ANSWERS: Unit 5, Lesson 01: Driving Forces in Chemical Reactions: Enthalpy and Entropy

1. If there are equal amounts of each of the following substances, circle the substance in each pair which has higher entropy:

a) H_2O (l) or (H_2O (v))

b) (H_2S (g)) or H_2S (aq)

c) $Ca(OH)_2$ (s) or ($Ca(OH)_2$ (aq))

d) CH_3OH (l) or (NH_3 (g))

e) (Br_2 (aq)) or Br_2 (l)

f) (powdered icing sugar) or sugar cubes

2. Complete the following chart for the reactions as written:

System	Does the drive to LOWER ENTHALPY favour the reactants or products?	Does the drive to HIGHER ENTROPY favour the reactants or products?	Is this reaction reversible? If not, will it favour the reactants or products?
a) $2\ SO_2\ (g) + O_2\ (g) \rightarrow 2\ SO_3\ (g) +$ heat	products	reactants	reversible
b) $Cu_2O\ (s) + C\ (s) +$ heat $\rightarrow 2\ Cu\ (s) + CO\ (g)$	reactants	products	reversible
c) $N_2\ (g) + 3\ H_2\ (g) \rightarrow 2\ NH_3\ (g) +$ heat	products	reactants	reversible
d) $CaO\ (s) + CO_2\ (g) \rightarrow CaCO_3\ (s) +$ heat	products	reactants	reversible
e) $NH_4NO_3\ (s) +$ heat $\rightarrow NH_4NO_3\ (l)$	reactants	products	reversible
f) $4\ Fe\ (s) + 3\ O_2\ (g) \rightarrow 2\ Fe_2O_3\ (s) +$ heat	products	reactants	reversible
g) $H_2O\ (l) +$ heat $\rightarrow H_2O\ (g)$	reactants	products	reversible
h) $N_2\ (g) \rightarrow N_2\ (s) +$ heat	products	reactants	reversible
i) $C_5H_{12}\ (l) + 8\ O_2\ (g) \rightarrow 5\ CO_2\ (g) + 6\ H_2O\ (g) +$ heat	products	products	no, products only
j) $NaCH_3COO{\cdot}3\ H_2O(s) +$ heat $\rightarrow NaCH_3COO\ (aq) + 3\ H_2O\ (l)$	reactants	products	reversible
k) $2\ H_2\ (g) + O_2\ (g) \rightarrow 2\ H_2O\ (g) +$ heat	products	reactants	reversible
l) $2\ H_2O\ (l) + O_2\ (g) +$ heat $\rightarrow 2\ H_2O_2\ (l)$	reactants	reactants	no, reactants only
m) $Ca\ (s) + 2\ H_2O\ (l) \rightarrow Ca(OH)_2\ (aq) + H_2\ (g) +$ heat	products	products	no, products only
n) $HgO\ (s) +$ heat $\rightarrow Hg\ (l) + ½\ O_2\ (g)$	reactants	products	reversible
o) $4\ CO_2\ (g) + 4\ H_2O\ (g) +$ heat $\rightarrow C_4H_8\ (g) + 6\ O_2\ (g)$	reactants	reactants	no, reactants only

3. Will the following situations favour the reactants only, the products only, or be a reversible reaction?

a) ΔS is positive and ΔH is negative: **favours the products only**

b) ΔS is negative and ΔH is negative: **reversible**

c) ΔS is negative and ΔH is positive: **favours the reactants only**

d) ΔS is positive and ΔH is positive: **reversible**