

### Thermodynamic Quantities

Substance	H <sub>f</sub> kJ/mole	S J/mole K
benzene (l)	+48.99	+172.2
carbon (diamond) (s)	+1.88	+2.4
carbon (graphite) (s)	0.00	+5.8
carbon dioxide (g)	-393.5	+213.7
ethyne (acetylene) (g)	+228	+200.8
hydrogen (g)	0.00	+130.6
water (l)	-285.8	+69.94
water (g)	-241.8	+188.7
oxygen (g)	0.00	+205.0
ozone (g)	+142.0	+238
sulfur (s)	0.00	+31.9
sulfur dioxide (g)	-296.8	+248.5
carbon monoxide (g)	-110.5	+197.6
propane (g)	-103.8	+269.9
methane (g)	-74.5	+186.1

Calculate the thermodynamic quantities for each reaction at 35°C.

oxygen ----> ozone

sulfur + oxygen -----> sulfur dioxide

methane (CH<sub>4</sub>) + oxygen -----> carbon dioxide (gas) + water (gas)

propane (C<sub>3</sub>H<sub>8</sub>) + oxygen -----> carbon dioxide (gas) + water (liquid)