

From Last Time:



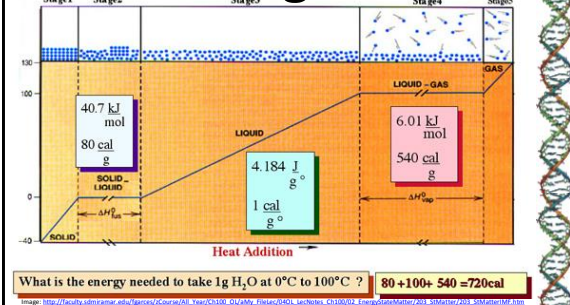
Pressure cookers

Change P_{atm}
Change T_{boiling}



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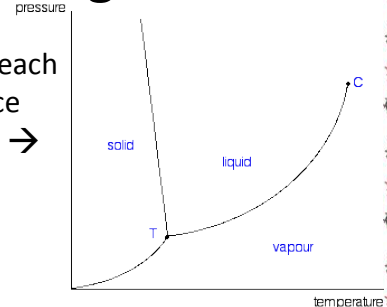
Phase Changes



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Phase Diagram

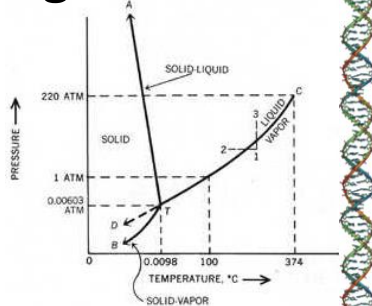
P vs. T
Unique to each
substance
For water $\rightarrow$



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Phase Diagram

“Normal”
conditions
 $1\text{atm} = 15\text{psi}$



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Baking

Heat transfer medium is air
Poor conductor of heat
Dehydrates
Intensifies flavor
To preheat or not to preheat...

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Preheating

Food safety – time at temperature

Surface heating

Food

Radiant heat

Walls



Image: <http://momsgoinggreenblog.com/?p=922>

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Frying

Heat transfer medium is oil

Good heat transfer

Seals in water

Creates steam



Image: <http://21ss.wordpress.com/category/japanese-cooking-methods/deep-frying/page/2/>

Image: <http://www.themedfastplan.com/main/eating-fried-foods-wont-lead-to-a-heart-attack-unless/>

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“Good” Frying

Hot oil is essential!

High “smoke point” oils

Peanut, canola



Image: http://www.blatherskiter.com/chefall/index.php?option=com_content&view=article&id=76&Itemid=126

Image: http://culinarymasterclass.com/techniques.php?techniques_state=selected_technique&technique_id=95

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Grilling

Heat transfer medium is air

Direct radiative infrared heating



Image: <http://www.stmosquitocontrol.com/news/grilling-for-gold/>

Image: <http://www.go.com/how-to/gut-and-drink/201007/summer-grilling/index-1>

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Storing & Preserving

Storing food

How to prevent spoilage

Use quickly

Preserving food

Early science

Trial and error



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Storage

Cold storage

Kinetics – double every $\sim 10^{\circ}\text{C}$

Pasteurization

Vacuum



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Drying

Most “spoilage microbes” need water to survive
 Removing water concentrates flavor
 Food is slightly heated (130-160°F)
 Prunes, raisins, figs, apricots



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Freeze-drying

Removes water while frozen
 Less heat-based deterioration
 Removes more water (usually)
 More shelf-stable



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“Pickling”

Food is acidified
 Add acid (vinegar)
 Fermentation (low oxygen)

 Pickles, sauerkraut, kimchi, etc



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Sugar Preserves

Too much sugar kills microbes!
 Jellies and Jams:
 Pectin extracted from cell walls
 Negative charge in water
 Sugar “dehydrates” solution
 Acidify to allow pectin binding



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Candied Fruits

Sugar is infused in fruit pieces
 Fruit maintains more structure



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Canning

Seal and heat
 Pasteurization of shelf-stable milk
 Food is cooked during canning

Safety...



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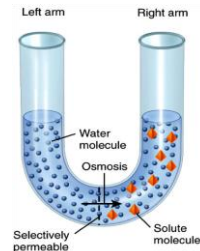
Osmosis

Transport of solvent (water) through a semipermeable membrane from areas of "low" concentration to areas of "high" concentration.



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Osmosis



(a) Starting conditions

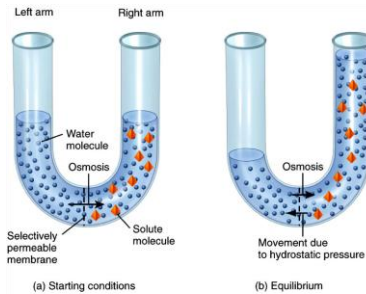
Figure 03.08 Tortora - PAP 12/e
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<http://www.studyblue.com/notes/note/n/cell-physiology-ii-chapter-3/deck/1069900>



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Osmosis



(a) Starting conditions

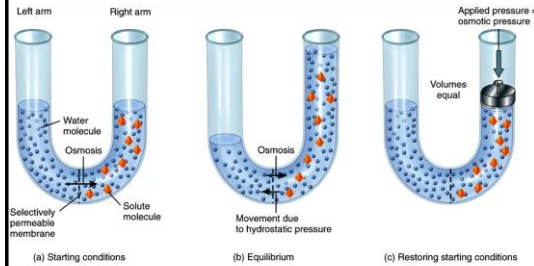
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Osmosis



(a) Starting conditions

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Preservation

Managing water

→ like almost ALL cooking!



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