

Propriedades da água

Propriedades Químicas

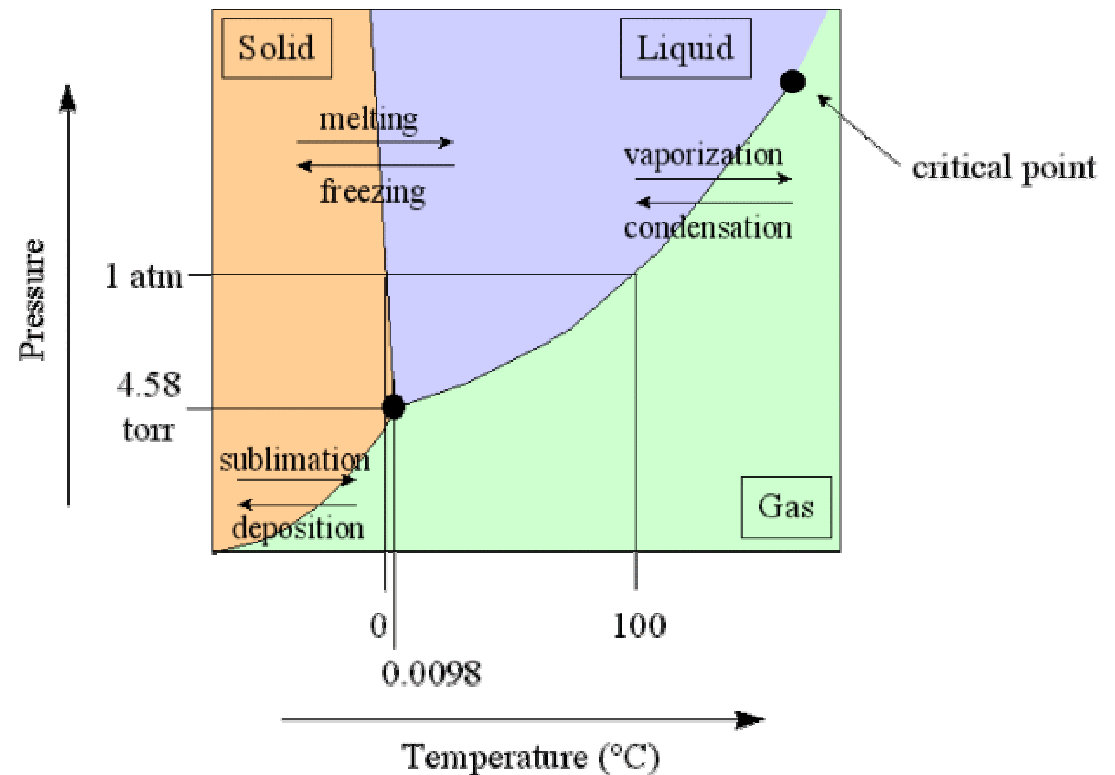
- preencher

Propriedades Físicas

- preencher

Diagrama de fases

- Curva p vs. T com derivada negativa.
- Muitas fases sólidas.
- O que acontece à direita do ponto crítico?
(T_c 374 °C,
 P_c 218 atm.)



<http://www.youtube.com/watch?v=yBRdBrnllTQ&feature=related>

Água supercrítica

- Acima do ponto crítico:
 - propriedades radicalmente diferentes das observadas nas condições do ambiente.

pK_w e
Constante
dielétrica

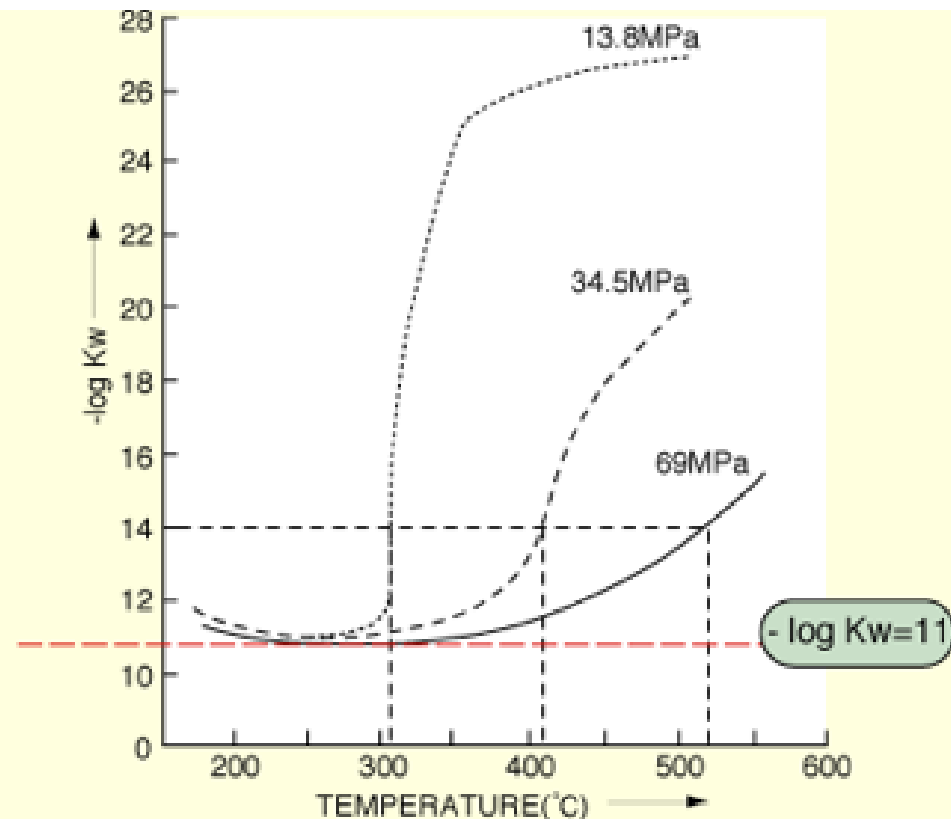


Fig.1 The ion product of water

(1) The ion product obtained differs significantly depending on changes in pressure and/or temperature.

As an electrolyte solvent, supercritical water provides a convenient reaction field for the ionic reaction.

As the dissociation proceeds, the water itself changes so that it show an acidic or alkaline catalyst making the hydrolysis more active

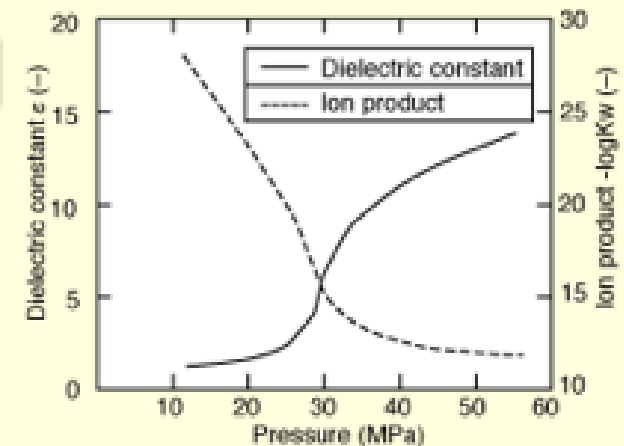


Fig.2 Changes in the dielectric constant and the ion product of water (400°C) in response to changes in pressure.

- Constante dielétrica e densidade vs. temperatura e pressão

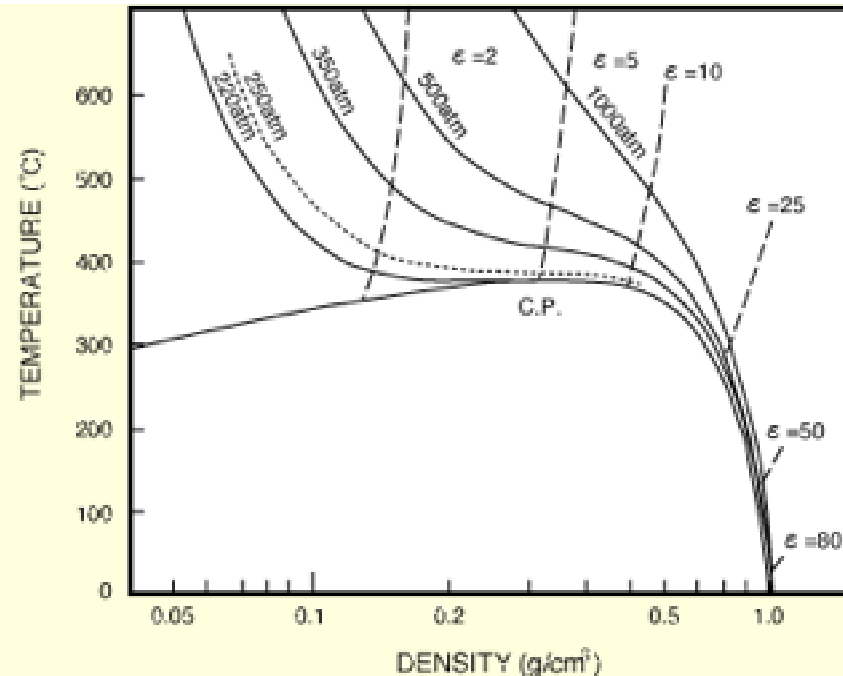


Fig.1 The dielectric constant of water

- Água supercrítica se assemelha a solventes apolares.

(1) A significant change in the dielectric constant can be obtained, depending on the pressure and/or temperature change.

Covers the range of solvents from polar to nonpolar.

In the vicinity of the critical point, where the dielectric constant of a weak polar solvent appears, the dissolving power can be expected to be more like that of a conventional organic solvent.

Relative dielectric constant of organic matters

• Propane	1.6
• Hexane	1.8
• Heptane	1.9
• Carbon tetrachloride	2.2
• Benzol	2.3
• Acetone	20.7
• Ethanol	24.5
• Methanol	32.6

<http://www.kobelco.co.jp/en/eka/p14/sfe09.htm>

Recovery Rate of TDA = over 80 %

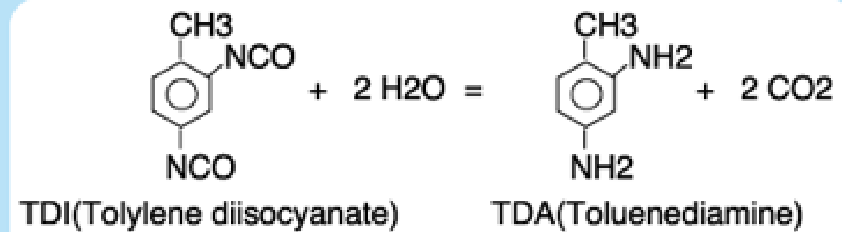
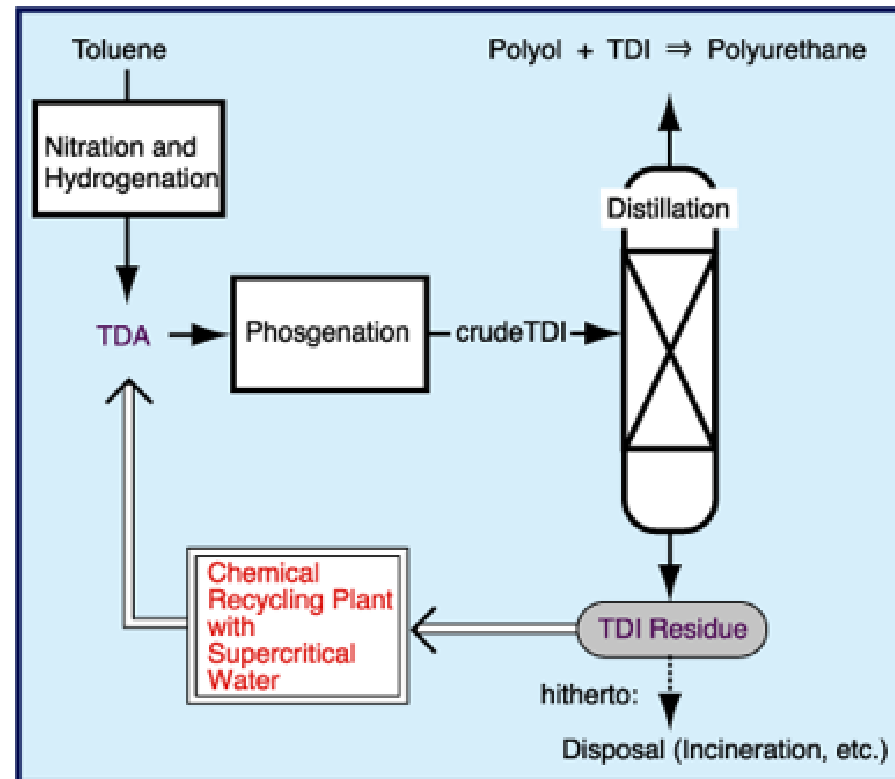


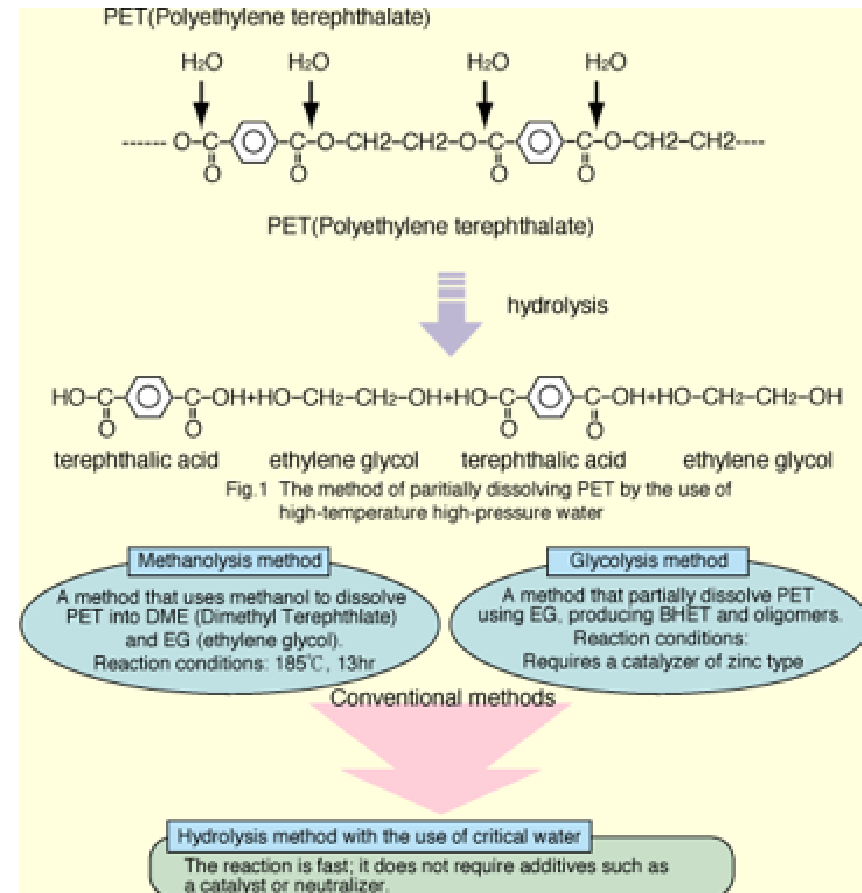
Fig.1 Hydrolysis of TDI in supercritical water

TDA Recovery Plant



TDI Producing Process with Chemical Recycling Plant by using Supercritical Water

Reciclagem de PET



Example of a hydrolyses reaction: The hydrolysis of PET pellets using supercritical water



Before composition
PET pellet material + water

After decomposition
Terephthalic acid (in fine particles) +
an ethylene glycol aqueous solution

<http://www.kobelco.co.jp/eneka/p14/sfe03.htm>

Existe água supercrítica na natureza?

- <http://www.youtube.com/watch?v=9AigRIUBSqc>

Serve para produzir hidrogênio?

- <http://vimeo.com/9883620>

Serve para fabricar nanopartículas?

- <http://www.youtube.com/watch?v=6zurHSq4CB4>

Hidrólise de celulose?

- <http://www.youtube.com/watch?v=3DxEJThIfeE>

Exercício

1. Preencha os dois primeiros slides.
2. Escolha um ano (entre 1990 e 2011) e acesse a base de dados do USPTO:

Quantas patentes foram depositadas nesse ano, utilizando água supercrítica?

Faça um resumo de uma das patentes, justificando a sua escolha.

Envie seu exercício por e-mail, até 16/8/2013, para fernagal@iqm.unicamp.br