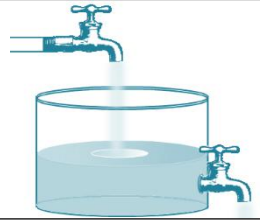
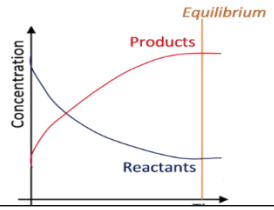
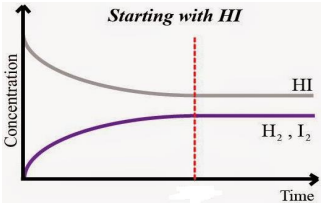
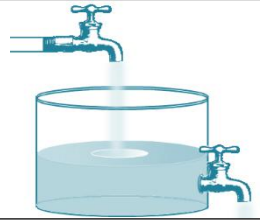
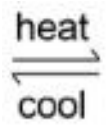
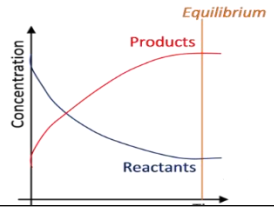
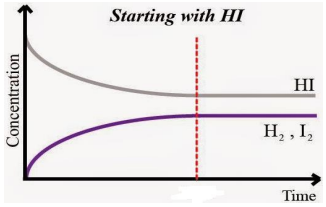
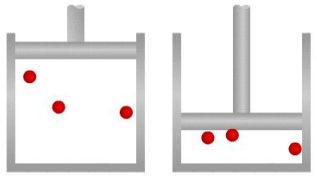
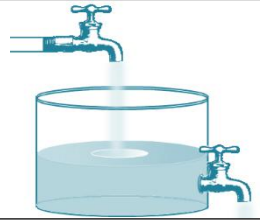
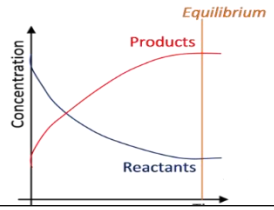
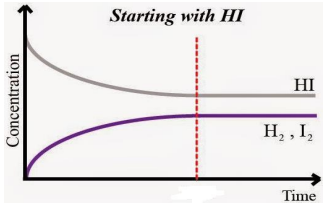
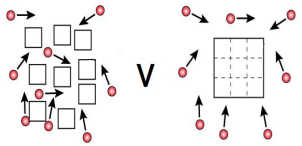
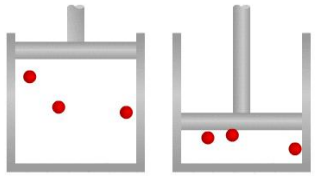
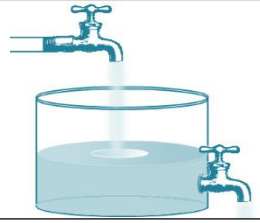
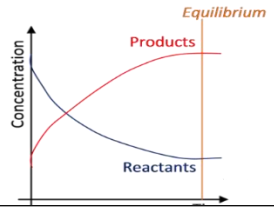
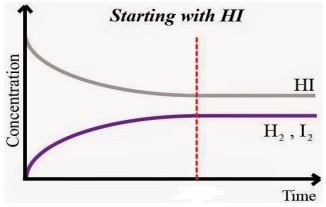
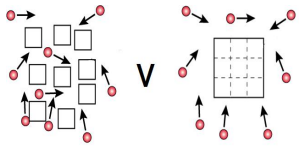
H	1	2	3	4	5	6
1	***Forces particles closer together***	$A + B \rightleftharpoons C + D$	**Concentrations will remain constant**	$N_{2(g)} + H_{2(g)} \rightleftharpoons 2NH_{3(g)}$ **The forwards reaction is exothermic. Why is a very high temperature NOT used?**		**Forwards reaction proceeds at same rate as backwards reaction**
2	**Irreversible chemical reaction**	Hydrated copper (II) sulfate is blue. When heated anhydrous copper (II) sulfate forms (a white solid). Adding water to this substance reforms the hydrated salt.		$H_{2(g)} + I_{2(g)} \rightleftharpoons 2HI_{(g)}$ Changes in pressure have no effect.	**BURNING PAPER → CARBON DIOXIDE + WATER**	**Static equilibrium**
3		heat ⇌ cool	*No reactants or products can escape to the outside environment*	**Reacts to oppose an external change**	***reversible reactions***	$N_2O_4 \rightleftharpoons 2NO_2$ Why does a low pressure produce a high equilibrium yield of dinitrogen tetroxide?
4	**Dynamic equilibrium**		$S_{(s)} + O_{2(g)} \rightarrow SO_{2(g)}$ ***What will happen if the pressure of the system is reduced? Why?***			
5	***Le Chatelier's principle***	When a system reaches dynamic equilibrium the component reactions have not stopped taking place	***Heat energy transferred in forwards reaction = ...***	**Products react to produce original reactants**	Heating ammonium chloride causes it to decompose into ammonia and hydrogen chloride gas. Is the forwards reaction exothermic or endothermic?	
6	$X + Y \rightarrow Z$ What effect will adding more Y have?		$PCl_5(s) \rightleftharpoons PCl_3(s) + Cl_2(g)$ Result of removing Cl_2 (g)?			***sealed system***

H	1	2	3	4	5	6
1	?	$A + B \rightleftharpoons C + D$	Concentrations will remain constant	$N_{2(g)} + H_{2(g)} \rightleftharpoons 2NH_{3(g)}$ **The forwards reaction is exothermic. Why is a very high temperature NOT used?**		Forwards reaction proceeds at same rate as backwards reaction
2	*Irreversible chemical reaction*	Hydrated copper (II) sulfate is blue. When heated anhydrous copper (II) sulfate forms (a white solid). Adding water to this substance reforms the hydrated salt.		$H_{2(g)} + I_{2(g)} \rightleftharpoons 2HI_{(g)}$ Changes in pressure have no effect.	?	Static equlibrium
3			*No reactants or products can escape to the outside environment*	?	***reversible reactions***	$N_2O_4 \rightleftharpoons 2NO_2$ *Why does a low pressure produce a high equilibrium yield of dinitrogen tetroxide?*
4	?		$S_{(s)} + O_{2(g)} \rightarrow SO_{2(g)}$ *What will happen if the pressure of the system is reduced? Why?*			
5	*Le Chatelier's principle*	When a system reaches dynamic equilibrium the component reactions have not stopped taking place	?	Products react to produce original reactants	*Heating ammonium chloride causes it to decompose into ammonia and hydrogen chloride gas. Is the forwards reaction exothermic or endothermic?*	
6	X + Y → Z What effect will adding more Y have?		$PCl_5(s) \rightleftharpoons PCl_3(s) + Cl_2(g)$ Result of removing Cl_2 (g)?			?

F	1	2	3	4	5	6
1		$A + B \rightleftharpoons C + D$	Concentrations will remain constant	$N_{2(g)} + H_{2(g)} \rightleftharpoons 2NH_{3(g)}$ The forwards reaction is exothermic. Why is a very high temperature NOT used?		Forwards reaction proceeds at same rate as backwards
2	Irreversible chemical reaction	Hydrated copper (II) sulfate is blue. When heated anhydrous copper (II) sulfate forms (a white solid). Adding water to this substance reforms the hydrated salt.			BURNING PAPER → CARBON DIOXIDE + WATER	Static equlibrium
3		heat ⇌ cool	No reactants or products can escape to the outside environment	Reacts to oppose an external change	reversible reactions	Not found in the chemical equation, but are involved in the chemical reaction
4	Dynamic equilibrium		Initially making products is slow. This increases in speed and products begin to turn into reactants. Eventually, the rates of both processes become the same.			
5		When a system reaches dynamic equilibrium the component reactions have not stopped taking place	Heat energy transferred in forwards reaction = …	Products react to produce original reactants	Heating ammonium chloride causes it to decompose into ammonia and hydrogen chloride gas. Is the forwards reaction exothermic or endothermic?	
6						sealed system

F	1	2	3	4	5	6
1		$A + B \rightleftharpoons C + D$	?	$N_{2(g)} + H_{2(g)} \rightleftharpoons 2NH_{3(g)}$ **The forwards reaction is exothermic. Why is a very high temperature NOT used?**		Forwards reaction proceeds at same rate as backwards reaction
2	?	Hydrated copper (II) sulfate is blue. When heated anhydrous copper (II) sulfate forms (a white solid). Adding water to this substance reforms the hydrated salt.			**Burning paper → carbon dioxide + water**	?
3		?	*No reactants or products can escape to the outside environment*	*Reacts to oppose an external change*	**reversible reactions**	***Not found in the chemical equation, but are involved in the chemical reaction***
4	Dynamic equilibrium		***Initially making products is slow. This increases in speed and products begin to turn into reactants. Eventually, the rates of both processes become the same.***			
5		When a system reaches dynamic equilibrium the component reactions have not stopped taking place	***Heat energy transferred in forwards reaction = ...***	Products react to produce original reactants	*Heating ammonium chloride causes it to decompose into ammonia and hydrogen chloride gas. Is the forwards reaction exothermic or endothermic?*	
6				?		?

4.6.2 Reversible reactions and dynamic equilibrium check list

Can you…	☹	😐	☺
a) state the meaning of the term '*reversible reaction*'			
b) describe the nature of energy changes in reversible reactions			
c) describe and explain the features of a system at (dynamic) equilibrium			
d) [HT only] describe the idea behind Le Chatelier's principle			
e) [HT only] make qualitative predictions about the effect of changes on systems at equilibrium when given appropriate information			
f) [HT only] interpret appropriate given data to predict the effect of a change in concentration of a reactant or product on given reactions at equilibrium			
g) [HT only] interpret appropriate given data to predict the effect of a change in temperature on given reactions at equilibrium			
h) [HT only] interpret appropriate given data to predict the effect of pressure changes on given reactions at equilibrium			