



How to determine the theoretical carbonic acid concentration in soda water from a Soda Stream

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I've seen it [cited](#) that commercial carbonation devices like a SodaStream put about 100 psi (700 kPa) of pressure to dissolve gaseous CO_2 in to solution. I've also heard that the reason carbonated water tastes different than the water before it is carbonated is the presence of carbonic acid (H_2CO_3). I guess my question is a two-parter:

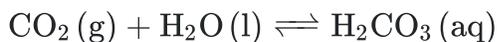


1) How can one determine the gaseous CO_2 concentration knowing only the temperature (assume room temperature) and the pressure (above).



2) How can one determine the carbonic acid concentration knowing only the dissolved CO_2 (g) concentration?

Is there a lit. value for the eq. reaction coefficient for this reaction at room temperature?



If so, where would I find it? And could it be used to get a ballpark for the carbonic acid concentration?

acid-base equilibrium

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edited Jul 11, 2016 at 7:51



IT Tsoi

2,070 6 10

asked Jul 10, 2016 at 22:54



D. W.

141 1 3

1 Answer

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3



The equilibrium you describe is quite well documented (especially with entire industries depending on their ability to carbonate drinks), so the [Wikipedia page for carbonic acid](#) is often a good place to start. The equilibrium constant, K_h , is given by:

$$\frac{[\text{H}_2\text{CO}_3]}{[\text{CO}_2]} = 1.7 \cdot 10^{-3}$$



NOW, for your first question:

How can one determine the gaseous CO_2 concentration knowing only the temperature (assume room temperature) and the pressure (above).

Well, for starters you should probably check the volume of the container and from there you could work out the amount of CO_2 that is above the solution. But if you are interested in the amount inside solution, you could check [this paper published in 1940](#) which has basically compiled the data for you.

And the second part:

How can one determine the carbonic acid concentration knowing only the dissolved CO_2 (g) concentration?

Now that you know the equilibrium constant, I'm sure you can work out the amount of carbonic acid.

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mhchem

3,296 2 13 34

answered Jul 11, 2016 at 13:14



IT Tsoi

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