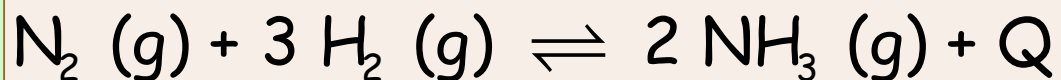


Le Châtelier's Principle



Removing matter
(product)

Equilibrium's
disturbance

Ammonia is
removed from the
system at
equilibrium

System's reaction

The system reacts against
the disturbance:

The system reacts
producing more
ammonia

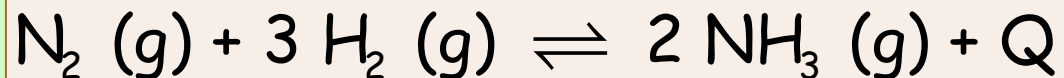
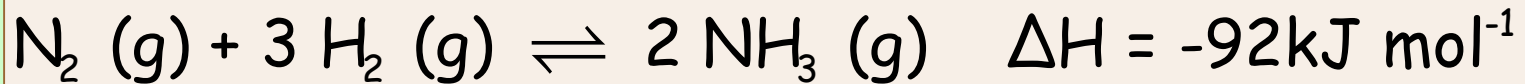
Direction of the
reaction

The reaction will
shift to the
product's side
(right)

If the equilibrium of a
reaction is disturbed, the
reaction will return to
equilibrium by shifting in
such direction as to undo the
disturbance.



Le Châtelier's Principle



Removing matter (reactant)

Equilibrium's
disturbance

Nitrogen is
removed from the
system at
equilibrium

System's reaction

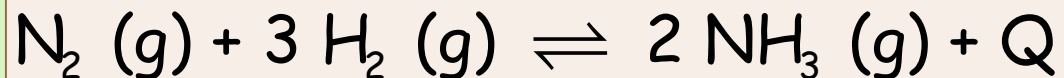
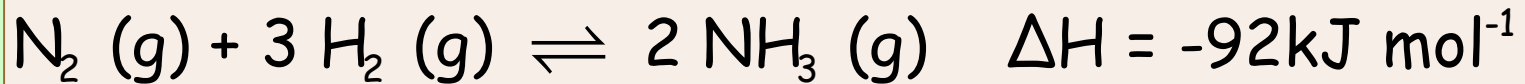
The system reacts against
the disturbance:

The system reacts
producing more
nitrogen

Direction of the
reaction

The reaction will
shift to the
reactants' side
(left)

Le Châtelier's Principle



Adding matter (product)

Equilibrium's
disturbance

More ammonia is
added to the
system at
equilibrium

System's reaction

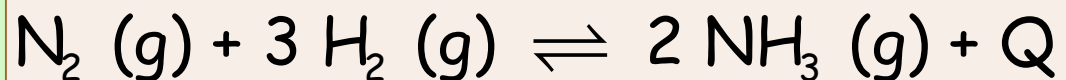
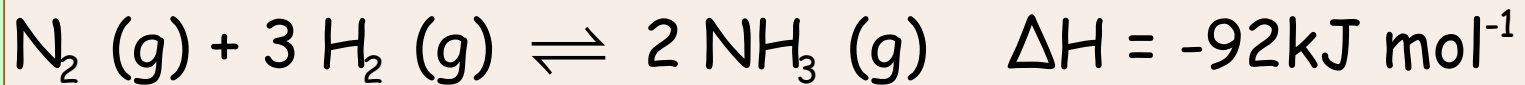
The system reacts against
the disturbance:

The system reacts
removing ammonia

Direction of the
reaction

The reaction will
shift to the
reactants' side
(left)

Le Châtelier's Principle



Adding matter (reactant)

Equilibrium's
disturbance

More hydrogen is
added to the
system at
equilibrium

System's reaction

The system reacts against
the disturbance:

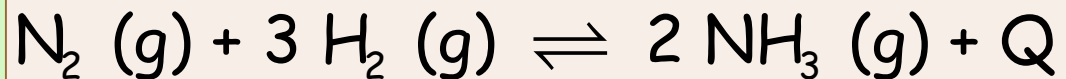
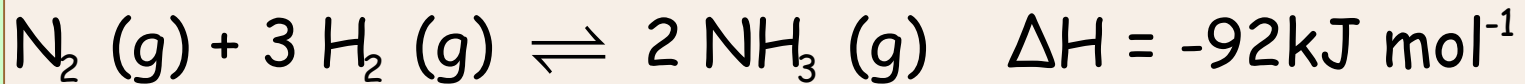
The system reacts
removing hydrogen

Direction of the
reaction

The reaction will
shift to the
product's side
(right)



Le Châtelier's Principle



Increasing temperature

Equilibrium's
disturbance

The temperature is
increased

System's reaction

The system reacts against
the disturbance:

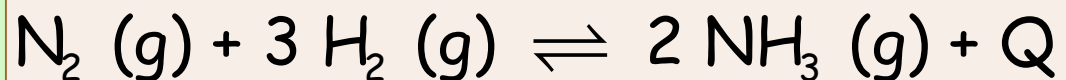
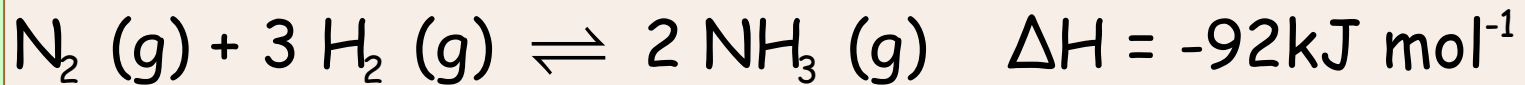
The system reacts
removing heat

Direction of the
reaction

The reaction will
shift to the
endothermic
direction (left)



Le Châtelier's Principle



Decreasing temperature

Equilibrium's
disturbance

The temperature is
lowered

System's reaction

The system reacts against
the disturbance:

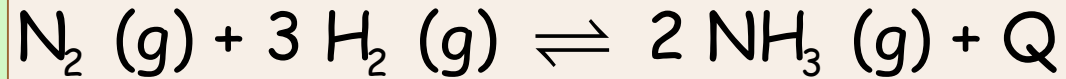
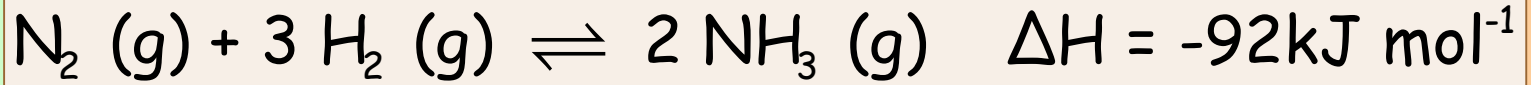
The system reacts
producing more
heat

Direction of the
reaction

The reaction will
shift to the
exothermic
direction (right)



Le Châtelier's Principle



Increasing pressure by reducing volume

Equilibrium's
disturbance

The pressure is
increased

System's reaction

The system reacts against
the disturbance:

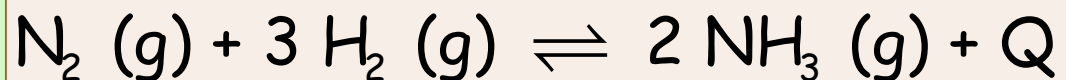
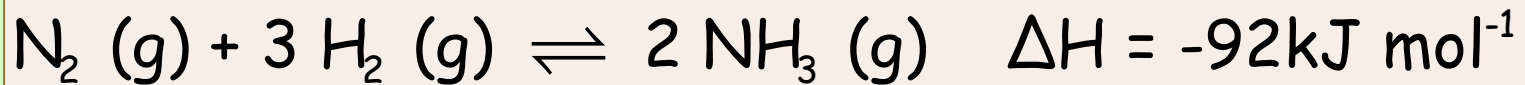
The system reacts
lowering pressure

Direction of the
reaction

The reaction will
shift to the
direction of less
gas molecules
(right)



Le Châtelier's Principle



Lowering pressure by increasing volume

Equilibrium's
disturbance

The pressure is
lowered

System's reaction

The system reacts against
the disturbance:

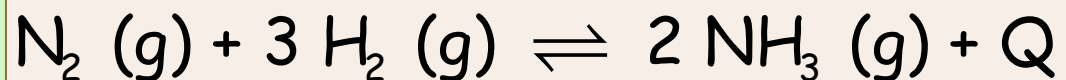
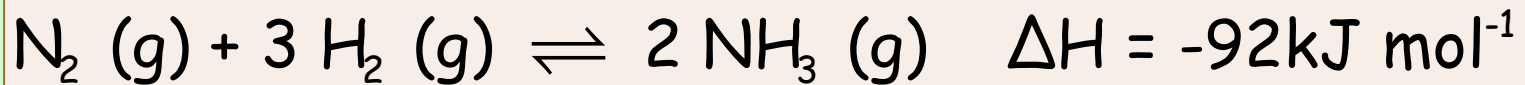
The system reacts
increasing pressure

Direction of the
reaction

The reaction will
shift to the
direction of more
gas molecules (left)



Le Châtelier's Principle



Increasing pressure by adding an inert gas

Equilibrium's
disturbance

The partial
pressures remain
constant

System's reaction

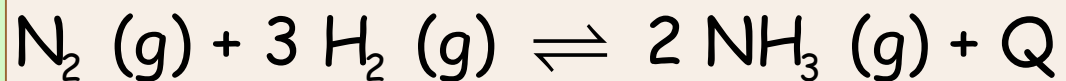
The system reacts against
the disturbance:

The system
remains at
equilibrium

Direction of the
reaction

The reaction will
not shift

Le Châtelier's Principle



Adding a catalyst

Equilibrium's
disturbance

No disturbance

System's reaction

The system reacts against
the disturbance:

The system
remains at
equilibrium

Direction of the
reaction

The reaction will
not shift