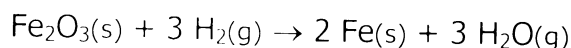


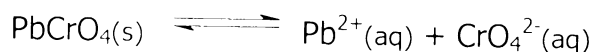
Unless otherwise specified, each question is worth 4 points.

1. For the following reaction $\Delta H^\circ = +98.8 \text{ kJ}$ and $\Delta S^\circ = +142 \text{ J/K}$; is this reaction spontaneous at 25°C ? Justify your answer with calculations.



$$\begin{aligned}\Delta G &= \Delta H - T\Delta S = +98,800 \text{ J} - (298)(142) \\ &= 98,800 - 42,316 \\ &= +56,484 \text{ J} \quad \boxed{\text{NO}}\end{aligned}$$

2. Which of the following statements is true? (Circle your choice.)
- For any spontaneous chemical or physical process, ΔS_{system} is always positive.
 - For any spontaneous chemical or physical process, $\Delta S_{\text{surroundings}}$ is always positive.
 - For any spontaneous chemical or physical process, $\Delta S_{\text{universe}}$ is always positive.
 - For any spontaneous chemical or physical process, $\Delta S_{\text{universe}}$ is impossible to determine.
 - For any spontaneous chemical or physical process, ΔS_{system} is impossible to determine.
3. For the following reaction, the equilibrium constant, K_{sp} , is 2.8×10^{-13} at 25°C ;

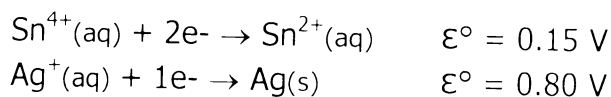


Is the value of ΔG° greater than zero, less than zero, or exactly equal to zero? BRIEFLY explain your answer; answers that are simply calculations will exactly equal to zero points.

K IS VERY SMALL, $\ll 1$
REACT. # IS UNFAVORABLE, ΔG MUST BE +
($\Delta G > 0$)

Unless otherwise specified, each question is worth 4 points.

4. calculate $\epsilon^\circ_{\text{cell}}$ for a galvanic cell that utilizes the following $\frac{1}{2}$ - reactions:



} BOTH ARE REDUCTION,
BUT 1 MUST BE OX.
($\neq E_{\text{cell}} > 0$)

SO, $-(0.15) + 0.80 =$ ~~+0.65V~~ 0.65V

5. For a galvanic cell that features the following chemical reaction, write the $\frac{1}{2}$ - reaction that occurs at the anode. Don't forget the electron(s)!

