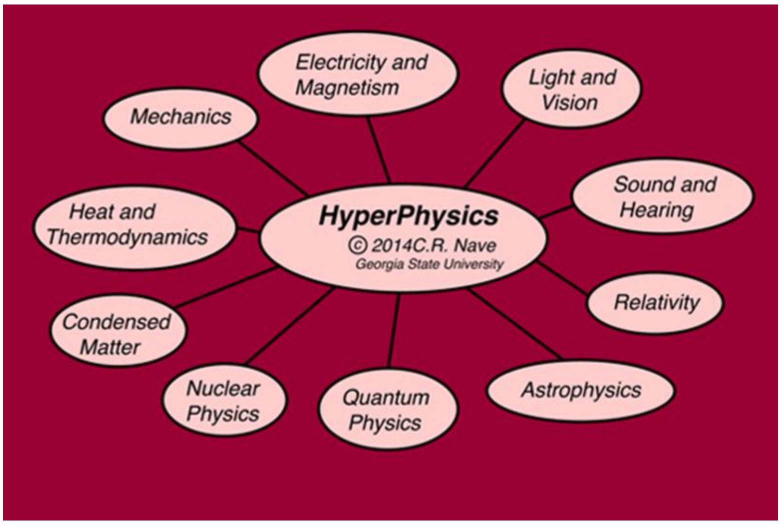


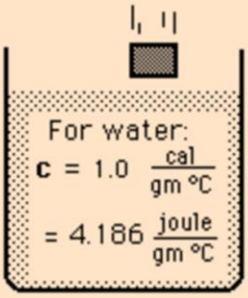
Interaktívny vzdelávací modul HyperPhysics je rozdelený na niekoľko základných fyzikálnych a fyzikálno – chemických častí, v ktorých sú vysvetlené základné, ale aj detailné pojmy, definície, modelové príklady.

Pre metalurgiu železa, ocele a ferozliatin má význam hlavne časť zameraná na tepelné a termodynamické procesy, kde sú vysvetlené termodynamické veličiny, ako napr. entalpia, entrópia, Gibbsova energia, tepelná kapacita, fázové premeny, atď. Jednotlivé procesy sa dajú interaktívne vizualizovať v prednastavených modeloch.

Na nasledujúcich printscreenoch sa nachádzajú ukážky z interaktívneho vzdelávacieho modulu Hyperphysics.

Cooling a Hot Object

The cooling of a hot object, say in a container of water, is an example of an approach to thermal equilibrium. The amount of cooling depends upon the masses, specific heats, and original temperatures of the objects. In this example, the possibility of vaporization of the water is neglected , which is unrealistic if the temperature of the hot object is well above 100 C.



Hot object	Water container
Mass of object = ___ gm Specific heat c = ___ cal/gm C c= ___ joule/gm C Initial temperature = ___ C	Mass of water = ___ gm Initial water temperature = ___ C

Heat lost by object = Heat gained by water

$$-Q_{object} = Q_{water}$$

$$-cm\Delta T_{object} = cm_w\Delta T_{water}$$

(___ cal/gm C)(___ gm)(___ - T_f) = (1cal/gm C)(___ gm)(T_f - ___)

Final temperature T_f = ___ C

Thermodynamic Properties of Selected Substances

For one mole at 298K and 1 atmosphere pressure

Substance (form)	Enthalpy $\Delta_f H$ (kJ)	Gibbs $\Delta_f G$ (kJ)	Entropy (J/ K	Specific heat C_P(J/K)	Volume V(cm^3)
Al (s)	0	0	28.33	24.35	9.99
Al_2SiO_5 (kyanite)	-2594.29	-2443.88	83.81	121.71	44.09
Al_2SiO_5 (andalusite)	-2590.27	-2442.66	93.22	122.72	51.53
Al_2SiO_5 (sillimanite)	-2587.76	-2440.99	96.11	124.52	49.90
Ar (g)	0	0	154.84	20.79	...
C (graphite)	0	0	5.74	8.53	5.30
C (diamond)	1.895	2.900	2.38	6.11	3.42
CH_4 (g)	-74.81	-50.72	186.26	35.31	...
C_2H_6 (g)	-84.68	-32.82	229.60	52.63	...
C_3H_8 (g)	-103.85	-23.49	269.91	73.5	...
C_2H_5OH (l)	-277.69	-174.78	160.7	111.46	58.4
$C_6H_{12}O_6$ (glucose)	-1268	-910	212	115	...
CO (g)	-110.53	-137.17	197.67	29.14	...
CO_2 (g)	-393.51	-394.36	213.74	37.11	...
H_2CO_3 (aq)	-699.65	-623.08	187.4	...	...
HCO_3^- (aq)	-691.99	-586.77	91.2	...	...
Ca^{2+} (aq)	-542.83	-553.58	-53.1	...	...
$CaCO_3$ (calcite)	-1206.9	-1128.8	92.9	81.88	36.93
$CaCO_3$ (aragonite)	-1207.1	-1127.8	88.7	81.25	34.15
$CaCl_2$ (s)	-795.8	-748.1	104.6	72.59	51.6
Cl_2 (g)	0	0	223.07	33.91	...
Cl^- (aq)	-167.16	-131.23	56.5	-136.4	17.3
Cu (s)	0	0	33.150	24.44	7.12
Fe (s)	0	0	27.28	25.10	7.11
H_2 (g)	0	0	130.68	28.82	...
H (g)	217.97	203.25	114.71	20.78	...
H^+ (aq)	0	0	0	0	...
H_2O (l)	-285.83	-237.13	69.91	75.29	18.068
H_2O (g)	-241.82	-228.57	188.83	33.58	...
He (g)	0	0	126.15	20.79	...

Specific Heat

The specific heat is the amount of heat per unit mass required to raise the temperature by one degree Celsius. The relationship between heat and temperature change is usually expressed in the form shown below where c is the specific heat. The relationship does not apply if a phase change is encountered, because the heat added or removed during a phase change does not change the temperature.

$$Q = cm\Delta T$$

Heat added = specific heat x mass x (t_{final} - $t_{initial}$)

Enter the necessary data and then click on the active text above for the quantity you wish to calculate.

For a mass m = [100] gm = [ ] kg

with specific heat c = [ ] cal/gm°C = [4.1868] joule/gm°C,

initial temperature T_i = [ ] °C = [273.15] K = [ ] °F

and final temperature T_f = [ ] °C = [283.15] K = [ ] °F,

the amount of heat added is

Q = [1000.0] calories = [1] kcal = [1.0000] x 10^[3] calories.

Q = [4186.8] joules = [0.4186] x 10^[4] joules.