



COMMON ACIDS				COMMON BASES				FIREWOOD_FUEL_COMPARISONS				
pH of Acids(pH<7)	Molarity	pH	Atom Num	gm/ mole	Water/ Air Std.			Million BTU /Unit (1)	Available Units /million BTU(2)		Comment	
Acetic	N	2.4										
Acetic	0.1N	2.9	Actinium	Ac	89	227		#2 Fuel Oil 0.135/gallon	11.5		65% efficient	
Alum	0.1N	3.2	Americium	Am	95			Charcoal 0.013/pound	128		60% efficient	
Ansniuous	Saturated	5	Astatine	At	85			Coal			60% efficient	
Benzoic	0.1N	3	Berkelium	Bk	97			Anthracite 15.2/ton	0.07			
Boric	0.1N	5.3	Californium	Cf	98			Bituminous 22.0/ton	0.08		Low Volatile	
Carbonic	Saturated	3.8	Cerium	Ce	58			BRuminous 28.6/ton	0.06		High Volatile	
Citric	0.1N	2.1	Curium	Cm	96			Lignite 13.8/ton	0.12			
Formic	0.1N	2.3	Dysprosium	Dy	66	162		Electricity 0.003/KWH	293		100% efficient	
Hydrochloric	N	0.1	Einsteinium	Es	99	254		Kerosene 0.135/gallon	11.5		65% efficient	
Hydrochloric	0.1N	1.1	Erbium	Er	68	167		Natural Gas 700/MCF	1.43		70% efficient	
Hydrochloric	0.01N	2	Europium	Eu	63	151		Propane 0.09/gallon	15.7		70% efficient	
Hydrocyanic	0.1N	5.1	Fermium	Fm	100	253		Wood			50% to 60% efficient	
Hydrogen Sulfide	0.1N	4.1	Francium	Fr	87	223		Apple 30/cord	0.047		L-smoke, L-spark	
Malic	0.1N	2.2	Gadolinium	Gd	64	157		Aspen 18/cord	0.077		M-smoke, H-spark	
OrthoPhosphoric	0.1N	1.5	Hafnium	Hf	72	168	11.4	Cottonwood 17/cord	0.082		M-smoke, L-spark	
Succinic	0.1N	2.7	Holmium	Ho	67	164		Elm, Red 28/cord	0.048		M-smoke, M-spark	
Salicylic	Saturated	2.4	Indium	In	49	114	7.3	Fir,Douglas 24/cord	0.058		H-smoke, M-spark	
Sulfuric	N	0.3	Lanthanum	La	57	139	6.15	hickory 27/cord	0.052		L-smoke, L-spark	
Sulfuric	0.1N	1.2	Lutetium	Lu	71	175		Juniper 15/cord	0.083		M-smoke, M-spark	
Sulfuric	0.01N	1.2	Mendelevium	Md	101	256		Maple,Silver 20/cord	0.070		L-smoke, L-spark	
Sulfurous	0.1N	1.5	Neodymium	Nd	60	144		Oak, Red 30/cord	0.047		L-smoke, L-spark	
Tartaric	0.1N	2	Neptunium	Np	93	237		Oak, White 32/cord	0.044		L-smoke, L-spark	
Trichloracetic	0.1N	1.2	Niobium	Nb	41	92	8.57	Lodgepole 21/cord	0.066		M-smoke, M-spark	
			Osmium	Os	76	190	22.48	Pine,Pinon 27/cord	0.052		M-smoke, M-spark	
pH of Bases(pH>7)	Molarity	pH	Palladium	Pd	46	106	12	Ponderosa 20/cord	0.070		M-smoke, M-spark	
Ammonia	N	11.6	Polonium	Po	84	210	6.63	Spruce 18/cord	0.077		M-smoke, H-spark	
Ammonia	0.1N	11.1	Praseodymium	Pr	59	141		INSULATION VALUE OF MATERIALS				
Barbitol Sodium	8.09	10.6	Promethium	Pm	61	145		Insulation	Thickness	R	SeaWater ppm	
Borax	0.01N	9.2	Protactinium	Pa	91	231		Material	(inches) k	C	Value	CL
CalciumCarbonate	Saturated	9.4	Rhenium	Re	75	186	20	Ground surface		2.00	0.50	Na
CalciumCarbonate	Saturated	12.4	Rhodium	Rh	45	102	12.44	Concrete	1	12.00	0.08	Mg
FerrousHydroxide	Saturated	9.5	Rubidium	Rb	37	85	1.53	Plaster	1	8.00	0.12	S
Lime	Saturated	12.4	Ruthenium	Ru	44	101	12.2	Face Brick	1	9.00	0.11	Ca
Magnesia	Saturated	10.5	Samarium	Sm	62	150	7.7	Brick-Low density	1	5.00	0.20	K
Potassium Acetate	0.1N	9.7	Scandium	Sc	21	45	2.5	Hollow Concrete Block	8	0.90	1.11	Au
PotassiumBicarbonate	0.1N	8.2	Tellurium	Te	52	127	6.24	Hollow Tile . .	4	1.00	1.00	
PotassiumCarbonate	0.1	11.5	Terbium	Tb	65	159		Stucco.	1	5.00.	0.20	
Potassium Cyanide	0.1N	11.0	Thallium	Tl	81	204	11.85	Metal Lath & Plaster	3/4	7.70	0.13	
PotassiumHydroxide	N	14	Thorium	Th	90	232	11.5	Rockcork .	1	0.328	3.05	
PotassiumHydroxide	0.1N	13	Thulium	Tm	69	169		Celotex	1	0.330	3.03	
PotassiumHydroxide	0.01N	12	Vanadium	V	23	51	5.68	Corkeoard	1	0.30	3.33	
Sodium Acetate	0.1N	8.9	Xenon	Xe	54	131	5.49A	Gypsum Board	1/2	2.20	0.45	
Sodium Benzoate	0.1N	8	Ytterbium	Yb	70	173	5.51	Plywood .	1/2	1.60	0.82	
Sodium Bicarbonate	0.1N	8.4	Zirconium	Zr	40	91	6.4	Most sottwoods	1	0.80	1.25	
Sodium Carbonate	0.1N	11.6					Most hardwoods	1	1.10	0.91		
Sodium Hydroxide	N	14					Sawdust	1	0.410	2.44		
Sodium Hydroxide	0.1N	13					Redwood	1	0.570	1.75		
Sodium Hydroxide	0.01N	12					Asphalt Shingles		2.27	0.44		
Sodium Metasilicate	0.1N	12.6					Built-up Roofing	3/8	3.00	0.33		
Sodium Sesquicarbonat	0.1N	10.1					Wood Shingles					
Trisodium Phosphate	0.1N	12					Structural Insulation Bd	1/2	0.76	1.32		
							Glass wool	1	0.266	3.76		
							Mineral Wool Bat	3-4	0.09	11.00		
							Mineral Wool Bat	5-6	0.05	19.00		
							Mineral Wool Bat	6-7	0.05	22.00		
							Mineral Wool Bat	8-9	0.03	30.00		
							Sheep'swool	1	0.338	2.96		
							Balsam wool	1	0.27	3.70		

'K' is heat conductivity over a thickness of 1 inch and 'C' is heat conductance over the specified thickness. 'R Value' is the most common number used to compare the insulating properties of various material and is typically marked on the wrapper of container or the insulator. The 'R Value' is effectively the materials resistance to heatflow and is based on the 'k' and 'C' values. 'R Values' based on 'k' assume a thickness of 1 inch and R Values' based on 'C' are based on the thickness indicated above. Values listed above are from the NatioM( Bureau of Slarr dards andf.

'L-' is Low,'M-' is Medium, and 'H-' is nigh  
In order to calculate the actual cost of heat for each type, simply multiply the 'Available Unit/million BTU' by the current cost per unit. For example, if natural gas is currently \$4 per MCF, the cost of 1 million BTU is \$4 x 1.43 = \$5.72. In the case of White Oak, the cost of 1 million BTU is \$150/cord x 0.072 = \$10.80. Note that the wood efficiency can vary greatly, depending on moisture and efficiency of the furnace you are using.

(1) Million BTU/Unit defines the average amount of heat per unit that is available for that fuel type, assuming 100%6 burning efficiency. For example, Aspen wood contains 18,000,000 BTU per dry cord.

(2) Available Units/million BTU defines the actual number of units required to produce 1,000,000 BTU. The efficiency of burning (shown in the Comment column) is considered, as well as the moisture content of woods (average 20% moisture for dry wood).

Tempering

Step 1:To harden the tool, heat tool end to bright red, quench tool end in cold water until cool to touch, then sharpen or polish tool end. At this the tool has been hardened but it is now brittle.

Step2:To temper the tool heat the tool to the temperature indicated by its color in the above table, then quench the tool in water.

TEMPERING COLOR FOR STEEL

Heated Color	Temper item or Comment
Carbon STEEL	
Faint yellow	420 Knives, hammers
Very pale yellow	430 Reamers
Light yellow	440 Lathe tools, scrapers, milling cutters, reamers
Pale straw-yellow	450 Twist drills for hard use
Straw-yellow	460 Dies, punches, bits, reamen
Deep straw-yellow	470
Dark yellow	480 Twist drills, large taps
	485 Knurls
yellow-brown	490
Brown-yellow	500 Axes, wood chisels, drifts
Spotted red-brown	510
Brown-purple	520 Taps 1/4 inch and under
Light purple	530
Full purple	540 Cold chisels, center puncher
Dark purple	550
Full blue	560 Screwdrivers, springs, gears
Dark blue	570
Medium blue	600 Scrapers, spokeshaves
Light blue	640
Red-visible at night	750
Red-visible at twilight	885
Red-visible in daylight	975
Red-visible in sunlight	1075
Dark red	1290
Dull cherry red	1475
Cherry red	1650
Bright cherry red	1830
Orange-red	2010
Orange-yellow	2190
yellow-white	2370
White	2550
Brilliant white	2730
Blue-white	2900
Acetylenene	4080
Induction furnace	5450
Electric arc light	7200