

Multiple Choice Response Sheet

Name: _____

1. A

2. B

3. A

4. C

5. B

6. C

7. B

8. B

9. B

10. B

11. A

12. A

13. A

14. C

15. C

16. A

17. A

18. C

19. D

20. A

21. D

22. B

23. A

24. C

25. C

26. B

27. B

28. B

29. C

30. C

31. B

32. D

33. _____

34. _____

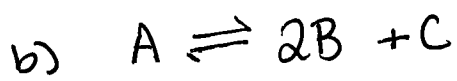
35. _____

36. _____

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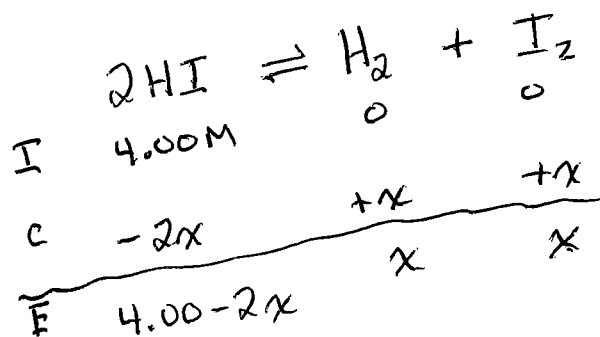
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1 a) the levelling off of concentrations at time = 4.0 min



c)
$$K_{eq} = \frac{[B]^2[C]}{[A]} = \frac{(0.40M)^2(0.20M)}{(0.60M)} = 0.53$$

2.
$$K_{eq} = \frac{[H_2][I_2]}{[HI]^2} = 81.0$$



$$\rightarrow \frac{x^2}{(4.00 - 2x)^2} = 81.0$$

$$\downarrow$$
$$x = 9(4.0 - 2x)$$

$$19x = 36$$

$$x = 1.89\dots$$

$$[HI]_e = 4.00 - 2(1.89\dots)$$
$$= 0.21M$$

3. a) disagree

b)
$$Q = \frac{[H_2][CO]}{[H_2O]}$$

$$Q = 0.333\dots \quad K_{eq} = 0.80$$

$Q < K_{eq} \therefore$ the reaction will proceed to the right and $[O]$ will increase, not decrease.

Multiple Choice Response Sheet

Name: _____

1. C

2. C

3. B

4. C

5. A

6. A

7. D

8. D

9. A

10. D

11. D

12. A

13. C

14. A

15. A

16. A

17. A

18. B

44

19. C

20. B

21. D

22. B

23. D

24. B

25. D

26. A

27. D

28. B

29. B

30. C

31. B

32. B

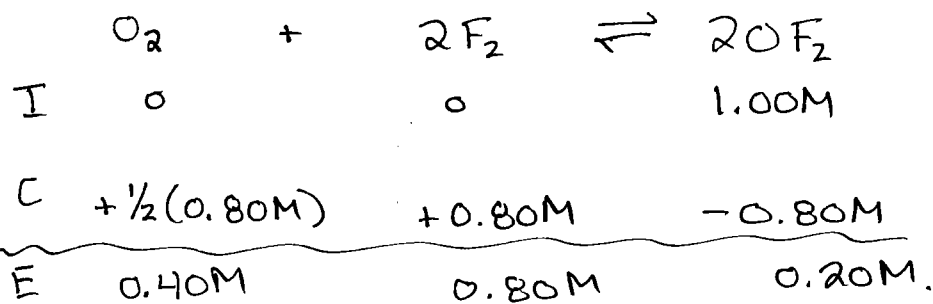
33. C

34. A

35. _____

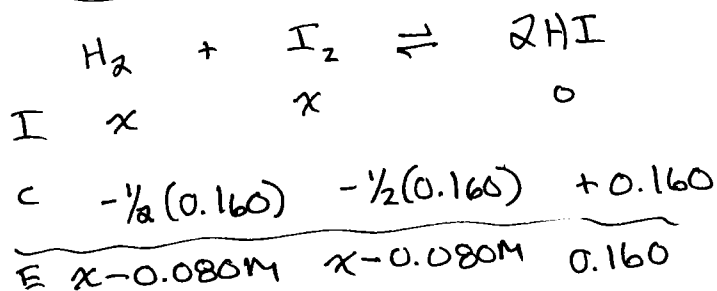
36. _____

$$1. \quad K_{eq} = \frac{[OF_2]^2}{[O_2][F_2]^2}$$



$$K_{eq} = \frac{(0.20M)^2}{(0.40M)(0.80M)^2} \quad K_{eq} = 0.16.$$

$$2. \quad \frac{[HI]^2}{[H_2][I_2]} = 64$$



$$K_{eq} = \frac{(0.160M)^2}{(x-0.080M)^2} = \sqrt{64}$$

$$0.160 = 8(x-0.080M)$$

$$0.160 = 8x - 0.64$$

$$8x = 0.8$$

$$[H_2]_i = 0.10M$$

3.

$$Q = \frac{[\text{NOCl}]^2}{[\text{NO}]^2 [\text{Cl}_2]}$$

$$= \frac{(5.6 \text{ M})^2}{(0.40 \text{ M})^2 (0.32 \text{ M})}$$

$$= 612.5$$

$$K_{\text{eq}} = 8.5$$

$Q > K_{\text{eq}} \therefore$ the reaction
will proceed left
(towards reactants)
to reach equilibrium.

Multiple Choice Response Sheet

Name: _____

1. A ✓

2. D ✓

3. C ✓

4. ~~B~~ ~~D~~

5. D ✓

6. C ✓

7. B ✓

8. C ✓

9. A ✓

10. A ✓

11. C

12. A

13. A

14. A

15. B

16. A

17. B

18. C

19. A

20. B

21. C

22. ~~B~~

23. ~~B~~ C

24. D

25. ~~A~~ B

26. ~~A~~ D

27. ~~B~~ C

28. ~~A~~ C

29. ~~A~~ B

30. ~~B~~ A

31. ~~B~~ C

32. C

33. C

34. _____

35. _____

36. _____

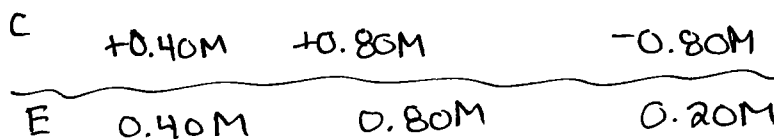
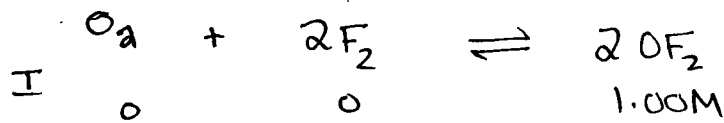
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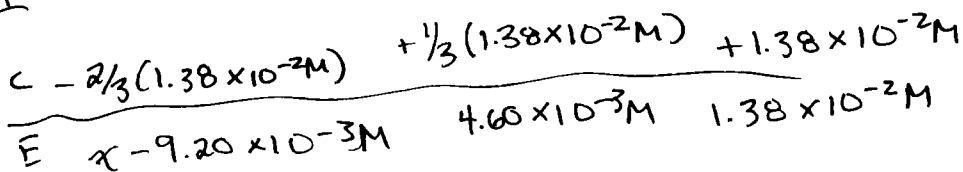
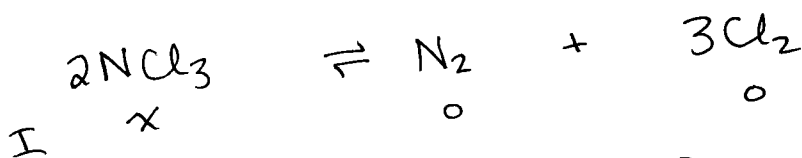
$$1. \quad K_{eq} = \frac{[OF_2]^2}{[O_2][F_2]^2} = \frac{(0.20M)^2}{(0.40M)(0.80M)^2}$$

$$= 0.15625 \dots$$

$$K_{eq} = 0.16$$



$$K_{eq} = \frac{[N_2][Cl_2]^3}{[NCl_3]^2} = 3.3 \times 10^{-8}$$



$$\sqrt{\frac{(4.60 \times 10^{-3}M)(1.38 \times 10^{-2}M)^3}{(x - 9.20 \times 10^{-3}M)^2}} = \sqrt{3.3 \times 10^{-8}}$$

$$0.00109 \dots = \sqrt{3.3 \times 10^{-8}} x - \sqrt{3.3 \times 10^{-8}} (9.20 \times 10^{-3})$$

$$1.1 \times 10^{-4} = \sqrt{3.3 \times 10^{-8}} x$$

$$x = [NCl_3]_i = 0.6144 \dots$$

$$[NCl_3]_i = 0.61M$$

$$3. \quad Q = \frac{[\text{NO}_2]^2}{[\text{N}_2\text{O}_4]}$$

$$K_{eq} = 9.5 \times 10^{-3}$$

$$Q = \frac{\left(\frac{0.020 \text{ mol}}{2.0 \text{ L}}\right)^2}{\left(\frac{0.060 \text{ mol}}{2.0 \text{ L}}\right)}$$

$$Q = 3.3 \times 10^{-3}$$

$Q < K_{eq} \therefore$ it will proceed to the right
to get to \rightleftharpoons

Multiple Choice Response Sheet

Name: _____

1. D

2. D

3. D

4. A

5. D

6. B

7. A

8. C

9. B

10. D

11. D

12. A

13. B

14. B

15. D

16. D

17. D

18. B

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45

19. B

20. D

21. B

22. D

23. B

24. A

25. B

26. C

27. C

28. B

29. B

30. D

31. C

32. D

33. D

34. C

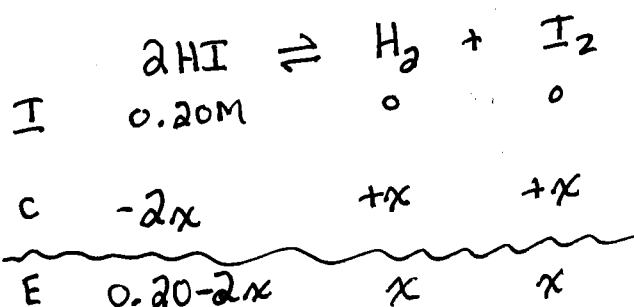
35. A

36. _____

1. a) If the temperature of the reaction is increased to 1000°C , the equilibrium would shift left consuming NH_3 , not producing it.

b) At a cooler temperature, particles of N_2 & H_2 do not have sufficient kinetic energy to overcome the activation energy for the reaction.

$$2. \quad K_{\text{eq}} = \frac{[\text{H}_2][\text{I}_2]}{[\text{HI}]^2} = 0.025$$



$$\sqrt{\frac{(x)(x)}{(0.20 - 2x)^2}} = \sqrt{0.025}$$

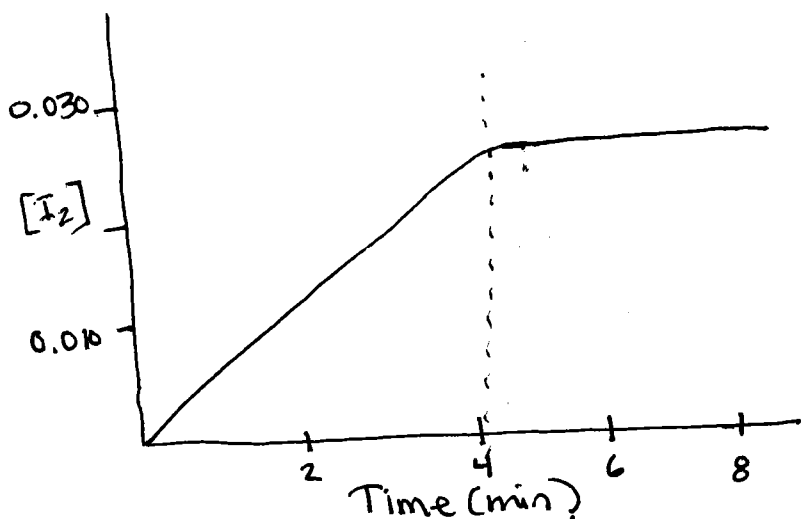
$$\rightsquigarrow x = \sqrt{0.025}(0.20) - 2\sqrt{0.025}x$$

$$x + 2\sqrt{0.025}x = \sqrt{0.025}(0.20)$$

$$1.316\dots x = 0.0316\dots$$

$$x = 0.024\dots$$

$$[\text{I}_2]_{\text{eq}} = x = 0.024\text{M}$$



$$3. \quad Q = \frac{[\text{NO}_2]^2}{[\text{N}_2\text{O}_4]} \quad K_{\text{eq}} = 9.5 \times 10^{-3}$$

$$Q = \frac{\left(\frac{0.020 \text{ mol}}{2.00 \text{ L}}\right)^2}{\left(\frac{0.060 \text{ mol}}{2.00 \text{ L}}\right)} = 3.3 \times 10^{-3}$$

$Q < K_{\text{eq}} \therefore$ the reaction proceeds to the right to reach equilibrium.