

Kinetics Review

Station/Topic	Demonstration	Supplies & Equipment
1) Temperature	Light Sticks	3 beakers; hot plate; thermometer; ice; 3 light sticks
2) Catalyst	Visible Activated Complex	1–1000 mL beaker; 1–25 mL beaker; graduated cylinder; hot plate; thermometer; wash bottle; scoop, CoCl_2 ; Rochelle's salt; 35% H_2O_2
2) Catalyst	Complex Balls	Complex Balls
3) Agitation	Blue Bottle	8 g KOH; 10 g Dextrose; H_2O ; 500 mL Boiling Flask; stopper; methylene blue; indigo carmine
3) Surface Area	Burning Down the House	1 wood block; 1 paper towel; lycopodium powder; large petri dish with candle; H_2O ; matches
4) Nature of Reactants	Three Reactions	a) Cu strip in H_2O in large test tube. b) $\text{Pb}(\text{NO}_3)_2 + \text{NaI}$ in large test tube. c) $\text{Ba}(\text{OH})_2 + \text{NH}_4\text{SCN}$ in beaker on wood block; H_2O ; stirring rod
5) Reaction Mechanism	Nassau Clock	Solutions A, B, and C; 1 Large beaker; 2 small beakers; stir bar
5) Reaction Mechanism	Rate Determining Step	Ring Stand; 4 funnels of different sizes; smallest funnel in stopper in large flask; catch basin; H_2O
6) [Extra/Enrichment]	Oscillator	Solutions A, B, and C; 1 Large beaker; 2 small beakers; stir bar
7) Concentration	Iodine Clock	Solutions A & B; 4–250 mL beakers; 4 stirring rods; 2 graduated cylinders; 2–150 mL beakers; stop watch; white board

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1) Light Sticks

One is placed in an ice bath, one in 70°C water, and one in room temperature water.

2) Visible Activated Complex

It is prepared by warming 450 mLs of water to 70°C plus. To this I add 30 grams of Rochelle's salt (potassium sodium tartrate) and 25 mLs of 30% H₂O₂. The reaction will proceed at an incredibly slow rate. By quickly adding some CoCl₂ in 5 or 10 mLs of water. It is catalyzed and the complex appears green.

3) Surface Area

I spray a mighty small amount into a candle flame and compare it to a wooden block in the same flame. Wood shavings/Paper Towels can be used to illustrate a medium surface area reactant. Wood block, paper towel, lycopodium.

3) Frustration Bottle

Dissolve 8 grams of KOH and 10 grams of dextrose in around 500 mLs of water. Add 20 drops of Indigo Carmine and 6-8 drops of Methylene Blue as the indicators. Stopper the florence flask and mix well.

4) The Nature of the Reactants

Can be demonstrated many ways. I sometimes explode three balloons. One filled with He, one with Hydrogen, and one with a hydrogen and oxygen mix. It is also possible to show one precipitation reaction, and gas forming reaction, and an acid base reaction. Ba(OH)₂ + NH₄SCN is great.

5) The Old Nassau Clock

A is 15 grams of KIO₃ per liter. B is 15 grams of NaHSO₃ and 4 grams of starch. Mix the starch in 500 mLs of boiling water and adding to the NaHSO₃ diluting to one liter. Solution C is 3 grams of HgCl₂ per liter. Mix equal volumes of A and B into C and stir quickly. It shows an intermediate species and clock reactions well. You may slow the reaction down by adding an equal volume of distilled water to the mercury solution.

5) Reaction Mechanism with Funnel Tree

Set up a big ring stand with four rings and then place a funnel in each. The funnels should be of different sizes and arranged one above the other. Place the smallest funnel into a stopper and then into a large Erlenmeyer flask at the bottom of the stack. Place the flask in a large clear catch basin. Use a second identical flask and pour water into the topmost funnel. Watch the mess!

6) The Oscillator

Solution A is 410 mL of 30% H₂O₂ diluted to 1 liter. B is 42.8 g of KIO₃ plus 40 mL of 2-M H₂SO₄. Solution C is 15.6 g of malonic acid, 3.38 g of MnSO₄•H₂O, and 0.30 g of soluble starch that has been slurried and boiled and all diluted to 1 liter. Mix equal volumes of each liquid and stir.

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7) The Iodine Clock

Solution A is prepared by dissolving 4.0 grams of KIO_3 in two liters of water.

Solution B is 0.8 grams of NaHSO_3 in 500 mLs of water. To this you slowly add a slurry of 4 grams of soluble starch that has been boiled in about 300 mLs of water and 10 mLs of 1-M H_2SO_4 . Then diluting to one liter.

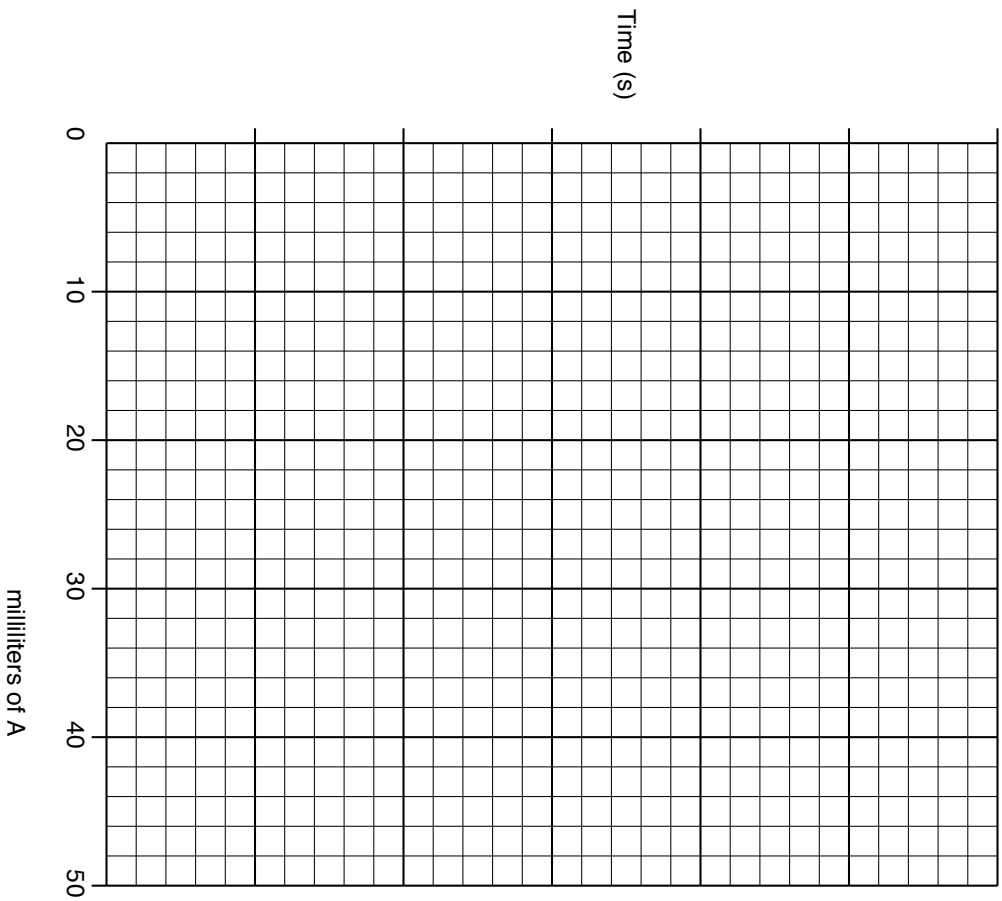
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The iodine Clock Quiz

Name _____

Period _____

Teacher _____



Best Estimate

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Seconds

mL of A