

CHASING EQUILIBRIUM



TEACHER GUIDE

LAUNCH



PLANNING

Here's a suggested schedule for this kit! The activities should be completed in order, but you can choose when the lessons take place over time.

ACTIVITY INFORMATION	SECTION (S)	TIME REQUIRED	DAY/ LESSON
Activity 1: Amazing Movement Be amazed when liquids flow in opposite directions. Total time: 1 h	<input type="checkbox"/> Traveling Fluids	60 minutes	Day 1
ACTIVITY 2: WATCHING THE SPREAD Test what impacts the spread and mixing of materials. Total time: 2 h 15 min	<input type="checkbox"/> Discovering Diffusion	75 minutes	Day 2
	<input type="checkbox"/> Graham's Law of Diffusion	30 minutes	Day 3
	<input type="checkbox"/> Showing the Spread	30 minutes	Day 4
ACTIVITY 3: OSMOSIS IN ACTION Watch water move in different directions to dilute salts. Total time: 4 h 15 min	<input type="checkbox"/> Where Things Flow	45 minutes	Day 5
	<input type="checkbox"/> Osmosis		

Full schedule
available with
purchase

14+ hours

LEARNING GOALS:

- ✓ I can show that diffusion and osmosis are predictable and can affect the structure and function of cells.

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DISCOVERING DIFFUSION

CONTENT

- In this reading section, your student will learn the following vocabulary terms: concentration, diffusion, solute, solution, and solvent.

? **Question:** In this diagram, label the solvent, solute, and solution.

Answer:



CONCENTRATION

? **Question:** How does concentration impact the rate of diffusion?

Answer: The higher the concentration, the more quickly molecules will move to a lower concentration.



PREPARATION AND SUPERVISION

- The measurement doesn't have to be 250 mL. Your student may measure whatever amount they choose. However, the two amounts need to be the same in each cup, and should be at least 150 mL.
- Students should find that 3 drops diffuses more quickly than 1 drop because it is a higher concentration of food coloring.

MULTIPLE AGES AND ABILITIES:

If you are working with multiple students, feel free to grab extra cups or bowls and have each student decide how much water and food coloring they want to test. Then, students can compare their results with one another to see if results are similar.

3

WARNING:

Boiled water can cause burns to skin. Be careful not to touch boiling water or hot appliances. Avoid spills by using a stable container and surface.



PREPARATION AND SUPERVISION

- Students should find that the food coloring in boiling water diffuses more quickly than the room temperature water.

LEARNING GOALS:



I can investigate feedback mechanisms to show they maintain homeostasis.

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STAYING BALANCED

CONTENT

- In this section, your student will learn the following vocabulary terms: enzyme, equilibrium, and homeostasis.
- There is an extension in Activity 7 called “You Are What You Drink” that complements the content on blood pH in this section. Feel free to look ahead and see if that extension is one you would like to do with your student.

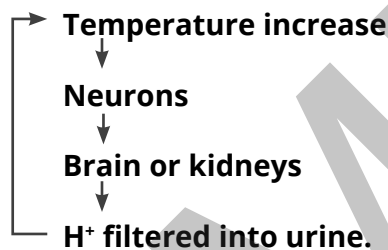
11

THINK LIKE A DOCTOR

? Question 1: Your patient is a 12-year-old with increased urination, even though their water intake has remained the same. You do a urine test and find that the patient’s pH level is dangerously low.

a. Fill in the negative feedback loop diagram for how the body would normally handle low blood pH.

Answer:



b. Independently, research one option your patient has to maintain their blood pH. Hint: Use what you learned earlier to help you.

Answer: Answers will vary.

How to Help: There are a variety of options your student could conclude from their research. One is that they could prescribe sodium bicarbonate (baking soda). This can either be taken orally in water, or in an IV drip.

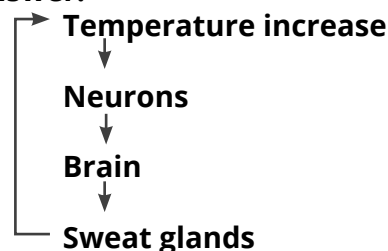
Students could also encourage their patient to work on a set of breathing exercises.

A third option is recommending foods and drinks that increase pH are not consumed or consumption is reduced.

? Question 2: You have an 18-year-old patient who is a runner in college. They run 25 miles a day to condition themselves for an upcoming marathon. Recently, they have found that their body temperature remains high for up to two hours after their daily run, which is dangerous.

a. Fill in the negative feedback loop diagram for how the body would normally handle a high temperature.

Answer:





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Kit	SU-CHASE
Instructions	IN-CHASEQT
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