

1. E
2. C
3. D
4. E
5. B
6. D
7. A
8. B
9. C
10. D
11.  $K = [\text{NH}_3]^2 / [\text{N}_2][\text{H}_2]^3$
12.  $K = [\text{H}_2\text{O}]^4 [\text{CO}_2]^3 / [\text{C}_3\text{H}_8][\text{O}_2]^5$
13.  $K = [\text{O}_2] / [\text{N}_2\text{O}_4][\text{O}_3]$
14. C
15. D
16.  $K = [\text{Ca}^{2+}] / [\text{H}^+]^2$
17.  $K = [\text{NH}_3]^2 [\text{CO}_2]$
18.  $K = 1 / [\text{Cl}_2]^2$
19. D
20. B
21. A
22. D
23. E
24. C
25.  $8.3 \times 10^2$
26. 0.016
27.  $5.6 \times 10^{-4}$
28. C
29. 49
30.  $8.9 \times 10^{-3}$
31.  $6.25 \times 10^{-6}$
32.  $2.19 \times 10^{-4}$
33. C
34. C
35. E
36. 3.2 mol, 1.6 mol, 0.8 mol
37. 0.37
38.  $K = 0.0505$
39.  $K = 20$

40. B
41.  $1.6 \times 10^{-4}$
42.  $[\text{H}^+] = [\text{A}^-] = 3.5 \times 10^{-3}$ ,  $[\text{HA}] = 0.60$
43.  $[\text{H}^+] = [\text{A}^-] = 3.9 \times 10^{-5}$ ,  $[\text{HA}] = 0.30$
44.  $[\text{H}^+] = [\text{A}^-] = 0.165$ ,  $[\text{HA}] = 0.135$   
(quadratic required for 44)
45.  $[\text{Br}_2] = [\text{Cl}_2] = 0.085$ ,  $[\text{BrCl}] = 0.23$
46.  $[\text{A}] = [\text{B}] = 0.500$ ,  $[\text{C}] = 1.5 \times 10^{-4}$
47. C
48. B
49. C
50. B
51. B
52. A
- 53.

	$[\text{H}_2]$	$[\text{Br}_2]$	$[\text{HBr}]$	K
1	down	down	up	--
2	up	up	down	--
3	up	up	down	--
4	down	down	up	--
5	up	up	down	down
6	down	down	up	up
7	--	--	--	--

54.

	$[\text{NO}_2]$	$[\text{NO}]$	$[\text{O}_2]$	K
1	down	up	up	--
2	up	down	down	--
3	up	down	down	--
4	down	up	up	--
5	down	up	up	up
6	up	down	down	down
7	up	down	down	down
8	down	up	up	up

55. C
56. B,C,D
57. B
58. C
59. C
60. C