Physical Chemistry (Chem 132A)

Thermodynamics and Chemical Kinetics

MWF 11:00Am—11:50Am

John C. Hemminger
Rowland Hall 334B
Office hours M 1—2Pm

Shane Flynn
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Discussions:
T 11-12
T 1-2
Th 12-1
F 10-11

Moises Romero
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Discussions:
W 12-1
W 1-2
W 2-3
F 1-2

COURSE WEBSITE

https://canvas.eee.uci.edu/courses/6058

Github website generated by Shane Flynn

https://github.com/swflynn/Teaching_UCI/tree/master/Chem132_A_2017

DISCUSSION SECTIONS

Discussion sections begin this week

W	12:00-12:50p	PSCB 230
W	2:00- 2:50p	RH 188
Tu	1:00- 1:50p	RH 188
Tu	11:00-11:50	ICF 101
W	1:00- 1:50p	RH 188
Th	12:00-12:50p	PSCB 240
F	1:00- 1:50p	SSL 145
F	10:00-10:50	SSPA 117

YOU SHOULD BE ENROLLED IN ONE OF THESE SECTIONS

If you have questions about the homework problems this is where you can have those questions answered.

ISSUES WITH WEBASSIGN

Some of you had problems registering with WebAssign (apparently there was an error message that your code was not valid).

I have been told that this has now been fixed.
(thanks to those of you who sent information to WebAssign to help sort this out).

If you still have problems registering with WebAssign, please send an email to Taufiki Lee (WebAssignTeam@cengage.com) Include the code you used to try to register AND INCLUDE A SCREENSHOT THAT SHOWS THE ERROR MESSAGE.

WebAssignTeam@cengage.com

Free grace period extended until Friday, Oct. 6

Discussion Sections (not mandatory)

Shane and Moises will make up an extra problem each week that will be discussed in the Discussion Sections.

You should try to work out the problem BEFORE you come to the discussion section.

These problems will not be graded.

However, Shane and Moises will also make up EXAM QUESTIONS (in addition to mine). So paying attention to these discussion questions would be a VERY SMART THING TO DO.

SOME IMPORTANT DEFINITIONS

Extensive properties

Intensive properties

Heat added or removed from a system: q

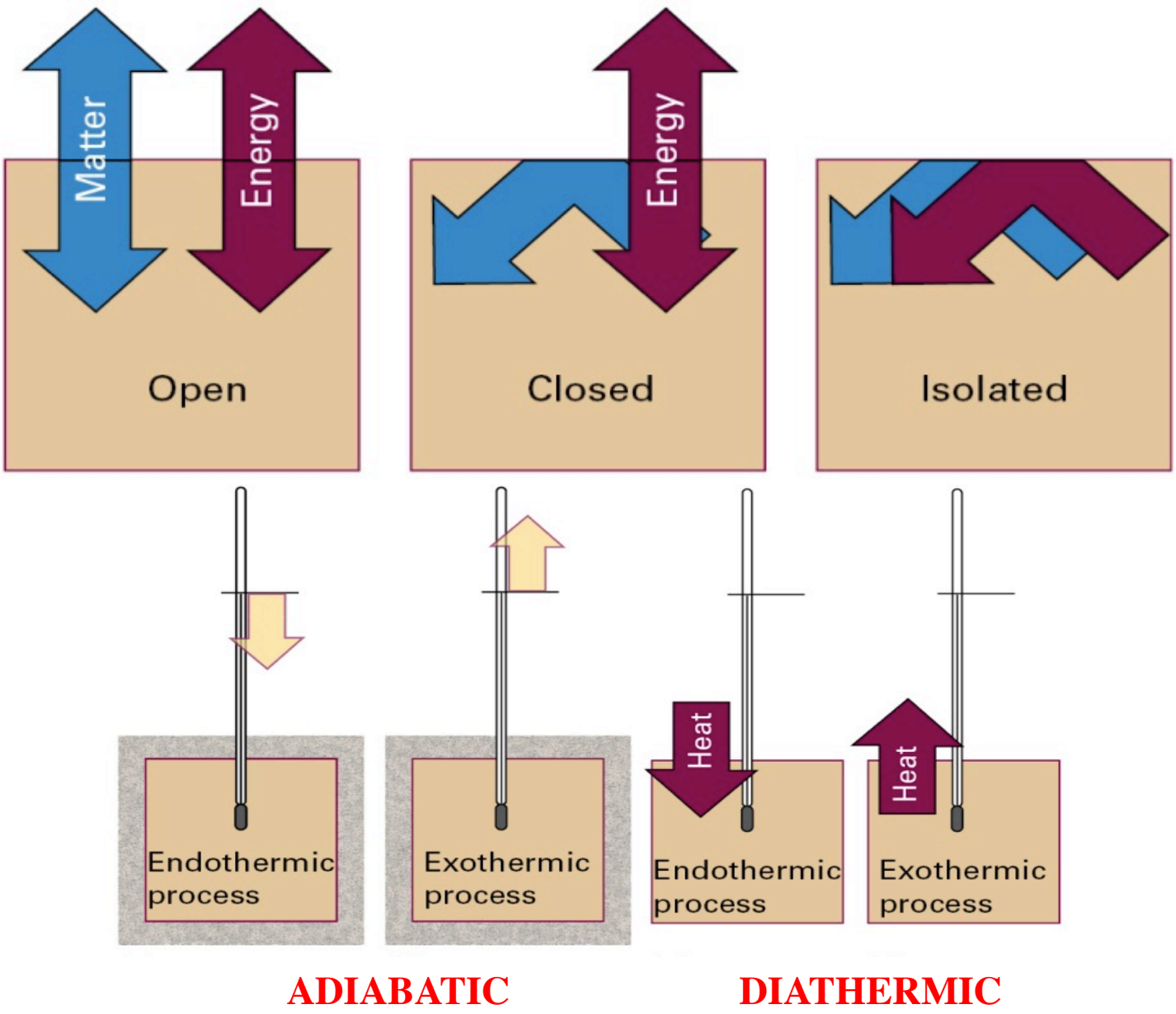
Work done on a system or by a system: w
(note about the sign of w)

Total Internal Energy of a System: U

Change in internal energy: $\Delta U = q + w$

STATE FUNCTION **equations of state e.g.** $p = \frac{nRT}{V}$

OPEN, CLOSED AND ISOLATED SYSTEMS



FIRST LAW OF THERMODYNAMICS

THE INTERNAL ENERGY OF AN ISOLATED SYSTEM IS CONSTANT

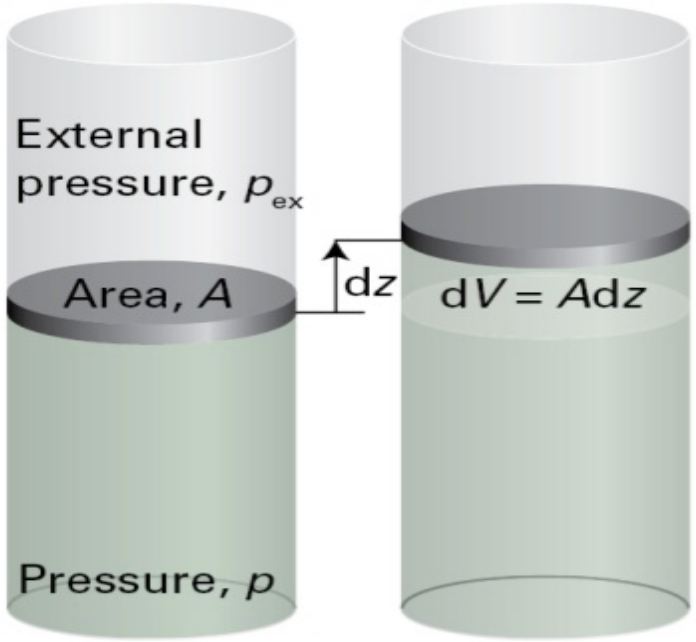
U for an isolated system is constant

$\Delta U = q + w$ **(for an isolated system q=w=0)**

$dU = dq + dw$

Example: Expansion/Compression of a Gas

$$dw = -\left|F\right|dz = -p_{ex}Adz = -p_{ex}dV$$



$$w = -\int_{V_i}^{V_f} p_{ex}\,dV = -p_{ex}\int_{V_i}^{V_f} dV = -p_{ex}(V_f - V_i)$$

REVERSIBLE PROCESSES

The direction of the process can be changed by an infinitesimal change in some variable (e.g. T, P, etc.)

Reversible Expansion of a Gas

Expansion with $p = p_{ex}$

$$w = -\int_{V_i}^{V_f} p\,dV$$

If this is an ISOTHERMAL, reversible expansion of an ideal gas

Then:

$$w = -\int_{V_i}^{V_f} \frac{nRT}{V}\,dV = -nRT\ln\frac{V_f}{V_i}$$

The work associated with a reversible process is the MAXIMUM possible for the process.

HEAT CAPACITY

Consider a change in T for a system at constant volume (no pV work)

$$C_V = \left(\frac{\partial U}{\partial T} \right)_V$$

Definition of constant volume heat capacity.

THE END

SEE YOU Wednesday