

NAME:

HONORS CHEMISTRY

SECTION:

Thermodynamics Webquest

Introductory Material

<http://www.physicsplanet.com/articles/three-laws-of-thermodynamics>

<http://www.grc.nasa.gov/WWW/k-12/airplane/thermo.html> Follow the thermodynamics guided tour

<http://www4.uwsp.edu/cnr/wcee/keep/Mod1/Rules/EnConversion.htm>

1. Define the term "thermodynamics."

2. State the First Law of Thermodynamics. What does it mean?



3. Give a real-world example that illustrates the first law of thermodynamics.

4. State the Second Law of Thermodynamics. What does it mean?

5. Give a real-world example that illustrates the second law of thermodynamics.

THE FOURTH LAW OF THERMODYNAMICS



the temperature in your office building will always be unbearably hot or unbearably cold - never somewhere in between

6. State the Third Law of Thermodynamics. What does it mean?

7. What does it mean when two objects are in thermal equilibrium? What law of thermodynamics does this illustrate?

State functions

[http://chemwiki.ucdavis.edu/Physical\\_Chemistry/Thermodynamics/State\\_Functions](http://chemwiki.ucdavis.edu/Physical_Chemistry/Thermodynamics/State_Functions)

[http://www.chem.ufl.edu/~itl/2045/lectures/lec\\_7.html](http://www.chem.ufl.edu/~itl/2045/lectures/lec_7.html)

8. What is a state function?
  
9. List an example of a state function that is important in chemistry and explain why it is a state function.

Hess' Law

10. Go to <http://chemistry2.csudh.edu/homework/hwhesslaw.html> and complete 3 problems. Staple your receipt to the back of the webquest.  
Copy one problem here (write out all the equations!), and show your complete solution

Heating/Cooling/Phase Change Problems

<http://www.kentchemistry.com/links/Matter/HeatingCurve.htm>

<http://www.periodictable.com/Properties/A/SpecificHeat.html>

11. Choose any element from the periodic table site and list relevant data here:  
Melting point                                  Boiling point  
Specific heat of solid

12. Create a 3 step heating/cooling curve problem for this element; then, write out a complete solution for this problem, including a sketch showing the temperature vs. time changes.

#### Thermodynamic Processes

<http://physics.bgsu.edu/~stoner/p201/engine/sld007.htm>

13. What is a reversible process?

14. What is an irreversible process?

[http://webphysics.davidson.edu/physlet\\_resources/bu\\_semester1/index.html](http://webphysics.davidson.edu/physlet_resources/bu_semester1/index.html)

[http://webphysics.davidson.edu/physlet\\_resources/gustavus\\_physlets/isothermalwork.html](http://webphysics.davidson.edu/physlet_resources/gustavus_physlets/isothermalwork.html)

[http://webphysics.davidson.edu/physlet\\_resources/bu\\_semester1/index.html](http://webphysics.davidson.edu/physlet_resources/bu_semester1/index.html)

<http://www.grc.nasa.gov/WWW/K-12/airplane/pvtsplot.html>

15. What is an adiabatic process?

16. What is an isothermal process?

17. What is an isochoric process?

18. What is an isobaric process?

19. Draw and label a P-V diagram that shows how each type of thermodynamic process affects the pressure and volume of a gas.

### Entropy

[http://www.avogadro.co.uk/h\\_and\\_s/entropy.htm](http://www.avogadro.co.uk/h_and_s/entropy.htm)

20. Describing entropy as disorder is actually an oversimplification. What is another way to describe entropy? Explain.



21. Give an example of an everyday process that illustrates an increase in entropy.

Gibb's Free Energy

<http://www.chem.tamu.edu/class/majors/tutorialnotefiles/gibbs.htm>

[http://www.saskschools.ca/curr\\_content/chem30\\_05/1\\_energy/energy3\\_3.htm](http://www.saskschools.ca/curr_content/chem30_05/1_energy/energy3_3.htm)

<http://www2.ucdsb.on.ca/tiss/stretton/CHEM2/equil9.htm>

22. What is the difference between an endergonic process and an exergonic process?

23. Can a reaction that is endothermic with a decrease in entropy ever occur spontaneously?  
Justify your answer.

BONUS: Complete a problem at the website below. Attach your receipt and a written out solution. (+3 points, no partial credit)

<http://chemistry2.csudh.edu/homework/hwbornhaber.html>