Name	KEY		
Period	Date	1 1	

# 20 • Entropy and Free Energy

QUICK CHECK

#### ☐ Positive or Negative:

When solid CaCl<sub>2</sub> dissolves in water, the solution gets hot. Predict the signs of  $\Delta S$ ,  $\Delta H$ , and  $\Delta G$ .



because it Does dissolve

## ☐ Spontaneity:

Put a check next to the following situations that would lead to a spontaneous reaction.

$   \sqrt{} $	$\Delta S$	$\Delta \mathbf{H}$	Temperature	-	
	+	+	low temp		
-	+	_	high temp	any	temp
	-	+	high temp		
	-	-	low temp	1	

## ☐ Entropy Change:

Calculate the standard entropy change for the following reaction,  $Cu(s) + \frac{1}{2} O_2(g) \rightarrow CuO(s)$ , given that

	/_
$S^{\circ}[Cu(s)] = 33.15 \text{ J/K} \cdot \text{mol}$	
$S^{\circ}[O_2(g)] = 205.14 \text{ J/K} \cdot \text{mol}$	
$S^{\circ}[CuO(s)] = 42.63 \text{ J/K} \cdot \text{mol}$	

## ☐ Changeover Temperature:

At what temperature would a given reaction become spontaneous if  $\Delta H = +119$  kJ and  $\Delta S = +263$  J/K?

$$DG = DH - TDS$$

$$O = DH - TDS$$

$$DH = TDS$$

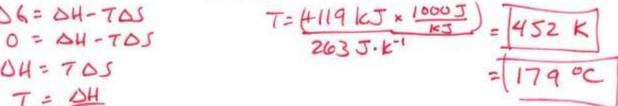
$$T = DH$$

$$DG = DH - TDS$$

$$T = DH$$

$$DG = DH - TDS$$

$$T = DH$$



## ☐ Entropy:

In which one of the following reactions do you expect to have a decrease in entropy?

$$a)$$
 Fe(s)  $\rightarrow$  Fe(l)

b) 
$$Fe(s) + S(s) \rightarrow FeS(s) \sim$$

(c) 
$$2 \text{ Fe(s)} + 3/2 \text{ O}_2(g) \rightarrow \text{Fe}_2\text{O}_3(s)$$

d) 
$$HF(1) \rightarrow HF(g)$$

e) 
$$2 H_2O_2(1) \rightarrow 2 H_2O(1) + O_2(g)$$