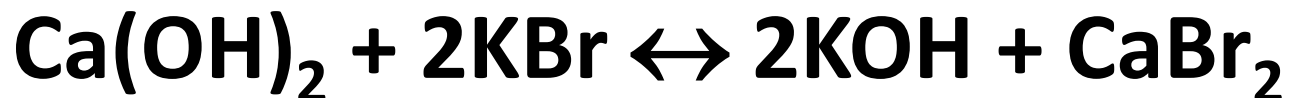
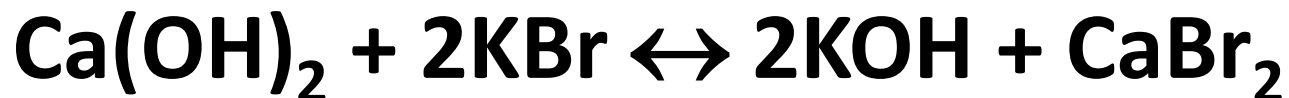


Jumpstart



- 1) Which way does equilibrium shift if you add extra KBr
- 2) What happens to the amount of KOH once the shift happens?
- 3) What happens to the amount of CaBr_2 once the shift happens?
- 4) What happens to the amount of Ca(OH)_2 once the shift happens?

Jumpstart



1) Add extra KBr

= shift right, need to use it up!

2) Amount of KOH

*= increases, you moved toward it so
you made some more*

3) Amount of CaBr₂

*= increases, you moved toward it so
you made some more*

4) Amount of Ca(OH)₂

*= decreases, you moved away from it
so you used some up*

Target: I can pay attention to small details when doing Le Chatelier's principle problems

Things to look for BEFORE answering an equilibrium problem		
Stressor	Question	What does it tell us?
Increase or decrease [] products or reactants	Which phase?	<ul style="list-style-type: none">• Gas, aqueous - change things• Solid, Liquid – DON'T CHANGE ANYTHING!
Increase or decrease T	Endo or exo?	<ul style="list-style-type: none">• Endo = absorbed, so it is a REACTANT• Exo = released, so it is a PRODUCT
Increase or decrease total Pressure <i>(Same as change in volume or number of moles of gas)</i>	How many moles of GAS are on each side of the equation?	<ul style="list-style-type: none">• Increase pressure = move to side with FEWER moles of gas• Decrease pressure = move to side with MORE moles of gas

- 1) Which change would cause the equilibrium to shift to the **right** in this endothermic rxn? *Circle an answer choice!*



- a. *Decrease the concentration of dihydrogen sulfide.*
- b. *Increase the pressure on the system.*
- c. *Increase the temperature of the system.*
- d. *Increase the concentration of carbon disulfide.*

- A) Would shift it LEFT to replace what you took out**
- B) Would shift LEFT because there are only 3 moles of gas which is less crowded than 5 moles of gas on the right**
- C) It is ENDOTHERMIC so heat is reactant, so if I raise the temperature I need to use up some heat, so it shifts to the RIGHT**
- D) Would shift to the LEFT to use up the CS₂ that you added**

2) What happens to equilibrium position if you decrease the concentration of methane.



- Sulfur dioxide is added to the system.

Shift LEFT to use up the extra SO_2

- Sulfur trioxide is removed from the system.

Shift LEFT to replace what you took out

- Oxygen is added to the system.

Shift LEFT to use up the extra O_2

3) What would happen to the position of the equilibrium



- HgO is added to the system.

NOTHING! It is a SOLID!

- The pressure on the system increases.

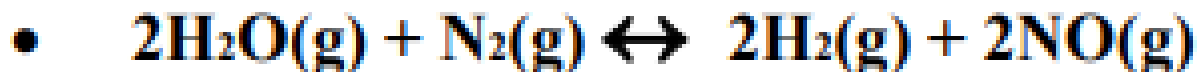
Shift LEFT to go to side with fewer moles of GAS so it feels less crowded and the pressure goes back down. Left side has 0 moles of GAS, right side has 1 mole of GAS

- 4) When the volume of the following mixture of gases is increased, what will be the effect on equilibrium position?



If volume is increased, then pressure goes down. The reaction needs to raise the pressure back up. So it shifts to the LEFT because that side is more crowded with 5 moles of gas instead of only 4 on the right side

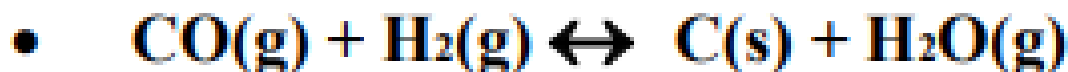
5) Predict the effect of decreasing the volume of the container for each equilibrium.



Decrease volume means pressure goes up. So shift to LEFT because less crowded with only 3 mol of gas instead of 4 mol



Decrease volume means pressure goes up. So shift to RIGHT because less crowded with only 3 mol of gas instead of 4 mol



Decrease volume means pressure goes up. So shift to RIGHT because less crowded with only 1 mol of gas instead of 2 mol

6) Predict the effect of decreasing the temperature on the position of the following equilibria.



Exothermic – so heat is a product - so if you raise the temperature, shift LEFT in order to use up the extra heat you added



$$\Delta H = +37.2 \text{ kJ}$$

Endothermic – so heat is a reactant - so if you raise the temperature, shift RIGHT in order to use up the extra heat you added



$$\Delta H = -27.6 \text{ kJ}$$



Exothermic – so heat is a product - so if you raise the temperature, shift LEFT in order to use up the extra heat you added