Thermochemistry III Worksheet   Name _____
Chem 140

Consider the following "thermite" reaction:

$$2 \text{ Al (s)} + \text{Fe}_2\text{O}_3 \text{ (s)} \rightarrow \text{Al}_2\text{O}_3 \text{ (s)} + 2 \text{ Fe (s)}$$
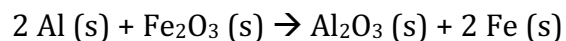
1) If 19 grams of aluminum were used in the reaction, how many grams of iron oxide are required to fully react with the aluminum?

2) The ΔH for this reaction (ΔH_{rxn}) is -852.5 kJ/rxn (as written). How many kJ of heat are released when 19 grams of aluminum reacts with a stoichiometric amount of iron oxide?

3) If this reaction was done underwater and the heat was released into the surrounding 5 liters of water, how hot would this water get assuming the initial temperature of the water was 25 °C?

TABLE 5.5 Fuel Values and Compositions of Some Common Fuels

	Approximate Elemental Composition (mass %)			
	C	H	O	Fuel Value (kJ/g)
Wood (pine)	50	6	44	18
Anthracite coal (Pennsylvania)	82	1	2	31
Bituminous coal (Pennsylvania)	77	5	7	32
Charcoal	100	0	0	34
Crude oil (Texas)	85	12	0	45
Gasoline	85	15	0	48
Natural gas	70	23	0	49
Hydrogen	0	100	0	142

4) How many kJ of energy are generated when burning 300 grams of pine tree?

5) How many kJ of energy are generated when burning 175 grams of anthracitic coal?

6) How many kJ of energy are generated when burning 110 grams of natural gas?

7) How many kJ of energy are generated when burning 40 grams of hydrogen gas?