottles of carbonated drink could burst if they are placed in a freezer. The density of water is larger in the liquid state than in solid form. The soft drink is basically water so when it freezes it expands and the molecules inside are still moving and this increases the pressure and causes it to burst out. 5. What happens to a carbonated drink if its container is opened and it is left to stand for hours before it is drunk? There will be lack of taste, because the equilibrium will shift to left side causing less acidic level.

Conclusion: In conclusion, we were successfully able to decarbonate a bottle of soft drink and find out the amount of CO₂ in the drink.