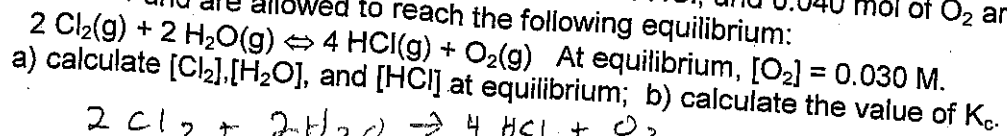


ICE Diagrams

Name _____

1. 0.020 mol of Cl_2 , 0.020 mol of H_2O , 0.060 mol of HCl , and 0.040 mol of O_2 are added to a 1.0 L container and are allowed to reach the following equilibrium:

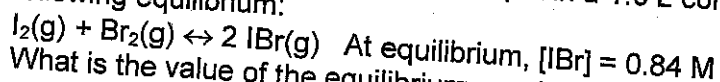


	$2 \text{Cl}_2 + 2 \text{H}_2\text{O} \rightarrow 4 \text{HCl} + \text{O}_2$			
I	.02	.02	.06	.04
C	+ .02	+ .02	- .04	- .01
E	.04	.04	.02	.03

$$K = \frac{[\text{HCl}]^4 [\text{O}_2]}{[\text{Cl}_2]^2 [\text{H}_2\text{O}]^2}$$

$$K = \frac{(0.02)^4 (0.03)}{(0.04)^2 (0.04)^2} = 0.0019$$

2. 0.50 mol of I_2 and 0.50 mol of Br_2 are put in a 1.0 L container and are allowed to reach the following equilibrium:



What is the value of the equilibrium constant (K) for this rxn?

.5	.5	0
-.42	-.42	+.84
.08	.08	.84

$$K = \frac{[\text{IBr}]^2}{[\text{I}_2][\text{Br}_2]} = \frac{(0.84)^2}{(0.08)(0.08)} = 110$$

3. Use the rxn: $2 \text{NOBr}(\text{g}) \rightleftharpoons 2 \text{NO}(\text{g}) + \text{Br}_2(\text{g})$
 Initially $[\text{NOBr}] = 2.0 \text{ M}$; $[\text{NO}] = 1.0 \text{ M}$; and $[\text{Br}_2] = 0$.
 At equilibrium, $[\text{Br}_2] = 0.50 \text{ M}$. Calculate the value of K_{eq} .

	2NOBr	2NO	Br_2
I	2	1	0
C	-1	+1	+.5
	1	2	.5

$$K = \frac{[\text{NO}]^2 [\text{Br}_2]}{[\text{NOBr}]^2}$$

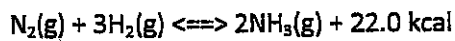
$$= \frac{(2)^2 (0.5)}{1^2} = 2$$

4. Use the rxn: $3 \text{H}_2(\text{g}) + \text{N}_2(\text{g}) \rightleftharpoons 2 \text{NH}_3(\text{g})$
 Initially $[\text{H}_2] = 1.0 \text{ M}$; $[\text{N}_2] = 2.0 \text{ M}$; and $[\text{NH}_3] = 2.0 \text{ M}$.
 At equilibrium, $[\text{N}_2] = 1.0 \text{ M}$. Calculate the value of K_{eq} .

SKIP

WRONG DATA

Complete the following charts by writing left, right or none for equilibrium shift, and decreases, increases or remains the same for the concentrations of reactants and products and for the value of K.



Stress	Equilibrium Shift	$[\text{N}_2]$	$[\text{H}_2]$	$[\text{NH}_3]$	K
18. Add N_2	right	—	decreases	increases	Remains the same
19. Add H_2	→	↓	—		same
20. Add NH_3	←	↑	↑	—	same
21. Remove N_2	←	—	↑	↓	same
22. Remove H_2	←	↑	—	↓	same
23. Remove NH_3	→	↓	↓	—	same
24. Increase Temperature	←	↑	↑	↓	changes
25. Decrease Temperature	→	↓	↓	↑	changes
26. Increase Pressure	→	↓	↓	↑	same
27. Decrease Pressure	←	↑	↑	↓	same

$\text{NaOH}(\text{s}) \rightleftharpoons \text{Na}^+(\text{aq}) + \text{OH}^-(\text{aq}) + 10.6 \text{ kcal}$ (Remember that pure solids and liquids do not affect equilibrium values)

Stress	Equilibrium Shift	Amount $\text{NaOH}(\text{s})$	$[\text{Na}^+]$	$[\text{OH}^-]$	K
28. Add $\text{NaOH}(\text{s})$		—			
29. Add NaCl (adds Na^+)			—		
30. Add KOH (Adds OH^-)				—	
31. Add H^+ (Removes OH^-)				—	
32. Increase Temperature					
33. Decrease Temperature					
34. Increase Pressure					
35. Decrease Pressure					