

Le Chatelier's Principle: Assignment

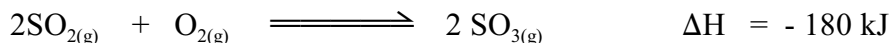
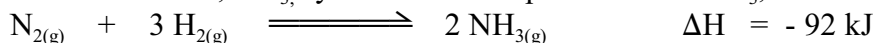
1. Continuous removal of one of the products of a chemical reaction has the effect of causing the reaction to go to completion. Explain this in terms of Le Chatelier's principle, using suitable examples.

2. Explain how each of the following factors affects the amount of hydrogen gas present in an equilibrium mixture in the following reaction ...



- raising the temperature of the mixture
- introducing more steam
- increasing the pressure
- addition of a catalyst
- decreasing the volume

3. In both the ammonia, NH_3 , synthesis and the production of SO_3 , according to ...

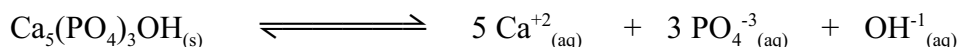


The mole fraction at equilibrium of the desired product (NH_3 , and SO_3), is greater at lower temperatures. Yet, the commercial production of these substances relatively high temperatures are used. Explain why this is so!

4. Define equilibrium in terms of ...

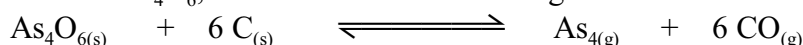
- reaction rates
- changes in observable properties
- energy and entropy changes

5. Is sugar candy really bad for your teeth? Tooth decay is the result of the dissolving of tooth enamel, $\text{Ca}_5(\text{PO}_4)_3\text{OH}_{(s)}$. In the mouth the following equilibrium is established ...



- When sugar ferments on the teeth, H^+ ion is produced. What effect does this increased H^+ ion have on tooth enamel?
- How would increased concentrations of Ca^{+2} ions influence this system in chemical equilibrium? Suggest a method to increase the Ca^{+2} ion concentration in your body.
- Research has indicated that if teeth are bathed in solutions containing appropriate amounts of Sr^{+2} ions or F^{-1} ions, the dissolving process may be reversed. Suggest an explanation for these findings.

6. Arsenic can be extracted from its ores by first reacting the ore with oxygen, (called roasting), to form solid As_4O_6 , which is then reduced using carbon ...



Predict the direction of the shift of the equilibrium position in response to each of the following changes in conditions ...

- addition of $\text{CO}_{(g)}$
- addition or removal of carbon or arsenic (III) oxide, As_4O_6
- removal of gaseous arsenic, $\text{As}_{4(g)}$