Which of the following is true about chelating ligands and chelates?

1. A chelating ligand can bind to a metal with multiple points of attachment
2. A chelating ligand contains multiple Lewis acids
3. Chelates are thermodynamically unstable due to entropic effects
4. Both 1 and 3
5. All of the above

Clicker Competition Today!

Which of the following is true about chelating ligands and chelates?

38% ✓ 1. A chelating ligand can bind to a metal with multiple points of attachment

11% 2. A chelating ligand contains multiple Lewis acids

4% 3. Chelates are thermodynamically unstable due to entropic effects

35% 4. Both 1 and 3

12% 5. All of the above

Clicker Competition Today!

Which statement is correct?

1. Stable/unstable refers to reaction rate (the rate associated with the tendency to decompose)
2. Stable/unstable refers to ΔG (the spontaneous tendency to decompose)
3. A chemist would say that a compound is stable if it is around for a long time before decomposing.
4. A chemist would say that a compound is stable if the ΔG for its decomposition into its elements is a negative number.
5. 1 and 3
6. 2 and 4

Which statement is correct?

3%

52%

4%

1%

5%

35%

1. Stable/unstable refers to reaction rate (the rate associated with the tendency to decompose)
2. Stable/unstable refers to ΔG (the spontaneous tendency to decompose)
3. A chemist would say that a compound is stable if it is around for a long time before decomposing.
4. A chemist would say that a compound is stable if the ΔG for its decomposition into its elements is a negative number.
5. 1 and 3
6. 2 and 4

Which statement is true for this reaction with hydrogen peroxide

$$IO_3^- + I^- + 2\ H_2O_2 + 2H^+ \rightarrow \ 2\ O_2 + 3\ H_2O\ +\ I_2$$

1. I in IO_3^- is being **reduced** to I_2; I^- is being **oxidized** to I_2
   O in H_2O_2 is being **oxidized** to O_2; O in H_2O_2 is being **reduced** to H_2O
2. I in IO_3^- is being **reduced** to I_2; I^- is being **reduced** to I_2
   O in H_2O_2 is being **oxidized** to O_2; O in H_2O_2 is being **oxidized** to H_2O
3. I in IO_3^- is being **reduced** to I_2 and I^- is being **oxidized** to I_2
   O in H_2O_2 is being **oxidized** to O_2; O in H_2O_2 is **not changing** oxidation states when forming H_2O
4. I in IO_3^- is being **reduced** to I_2 and I^- is being **oxidized** to I_2
   O is **not changing** oxidation states **at all**.

Which statement is true for this reaction with hydrogen peroxide

$$IO_3^- + I^- + 2\ H_2O_2 + 2H^+ \rightarrow\ \ 2\ O_2 + 3\ H_2O\ +\ I_2$$

75% 

1. I in IO_3^- is being **reduced** to I_2; I^- is being **oxidized** to I_2
   O in H_2O_2 is being **oxidized** to O_2; O in H_2O_2 is being **reduced** to H_2O

9%

2. I in IO_3^- is being **reduced** to I_2; I^- is being **reduced** to I_2
   O in H_2O_2 is being **oxidized** to O_2; O in H_2O_2 is being **oxidized** to H_2O

15%

3. I in IO_3^- is being **reduced** to I_2 and I^- is being **oxidized** to I_2
   O in H_2O_2 is being **oxidized** to O_2; O in H_2O_2 is **not changing** oxidation states when forming H_2O

1%

4. I in IO_3^- is being **reduced** to I_2 and I^- is being **oxidized** to I_2
   O is **not changing** oxidation states **at all**.

Predict which statement is true about H_2O_2

$H_2O_2 + 2\ H^+ + 2e^- \rightarrow 2\ H_2O \qquad E° = +1.78$

1. with a large (+) $E°$, H_2O_2 would be a good oxidizing agent
2. with a large (+) $E°$, H_2O_2 would be a good reducing agent
3. with a large (+) $E°$, the reduction of H_2O_2 would be spontaneous
4. with a large (+) $E°$, the reduction of H_2O_2 would be non-spontaneous
5. 1 and 3
6. 1 and 4
7. 2 and 3
8. 2 and 4

Predict which statement is true about H_2O_2

$H_2O_2 + 2\ H^+ + 2e^- \rightarrow 2\ H_2O \qquad E° = +1.78$

9% 1. with a large (+) $E°$, H_2O_2 would be a good oxidizing agent

4% 2. with a large (+) $E°$, H_2O_2 would be a good reducing agent

4% 3. with a large (+) $E°$, the reduction of H_2O_2 would be spontaneous

0% 4. with a large (+) $E°$, the reduction of H_2O_2 would be non-spontaneous

65%  5. 1 and 3

6% 6. 1 and 4

7% 7. 2 and 3

4% 8. 2 and 4

Select the correct rate expression for

$$2HI(g) \rightarrow H_2(g) + I_2(g)$$

1. rate = $-\frac{d[HI]}{dt} = -\frac{d[H_2]}{dt} = -\frac{d[I_2]}{dt}$
2. rate = $-\frac{d[HI]}{dt} = \frac{d[H_2]}{dt} = \frac{d[I_2]}{dt}$
3. rate = $-\frac{1}{2}\frac{d[HI]}{dt} = \frac{d[H_2]}{dt} = \frac{d[I_2]}{dt}$
4. rate = $-2\frac{d[HI]}{dt} = -\frac{d[H_2]}{dt} = -\frac{d[I_2]}{dt}$
5. rate = $-2\frac{d[HI]}{dt} = \frac{d[H_2]}{dt} = \frac{d[I_2]}{dt}$

Select the correct rate expression for

$$2HI(g) \rightarrow H_2(g) + I_2(g)$$

1% 1. $\text{rate} = -d[HI]/dt = -d[H_2]/dt = -d[I_2]/dt$

5% 2. $\text{rate} = -d[HI]/dt = d[H_2]/dt = d[I_2]/dt$

87% ✓ 3. $\text{rate} = -\frac{1}{2}\, d[HI]/dt = d[H_2]/dt = d[I_2]/dt$

0% 4. $\text{rate} = -2d[HI]/dt = -d[H_2]/dt = -d[I_2]/dt$

7% 5. $\text{rate} = -2d[HI]/dt = d[H_2]/dt = d[I_2]/dt$

$$\text{rate} = k[A]^m[B]^n$$

For m = 2, If you triple the concentration of [A], you

1. triple the rate.
2. Increase the rate by order of 5.
3. increase the rate by an order of 6.
4. increase the rate by an order of 9.

$$\text{rate} = k[A]^m[B]^n$$

For m = 2, If you triple the concentration of [A], you

2%	1. triple the rate.
1%	2. Increase the rate by order of 5.
6%	3. increase the rate by an order of 6.
91%	✓ 4. increase the rate by an order of 9.

$$\text{rate} = k[A]^m[B]^n$$

For m = -1/2, If you double the concentration of [A], you multiply the rate by

1. 0.5 times
2. -0.5 times
3. 0.7 times
4. -0.7 times

$$\text{rate} = k[A]^m[B]^n$$

For m = -1/2, If you double the concentration of [A], you multiply the rate by

10%	1. 0.5 times
5%	2. -0.5 times
78% ✓	3. 0.7 times
6%	4. -0.7 times

For the same material, does it take longer for 1 ton to go to ½ ton or for 1 gram to go to ½ gram?

1. It takes longer to go from 1 gram to ½ gram
2. It takes longer to go from 1 ton to ½ ton
3. The conversion times are equal.

For the same material, does it take longer for 1 ton to go to ½ ton or for 1 gram to go to ½ gram?

33% 1. It takes longer to go from 1 gram to ½ gram

33% 2. It takes longer to go from 1 ton to ½ ton

33% ✓ 3. The conversion times are equal.

5.111 Principles of Chemical Science
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