

**VAPE MADNESS**

**TITLE:** Crazy Vape Trick Compilation

**SOURCE:** \_\_\_\_\_

|  |
|--|
| <b>NOTICED:</b> What are TWO things you noticed (saw)... |
| 1.   |
| 2.   |

|   |
|---|
| <b>WONDER:</b> What are TWO thing you wondered or had questions about in regards to vaping? |
| 1.  |
| 2.  |

**TITLE:** The ‘Vape Culture’ Explored

**SOURCE:** \_\_\_\_\_

|  |
|--|
| <b>NOTICED:</b> What are TWO things you noticed (saw)... |
| 1.   |
| 2.   |

|   |
|---|
| <b>WONDER:</b> What are TWO thing you wondered or had questions about in regards to vaping? |
| 1.  |
| 2.  |

Does this make Vaping look GOOD or BAD? \_\_\_\_\_

How does this make vaping look good or bad?

---



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Based on the video, do you think the view has a biased slant? (YES or NO) \_\_\_\_\_

EXPLAIN: \_\_\_\_\_

---

**TITLE:** Vaping: An Epidemic in U.S. High Schools

**SOURCE:** \_\_\_\_\_

**NOTICED:** What are TWO things you noticed (saw)...

1.

2.

**WONDER:** What are TWO thing you wondered or had questions about in regards to vaping?

1.

2.

Does this make Vaping look GOOD or BAD? \_\_\_\_\_

How does this make vaping look good or bad?

\_\_\_\_\_  
\_\_\_\_\_

Based on the video, do you think the view has a biased Slant? (YES or NO) \_\_\_\_\_

EXPLAIN: \_\_\_\_\_

\_\_\_\_\_

**VAPE SOURCES CLOSING QUESTIONS**

Do you think it matters if a source is biased? Why?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

How could this impact your opinion on vaping with biased sources?

\_\_\_\_\_  
\_\_\_\_\_



# Reading Anticipation Guide<sup>1</sup>

Anticipation guides help engage students by activating prior knowledge and stimulating student interest before reading. If class time permits, discuss students' responses to each statement before reading each article. As they read, students should look for evidence supporting or refuting their initial responses.

**Directions:** *Before reading*, in the first column, write "A" or "D," indicating your agreement or disagreement with each statement. As you read, compare your opinions with information from the article. In the space under each statement, cite information from the article that supports or refutes your original ideas.

| Me | Text | Statement   |
|----|------|---|
|    |      | 1. E-cigarettes burn to produce carbon monoxide, hydrogen cyanide, and other toxic compounds. |
|    |      | 2. Nicotine comes from plants.  |
|    |      | 3. Neurons are nerve cells that carry messages.   |
|    |      | 4. Nicotine imitates acetylcholine, a neurotransmitter found in the body.                     |
|    |      | 5. Nicotine reduces production of adrenaline.   |
|    |      | 6. Your body regulates nicotine production.   |
|    |      | 7. Nicotine is addictive because it activates proteins in receptors.                          |
|    |      | 8. Nicotine can affect brain development in teenagers.  |
|    |      | 9. Nicotine can lower blood pressure.   |
|    |      | 10. Scientific studies agree that e-cigarettes can help people quit smoking.                  |

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<sup>1</sup> This text is used with permission from ACS. It is a shortened version of the original content taken from *ChemMatters* "Let's Talk about E-Cigarettes" – Teacher's Guide, ChemMatter (2016)

## **POSERS: Photo Analysis Guide<sup>1</sup>**

|  |  |
|--|--|
| <p><b>PEOPLE:</b><br/>What types of people do you see in the photograph? Are they posing or was the photo taken without their knowledge? What is their clothing like? Are you puzzled by anything related to their dress, expression, body language and so on?</p> |  |
| <p><b>OBJECTS:</b><br/>What objects do you see in the photograph? Are there objects missing that you would expect to see in the photograph? Can you explain the function or the purpose of all the objects?</p>  |  |
| <p><b>SETTING:</b><br/>What is the setting of the photograph? Are there buildings in the picture? Can you tell where the picture was taken? Can you identify the time in history? Are there any plants or animals that tell you what the setting might be?</p>     |  |
| <p><b>ENGAGEMENT (Action):</b><br/>What action do you see between the people in the photograph? Are they showing any kind of emotion? Is the action staged? If no people are shown, what is suggested between the objects or animals in the photograph?</p>        |  |
| <p><b>RELATIONSHIPS:</b><br/>What relationships do you see in the photograph between the individuals and the objects? Do the objects mean something to the people? Are the people connected to one another (family, business, friends, enemies)?</p>               |  |
| <p><b>SUMMARY:</b><br/>Based on the questions presented and your observations, what are one or two things you can summarize about this photo?</p>  |  |

<sup>1</sup> Note: Adapted from The Write Path I: Science Teacher Guide (AVID)

**NEWW** (vaping culture article jigsaw) Name: \_\_\_\_\_

Block: \_\_\_\_\_

Title of Article: \_\_\_\_\_

Date of Publication: \_\_\_\_\_

|   |  |
|---|--|
| <b>N</b> oteworthy  |  |
| <b>E</b> vidence  |  |
| <b>W</b> hat does this have to do with me?                        |  |
| <b>W</b> hat connections does this have to the culture of vaping? |  |

Summary of Article (2-3 sentences): \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Use this page to jigsaw with you partners about the articles they read.

**TITLE 1:** \_\_\_\_\_

**MAIN IDEAS OF PARTNER'S ARTICLE.**

*The main idea from my partner's article was....*

**EVIDENCE:** What are TWO pieces of evidence/ important information from your partner's article?

1.

2.

**TITLE 2:** \_\_\_\_\_

**MAIN IDEAS OF PARTNER'S ARTICLE.**

*The main idea from my partner's article was....*

**EVIDENCE:** What are TWO pieces of evidence/ important information from your partner's article?

1.

2.

**Conclusion:** Have these articles influenced your position about how e-cigarettes and Vaping should be regulated? \_\_\_\_\_ (YES or NO)

WHY or WHY NOT? \_\_\_\_\_

Name:

## HOMEOSTASIS AND FEEDBACK LOOPS

EQ:

**Homeostasis**= \_\_\_\_\_



**Is all about change and response to a stimulus....**

- \_\_\_\_\_ in \_\_\_\_\_ environment.
- OR \_\_\_\_\_ in \_\_\_\_\_ environment.

**How do we respond to changes in our environment?**

- STRUCTURAL:
- FUNCTIONAL:
- BEHAVIORAL:

One example of how we organisms respond to the environment is \_\_\_\_\_

\_\_\_\_\_

Physiological Factors Controlled Through Homeostasis:

- 1.
- 2.
- 3.

**When homeostasis fails this leads to \_\_\_\_\_ !!**



Name:

## HOMEOSTASIS AND FEEDBACK LOOPS

### Systems that have the biggest impact on our homeostasis:

- \_\_\_\_\_ System
  - Receives...
  
- \_\_\_\_\_ System
  - Responsible...
  
- \_\_\_\_\_ System
  - Movement...
  
- \_\_\_\_\_ System
  - Release...

**Positive** feedback is (amplification or stabilization.) Choose one.

Example with explanation:

**Negative** feedback is (amplification or stabilization.) Choose one.

Example with explanation:

Name:

## HOMEOSTASIS AND FEEDBACK LOOPS

### FEEDBACK LOOP VIDEO ([https://www.youtube.com/watch?v=CLv3SkF\\_Eag](https://www.youtube.com/watch?v=CLv3SkF_Eag))

Things I noticed:

1.

2.

A question or wondering I still have

1.

### Class models of feedback loops

**Positive**

**Negative**



Name:

## HOMEOSTASIS AND FEEDBACK LOOPS

### VAPING AND HOMEOSTASIS:

- 
- 
- 
- 
- 
- 

Vaping is an example of (positive or negative) feedback loop because...

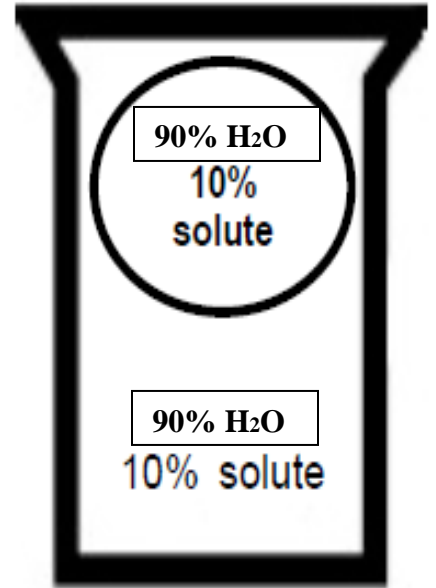
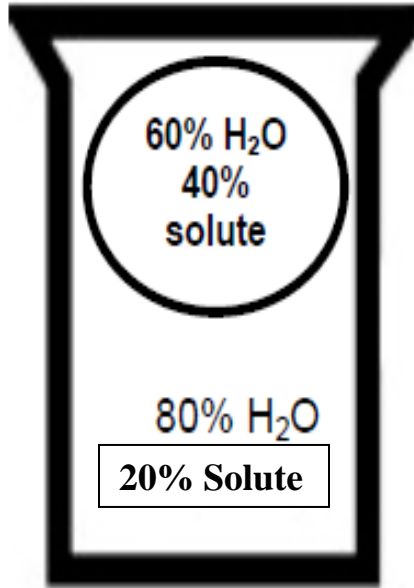
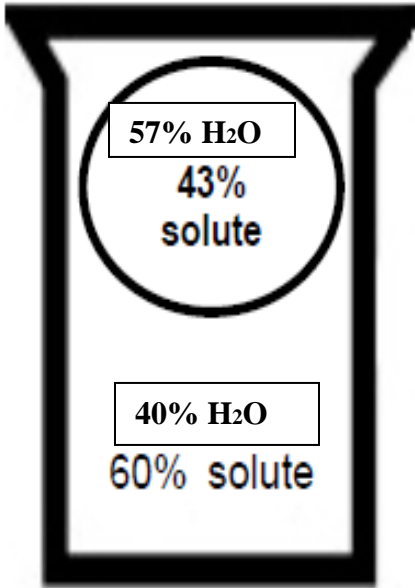
| <b>Macromolecule</b> | <b>Examples</b> | <b>Functions</b> | <b>Building Block</b> | <b>Elements</b> |
|----------------------|-----------------|------------------|-----------------------|-----------------|
| Carbohydrates        |                 |                  |                       |                 |
| Lipids               |                 |                  |                       |                 |
| Proteins             |                 |                  |                       |                 |
| Nucleic Acids        |                 |                  |                       |                 |

**Osmosis Beaker Review Practice**

Name: \_\_\_\_\_

**DIRECTIONS:** On the following beakers

- Draw arrows to indicate the movement of water.
- Predict what will happen to the cell (stay the same, shrink, or grow)
- Label the solution as either Hypotonic, Hypertonic, or Isotonic.

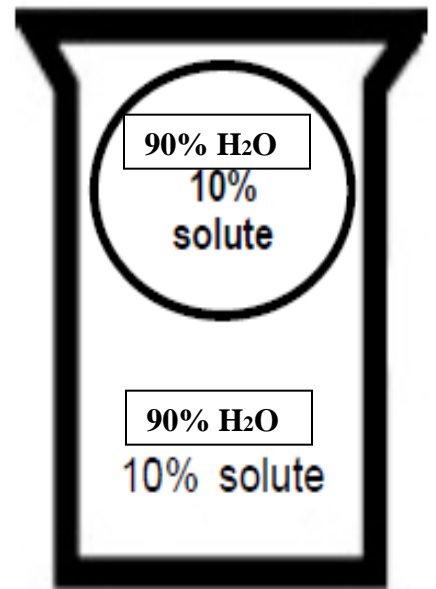
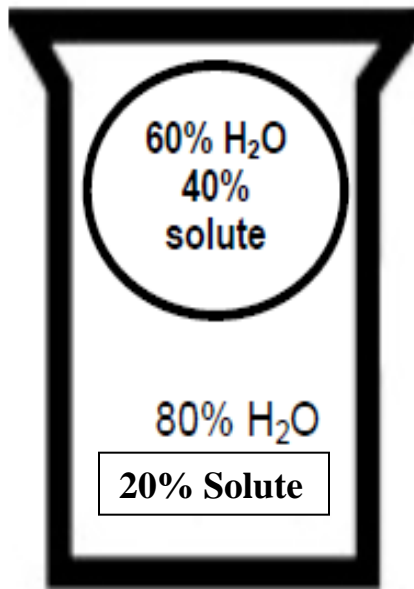
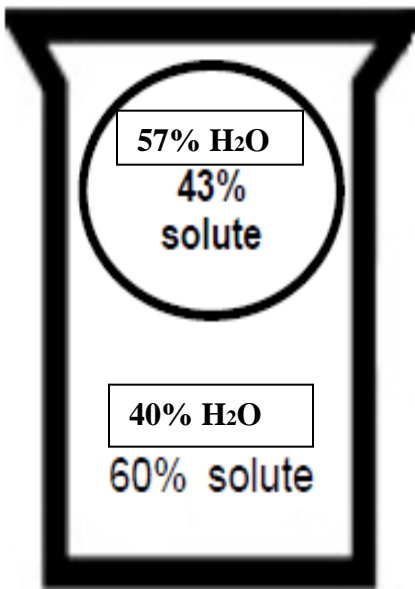


**Osmosis Beaker Review Practice**

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- Draw arrows to indicate the movement of water.
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- Label the solution as either Hypotonic, Hypertonic, or Isotonic.





Names: \_\_\_\_\_

Period: \_\_\_\_\_

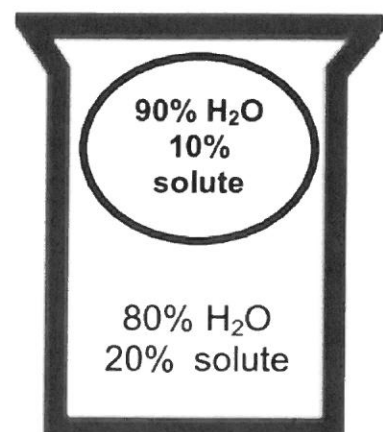
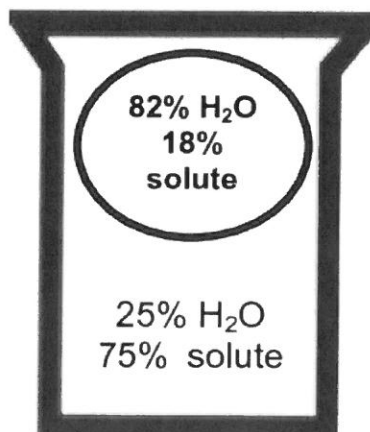
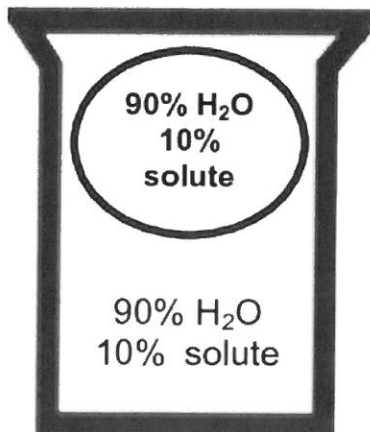
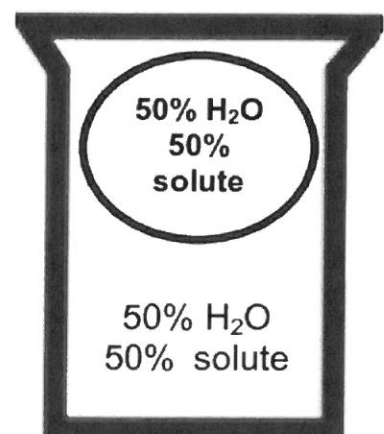
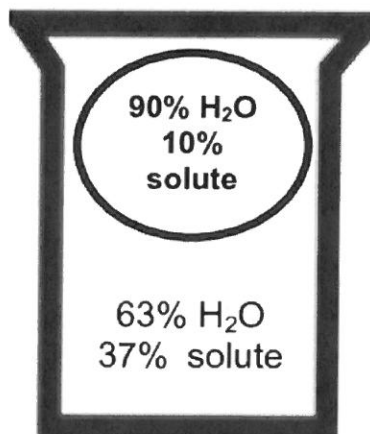
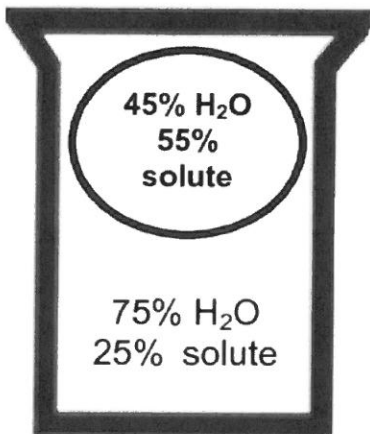
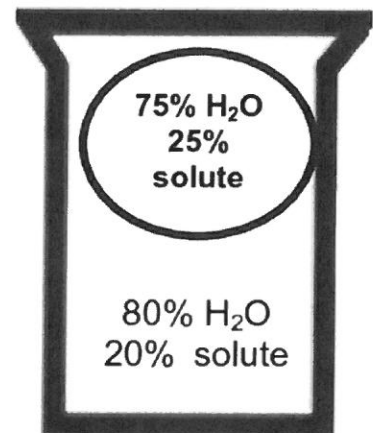
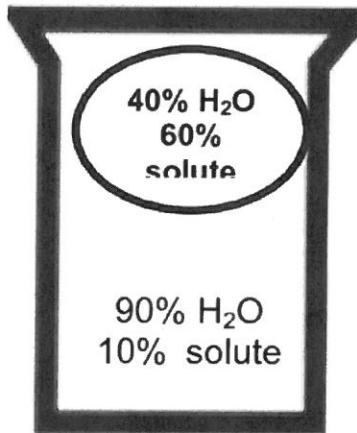
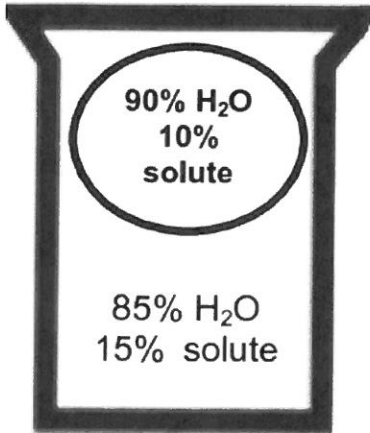
Date: \_\_\_\_\_  
Biology -

## Osmosis Worksheet

### 20 Points

Below are animal cells placed in beakers of various concentrations.

1. Draw an arrow to show which way the water would move by osmosis
2. Fill in any missing percentages (water or solute)
3. Identify the type of solution (isotonic, hypertonic, or hypotonic)



## Cell Membrane Activity

### BACKGROUND:

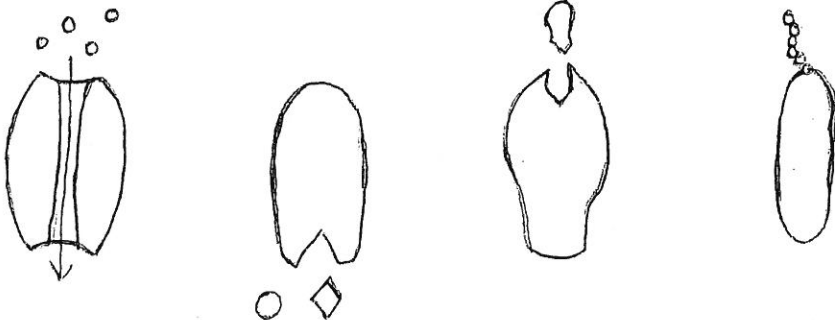
If a cell is viewed in cross section, it looks like the attached sheet.

Both the cell's exterior membrane and interior membrane face water. The shape of the cell membrane is of two layers of *phospholipids* sandwiched together. How do these molecules make the cell membrane? How do these molecules arrange themselves so that the cell membrane is held together?

It turns out that the phospholipid molecules contain two regions (see diagram below). The "head" of the phospholipid molecule is polar and attracts toward water. This attraction is considered water-loving or HYDROPHILIC. In contrast, the "tail" of the phospholipid molecule is non-polar and moves away from water. This is considered water-fearing or HYDROPHOBIC.



Several proteins, including marker proteins, channel proteins, and receptor proteins are embedded in the cell membrane for structural support, communication, and basic transport needs. These proteins may span the entire membrane or partway into it. Their positions within the cell membrane depend on hydrophilic and hydrophobic regions. Like phospholipids, hydrophilic regions of proteins attract toward water, whereas, hydrophobic regions of proteins move away from water. Enzymes are also found in the cell membrane playing a large role in cell metabolism.



### Your Task:

Follow the directions below to demonstrate how the phospholipid molecules arrange themselves so that all "water-loving" regions contact water, and all "water-fearing" regions face away from

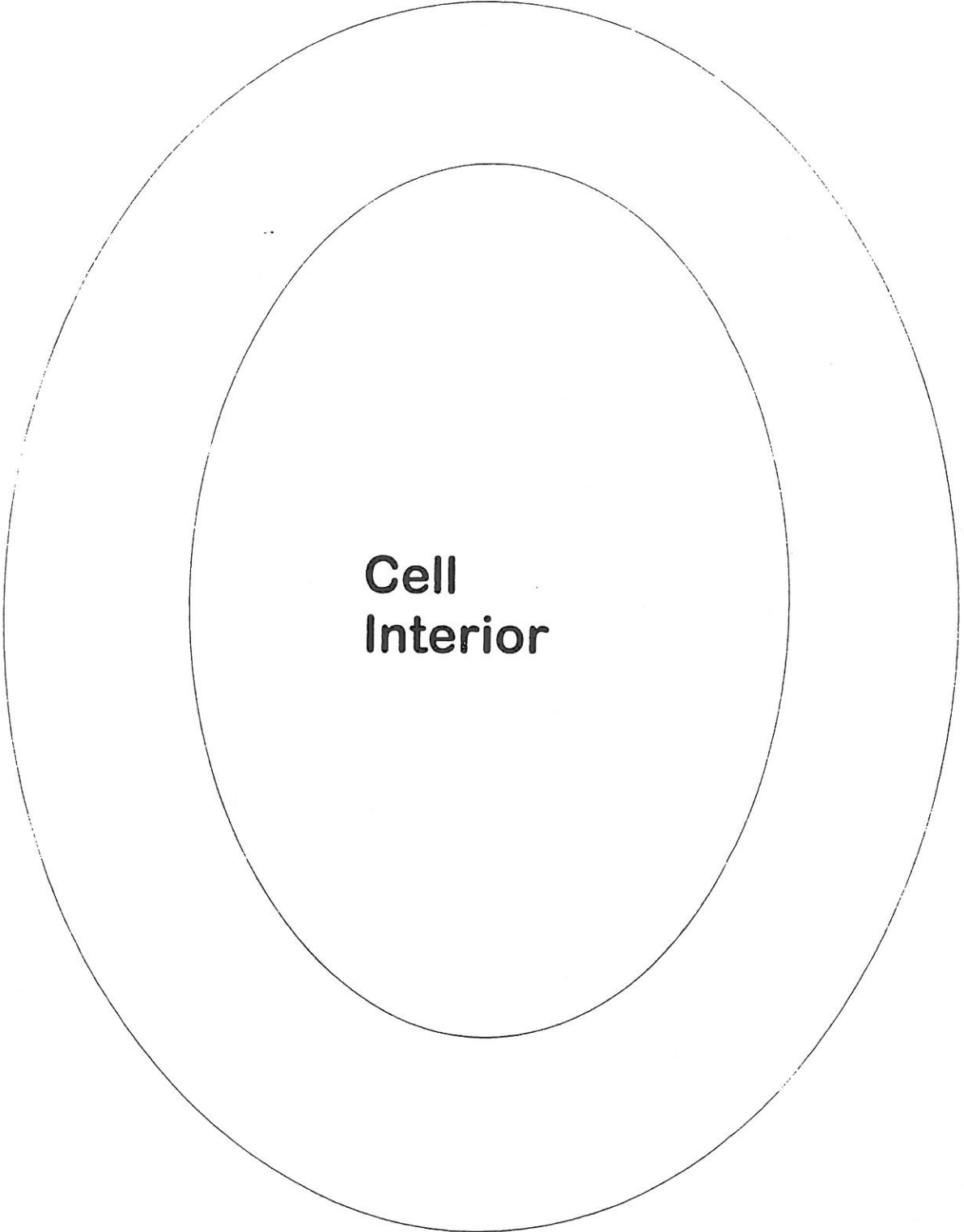


**rections:** use the sheet attached

1. Using the BACKGROUND information as a guide, label all regions which contain WATER. (HINT: There are two of them)
2. Draw phospholipid molecules within the cell membrane cross section, making sure the "head" regions contact water and the "tail" regions face away from water.
3. At this point, have me approve and initial your arrangement after drawing several phospholipids.
4. Label the polar and non-polar regions of the cell membrane.
5. Label the hydrophilic and hydrophobic regions of the cell membrane.
6. Draw several of each protein listed above and an enzyme using the diagram above as a guide. Decide which way each protein will face. Make sure to label each.

Name \_\_\_\_\_

**Cell  
Exterior**



**Diagram of Cell Membrane in cross section**

L104



NAME:

BLOCK:

**TITLE:**

**EQ:**

**WHITEBOARD:** Using white board, draw/model/explain what is happening to the particles of food coloring in different temperatures of water. After showing on whiteboard we will discuss together, then write below.

**WRITE:** What happens to particles....

In cold:

In room temp:

In hot:

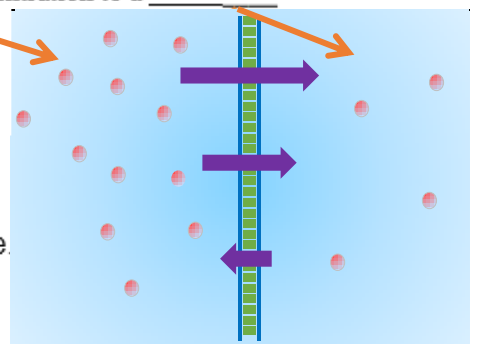
### DIFFUSION ( \_\_\_\_\_ )

\_\_\_\_\_ molecules (like oxygen and carbon dioxide but also lead and other toxic chemicals) move through the \_\_\_\_\_ by DIFFUSION.

**DIFFUSION**= The \_\_\_\_\_ of molecules from a \_\_\_\_\_ concentration to a \_\_\_\_\_ concentration until they reach \_\_\_\_\_ (equal/even)  
\_\_\_\_\_ energy (ATP) required!!

#### Why is diffusion important?

- \_\_\_\_\_!  
Exchanging gases (CO<sub>2</sub> and O<sub>2</sub>), minerals, food, and removing waste.  
This happens at the cellular level



**QUICK WRITE:** What is going to happen to the vaporized lead once it is inhaled into a person's lungs? (think about the vocabulary you just learned and use that in your explanation). \_\_\_\_\_

---



---

What is semipermeable membrane?.....

.....

.....

NAME:

BLOCK:

## **Membrane Proteins:**

### **RECEPTOR PROTEINS:**

Definition:

Where are they found?

What is a ligand?

### **CHANNEL PROTEINS:**

Where are they found?

What do they do?

Example of things that use this kind of protein:

### **MARKER PROTEINS:**

Where are they found?

What do they do?

Example of things that use this kind of protein:

## **Active Vs. Passive Transport**

\_\_\_\_\_ is moving particles from a \_\_\_\_\_  
to \_\_\_\_\_ concentration (opposite of diffusion)

To move things \_\_\_\_\_ the concentration  
gradient \_\_\_\_\_ is required (diffusion doesn't  
use energy)

Example:

**Phagocytosis:**

**Pinocytosis:**

**Exocytosis:**

NAME:

BLOCK:

Passive vs. Active Transport:

| Passive Transport   | Active Transport   |
|---|--|
| 1. Does NOT use the cell's energy   | 1. REQUIRES cell to use energy                                   |
| 2. Movement from high to low concentration until equilibrium  | 2. Movement does NOT stop at equilibrium (usually low to high)   |
| 3. Simple diffusion: smaller and uncharged molecules moving through the lipid bilayer<br>Facilitated diffusion: involves larger and/or charged molecules and ions moving through a carrier or channel protein | 3. Involves HUGE molecules (or many at a time), and charged ions |
| 4. Simple: O <sup>2</sup> , H <sub>2</sub> O, lead, CO <sub>2</sub> ,<br>Facilitated: Na <sup>+</sup> , Cl <sup>-</sup> , sugar   | 4. Examples: acetylcholine, dopamine,                            |

**QUICK WRITE:**

summarize how acetylcholine normally moves through the synapse using the vocab diffusion and active transport:

How does nicotine impact this normal (homeostasis) function of acetylcholine at the synapse?

How can water KILL you?

What is OSMOSIS?

SOLUTION:

SOLVENT:

SOLUTE:

NAME:

BLOCK:

SOLUTIONS CONTINUED:

**HYPERTONIC**

Definition:

Example:

**HYPOTONIC**

Definition:

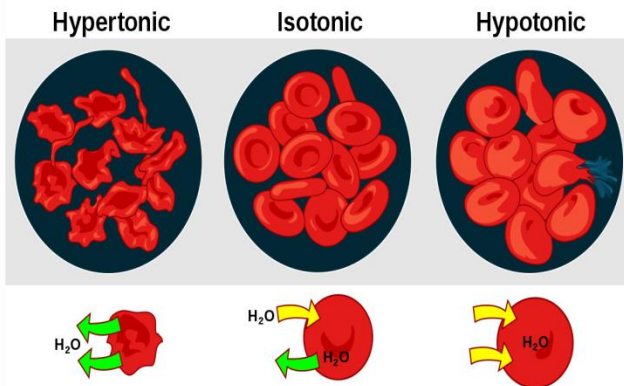
Example:

**ISOTONIC**

Definition:

Example:

Using the above notes, **explain** in words what is happening to each blood cell and WHY:

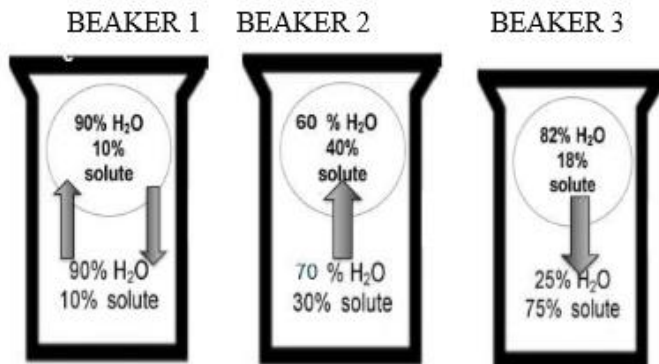


Cell 1 (ISOTONIC):

Cell 2 (HYPERTONIC):

CELL 3 (HYPOTONIC):

Source: <https://en.wikipedia.org/wiki/Tonicity>



BEAKER 1 WILL...  
BECAUSE...

BEAKER 2 WILL...  
BECAUSE...

BEAKER 3 WILL...  
BECAUSE...

**CELLS:** Will the cells Shrink, Grow, or Stay the Same?

NAME:

BLOCK:

Veggie Demo: Fill out the chart below

|                  | Description (size, how it feels, soft/stiff) | Recall what you learned about cells and solutions. What do you think caused the potato/lettuce to change? |
|------------------|--|---|
| <b>Potato A</b>  |  |   |
| <b>Potato B</b>  |  |   |
| <b>Lettuce A</b> |  |   |
| <b>Lettuce B</b> |  |   |



NAME:

BLOCK:

**TITLE:**

**EQ:**

**WHITEBOARD:** Using white board, draw/model/explain what is happening to the particles of food coloring in different temperatures of water. After showing on whiteboard we will discuss together, then write below.

**WRITE:** What happens to particles....

In cold:

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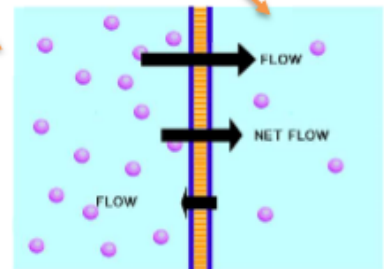
### DIFFUSION ( \_\_\_\_\_ )

\_\_\_\_\_ molecules (like oxygen and carbon dioxide but also lead and other toxic chemicals) move through the \_\_\_\_\_ by DIFFUSION.

**DIFFUSION**= The \_\_\_\_\_ of molecules from a \_\_\_\_\_ concentration to a \_\_\_\_\_ concentration until they reach \_\_\_\_\_ (equal/even) \_\_\_\_\_ energy (ATP) required!!

### Why is diffusion important?

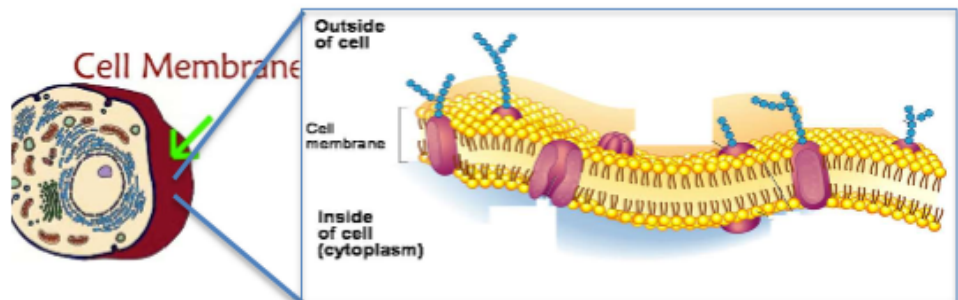
- \_\_\_\_\_!  
Exchanging gases (CO<sub>2</sub> and O<sub>2</sub>), minerals, food, and removing waste.  
This happens at the cellular level



**QUICK WRITE:** What is going to happen to the vaporized lead once it is inhaled into a person's lungs? (think about the vocabulary you just learned and use that in your explanation). \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_ is a *semipermeable membrane* surrounding the **cytoplasm** of the cell. Which means only certain molecules can \_\_\_\_\_ and \_\_\_\_\_ the cell.



NAME:

BLOCK:

## **Membrane Proteins:**

### **RECEPTOR PROTEINS:**

Definition:

Where are they found?

What is a ligand?

### **CHANNEL PROTEINS:**

Where are they found?

What do they do?

Example of things that use this kind of protein:

### **MARKER PROTEINS:**

Where are they found?

What do they do?

Example of things that use this kind of protein:

## **Active Vs. Passive Transport**

\_\_\_\_\_ is moving particles from a \_\_\_\_\_  
to \_\_\_\_\_ concentration (opposite of diffusion)

To move things \_\_\_\_\_ the concentration  
gradient \_\_\_\_\_ is required (diffusion doesn't  
use energy)

Example:

**Phagocytosis:**

**Pinocytosis:**

**Exocytosis:**

NAME:

BLOCK:

Passive vs. Active Transport:

| Passive Transport   | Active Transport   |
|---|--|
| 1. Does NOT use the cell's energy   | 1. REQUIRES cell to use energy                                   |
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**QUICK WRITE:**

Summarize how acetylcholine normally moves through the synapse using the vocab diffusion and active transport:

How does nicotine impact this normal (homeostasis) function of acetylcholine at the synapse?

How can water KILL you?

What is OSMOSIS?

SOLUTION:

SOLVENT:

SOLUTE:

NAME:

BLOCK:

SOLUTIONS CONTINUED:

**HYPERTONIC**

Definition:

Example:

**HYPOTONIC**

Definition:

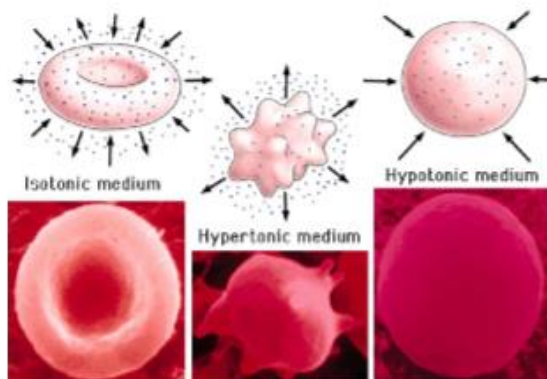
Example:

**ISOTONIC**

Definition:

Example:

Using the above notes, **explain** in words what is happening to each blood cell and WHY:



Cell 1 (ISOTONIC):

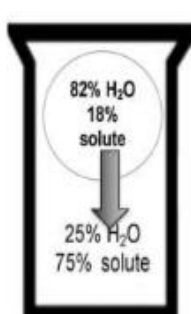
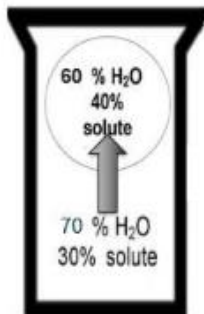
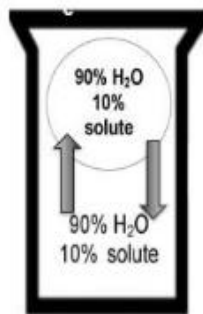
Cell 2 (HYPERTONIC):

CELL 3 (HYPOTONIC):

BEAKER 1

BEAKER 2

BEAKER 3



BEAKER 1 WILL...  
BECAUSE...

BEAKER 2 WILL...  
BECAUSE...

BEAKER 3 WILL...  
BECAUSE...

**CELLS:** Will the cells Shrink, Grow, or Stay the Same?

NAME:

BLOCK:

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| <b>Potato B</b>  |  |   |
| <b>Lettuce A</b> |  |   |
| <b>Lettuce B</b> |  |   |

**Teacher cut these out and have students put them in order to model nicotine feedback loop.**

**Brain in normal state**

**Vape nicotine for the first time**

**Endocrine system releases dopamine which make the brain feel pleasure**

**Brain has a compulsion for more nicotine**

**Vape more nicotine**

**Endocrine system increases  
dopamine release with nicotine  
intake**

**Nicotine levels decreases, and  
dopamine levels lower which is  
not what brain has become used  
to**

**Brain becomes unpleased with  
low levels of dopamine**

**Brain craves for increase  
amount of nicotine to get  
dopamine levels back to normal**



# Body System Poster

Group Activity

Name(s): \_\_\_\_\_

Period: \_\_\_\_\_ Date: \_\_\_\_\_

## Background

The human body is a very complex system. There are more than 50 trillion single cells in the human body made up of more than 200 different cell types, and each perform a different function. For example, the primary function of red blood cells is to carry oxygen while the primary function of a muscle cell is contraction. Each cell type is shaped differently depending on its function. When groups of cells that perform the same or similar function are combined, a tissue is created. When a group of tissues combines to perform a function, an organ results; and a group of organs performing a combined function results in the body systems. The eleven primary body systems are the digestive, endocrine, excretory, reproductive, respiratory, circulatory, nervous, lymphatic/immune, muscular, skeletal, and integumentary.

## Materials

Butcher Paper

Markers/Colored Pencils

Anatomy Textbooks and Teacher-provided Resources

## Procedure

when complete

|         |  |  |
|---------|--|--|
| Step 1  | Choose a student in your group to be the body model.   |  |
| Step 2  | Obtain a sheet of butcher paper that is at least as long as him or her   |  |
| Step 3  | Have the body model lay down in "anatomical position" (flat on back, palms facing up) on the butcher paper. <i>NOTE: Make sure there is no debris under the butcher paper before the body model lies down.</i>   |  |
| Step 4  | Using a pencil, outline the body model onto the butcher paper.   |  |
| Step 5  | Once the outline is complete, make any needed adjustments so it actually looks like the outline of a human body.   |  |
| Step 6  | Your teacher will assign your group one of the following body systems: Nervous, Circulatory, Endocrine, Respiratory  |  |
| Step 7  | Your group will need to include all of the following on your poster related to the body system assigned to your group: <ul style="list-style-type: none"><li>Title and <b>function</b> of the body system</li><li>Draw all of the <b>organs</b> that are part of the body system</li><li>Label and <b>function</b> of each organ</li><li>Describe briefly <b>how nicotine/vaping interacts</b> with your assigned system</li></ul> |  |
| Step 8  | Use the rubric to obtain a better understanding of the grading expectations.   |  |
| Step 9  | Use the textbook/internet resources to find the information needed for the poster.   |  |
| Step 10 | BE CREATIVE! Add color, clothes, background, decorations, removable labels, etc.   |  |

## Rubric

Group Member(s): \_\_\_\_\_

Body System: \_\_\_\_\_ Date: \_\_\_\_\_

| CATEGORY                               | Full Pts.   |   | Partial Pts.  |  | No Pts.  | Grade      |
|--|---|---|---|--|--|------------|
| <b>Labels<br/>(5 points)</b>           | All items of importance on the poster are clearly labeled with identifiers that can be read at least 3 ft. away. (15) | Almost all items of importance on the poster are clearly labeled and can be read from at least 3 ft. away. (12) | Several items of importance on the poster are clearly labeled. Labels can be read from at least 3 ft. away. (9) | Labels are too small to view and/or many important items were not labeled. (6)       | Required items were not labeled at all. (3)                  | <b>/5</b>  |
| <b>Content<br/>(5 points)</b>          | The poster includes all required elements as well as additional information. (25)                                     | All required elements are included on the poster. (20)  | All but 1 of the required elements are included on the poster. (15)   | Several required elements are missing. (10)  | Most of the required elements are missing. (5)               | <b>/5</b>  |
| <b>Content Accuracy<br/>(5 points)</b> | All facts on the poster are accurate. (15)  | Mostly accurate facts are displayed, and there are 10 or more facts present. (12)                               | 50% of the facts on the poster are accurate. (9)  | Few of the facts are accurate and/or are not displayed on the poster. (6)            | Little to no accuracy recorded on poster. (3)                | <b>/5</b>  |
| <b>Attractiveness<br/>(5 points)</b>   | The poster is exceptionally attractive in terms of design, layout, and neatness. (5)                                  | The poster is attractive in terms of design, layout and neatness. (4)   | The poster is acceptably attractive though it appears a bit messy. (3)  | The poster is distractingly messy or very poorly designed. It is not attractive. (2) | The poster appears as if little to no time was invested. (1) | <b>/5</b>  |
| <b>Project Grade</b>                   |   |   |   |  |  | <b>/20</b> |

Write your name next to the uno card color that you had in your group.

Red=

Yellow=

Blue=

Green=

Name \_\_\_\_\_ Block \_\_\_\_\_

### Analysis

Complete the following chart using the group body system posters displayed around the room.

| Body | Major | How system is affected |
|------|-------|------------------------|
|------|-------|------------------------|

| <b>System</b>      | <b>Function</b> | <b>Organs</b> | <b>by vaping</b> |
|--------------------|-----------------|---------------|------------------|
| <b>Circulatory</b> |                 |               |                  |
| <b>Respiratory</b> |                 |               |                  |
| <b>Endocrine</b>   |                 |               |                  |
| <b>Nervous</b>     |                 |               |                  |

# VAPING ECONOMIC STATISTICS

Countries including the Seychelles and Brazil have also banned the sale of e-cigarettes, but spending on them globally is going up.

These charts tell the story of a growing industry - but how many people vape, how much is being spent on e-cigarettes and why do people buy them?



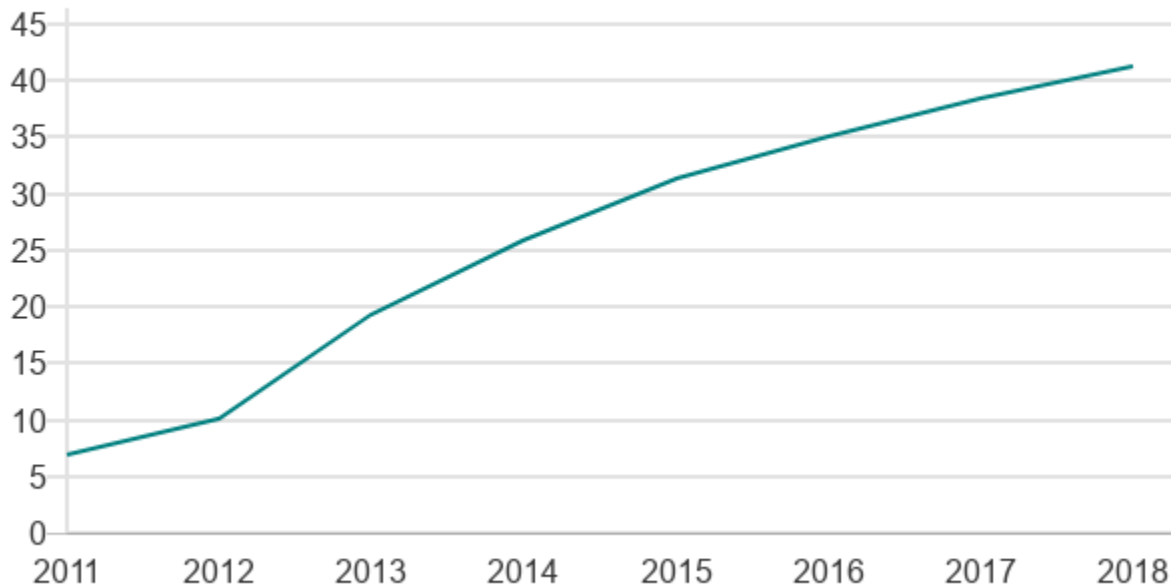
## 1. Vaping is increasingly popular

According to the latest statistics from the [World Health Organization](#), there has been a small but steady decrease in the estimated number of smokers globally since 2000 - from 1.14 billion then to about 1.1 billion now.

But it's a different matter when it comes to vaping.

### Number of vapers globally

Adult smoking population of vapour products (millions)



Source: Euromonitor International

BBC

The number of vapers has been increasing rapidly - from about seven million in 2011 to 35 million in 2016.

Market research group Euromonitor estimates that the number of adults who vape will reach almost 55 million by 2021.

ADVERTISEMENT

## 2. Spending on e-cigarettes is growing

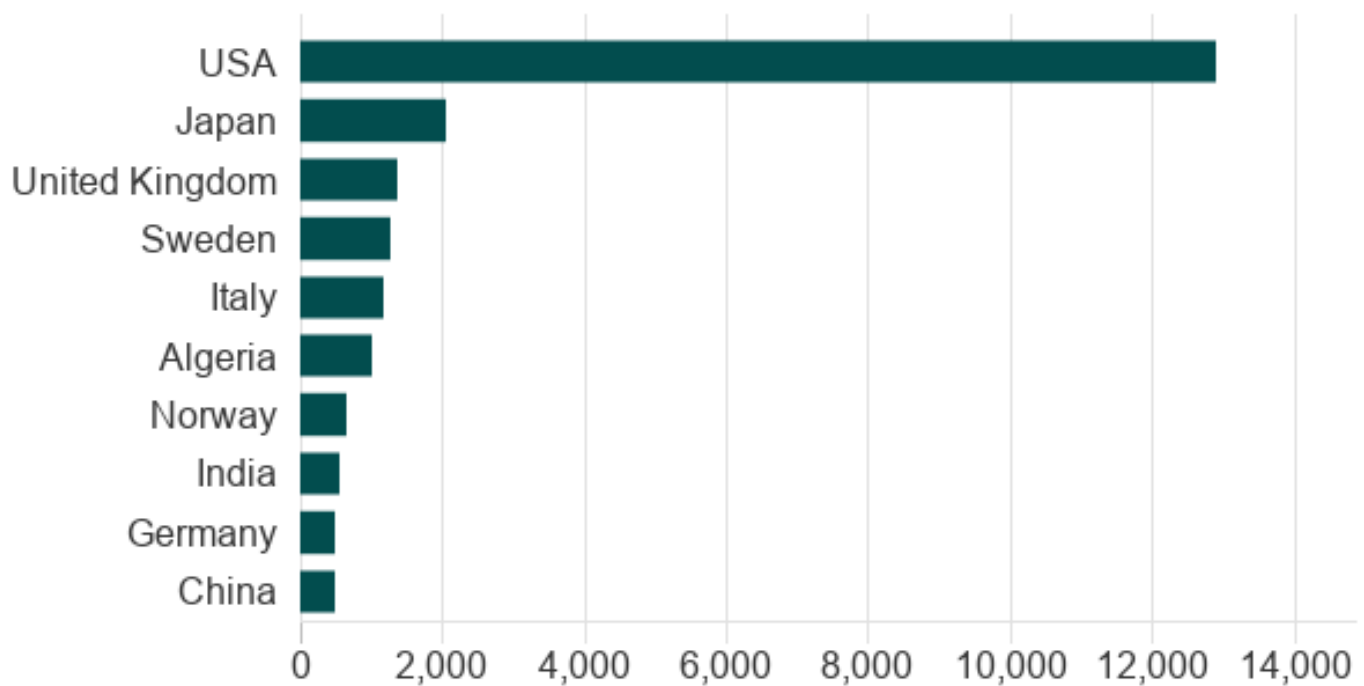
The e-cigarette market is expanding, as the number of vapers rises.

The global vapour products market is now estimated to be worth \$22.6bn (£17.1bn) - up from \$4.2bn just five years ago.

The United States, Japan and the UK are the biggest markets. Vapers in the three countries spent a combined \$16.3bn on smokeless tobacco and vaping products in 2016.

### Top 10 markets for vape products

Market size for smokeless tobacco and vape products, 2016 (\$m)



Source: Euromonitor International



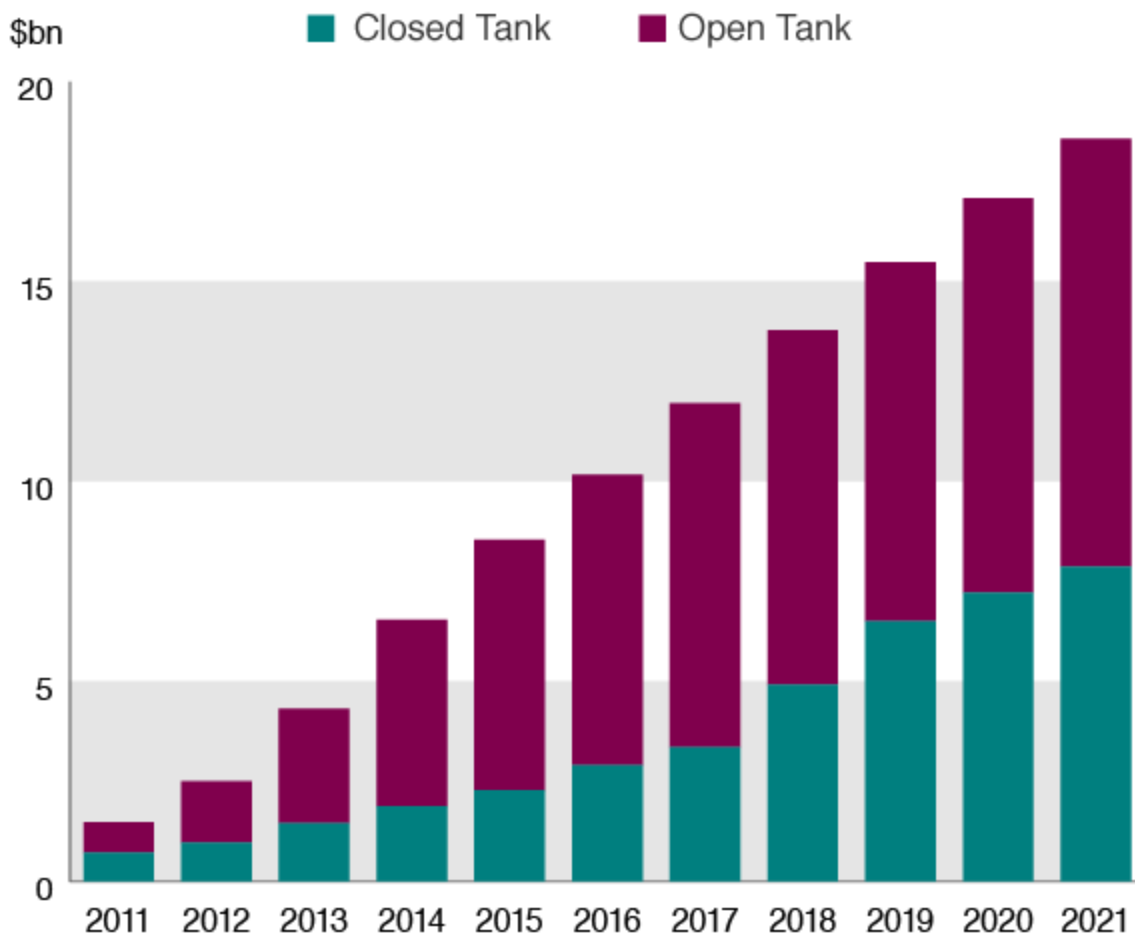
European countries such as Sweden, Italy, Norway and Germany also feature in the top 10.

### 3. Open-system e-cigarettes are the most popular

There are two main types of e-cigarette - open and closed system, also known as open and closed tank.

In an open system, the liquid that is vapourised can be refilled manually by the user. There is also a removable mouthpiece.

#### Vaping products: Growth in global market



Source: Euromonitor International



Closed system e-cigarettes use ready-made refills, which screw directly on to the e-cigarette's battery.

Since 2011, the gap in spending between them has been gradually widening.

It is reckoned that this year, vapers will spend an estimated \$8.9bn on open system e-cigarettes, also known as vape pens - more than double the spend on closed-system products.

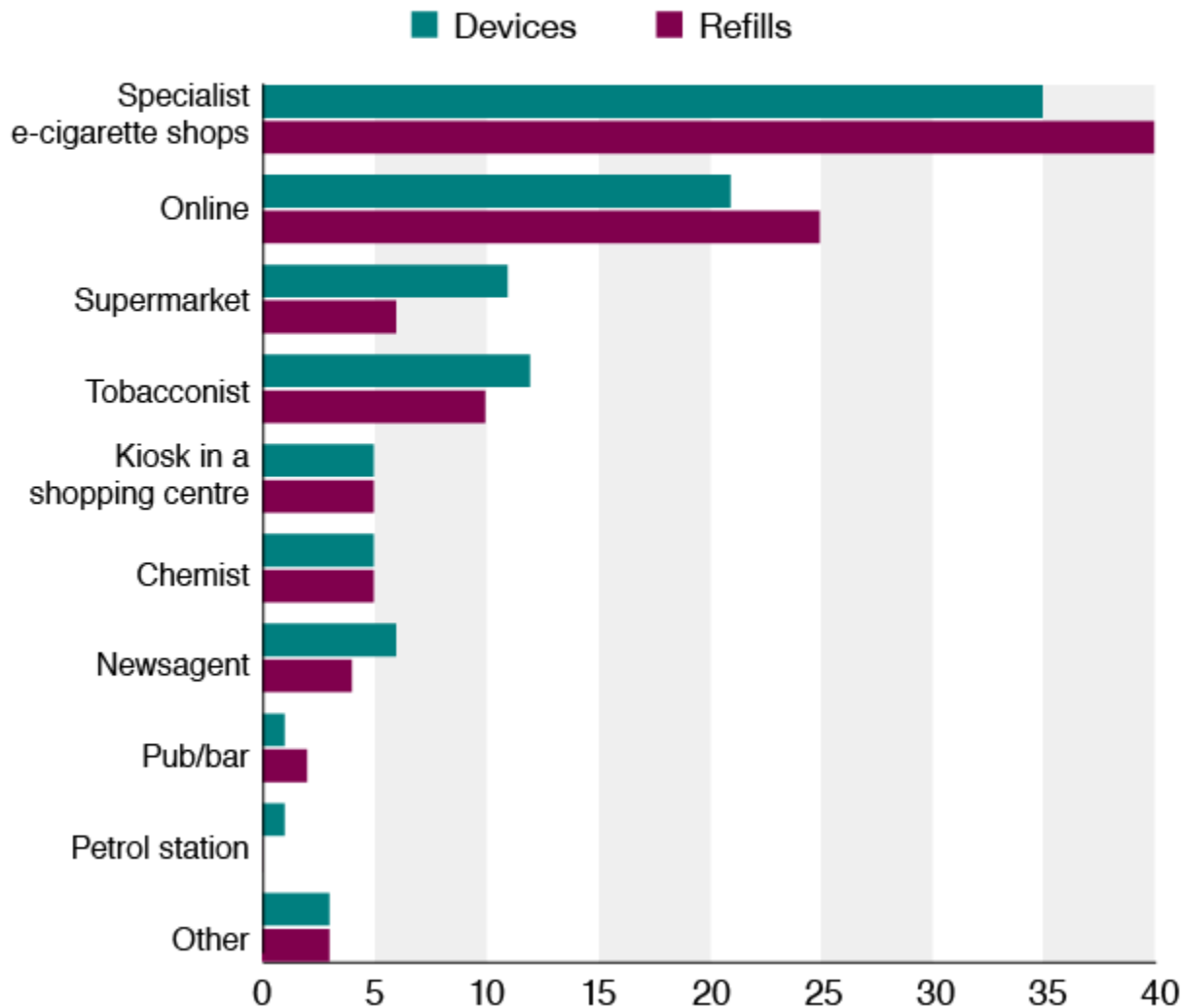
## 4. Most e-cigarettes are purchased in-store

Most e-cigarette users buy their devices in specialist shops, according to a [report published by Ernst & Young](#).

In 2015, 35% of e-cigarette users surveyed across the UK, France, Germany, Poland, Italy, Russia and South Korea bought their devices in e-cigarette shops.

### Regular vapers' shopping habits

Survey of 3,000 regular e-cigarette users in 2015 (%)



Source: Kantar, Ernst & Young analysis

BBC

Of the 3,000 users surveyed by Kantar for Ernst & Young, 21% said they had purchased their devices online.

It's thought that consumers might make their first e-cigarette purchase in person, to build familiarity with a relatively new product, or to seek advice on which type of device might suit them best. In the UK, Europe's largest e-cigarette market, there are an estimated **2,000 vaping outlets**.

Note: Adapted from <https://www.bbc.com/news/business-44295336>

# FDA plans curbs on e-cigarette sales over concerns about surge in teen vaping



Juul e-cigarettes are appealing to young people because they are easy to hide and come in a variety of flavors. (Michael S. Williamson/The Washington Post)

By [Laurie McGinley](#)

November 8 2018 at 5:28 PM

The Food and Drug Administration, alarmed by a huge increase in vaping among minors, is expected to impose severe restrictions on the sale of e-cigarette products throughout the United States — actions that will probably have a significant impact on an industry that has grown exponentially in recent years with little government oversight.

As soon as next week, FDA Commissioner Scott Gottlieb is expected to announce a ban on the sale of most flavored e-cigarettes in tens of thousands of convenience stores and gas stations across the country, according to senior agency officials. The agency will also impose such rules as age-verification requirements for online sales, the officials say.

Gottlieb also is expected to propose banning menthol in regular cigarettes. The agency has been collecting public comments on such a prohibition, which is a major goal of the public health community but is likely to be strongly opposed by the cigarette industry.

The FDA's initiatives on vaping are spurred by preliminary government data that show [e-cigarette use rose 77 percent among high schoolers](#) and nearly 50 percent



among middle schoolers in 2018. That means 3.5 million children were vaping in early 2018, up 1 million from 2017.

Gottlieb, who once served on the board of a North Carolina vaping company, was at one time viewed as an ally of the e-cigarette industry, and he [delayed](#) some [critical e-cigarette rules](#) shortly after becoming commissioner in 2017. He has also said his first priority is protecting children from tobacco-related disease. Most vaping products are flavored, and studies show teenagers are attracted to the flavors.

“We now have evidence that a new generation is being addicted to nicotine, and we can’t tolerate that,” he said, referring to the vaping data in an interview before he made his final decision on e-cigarette policy.

The only exception to the flavored-products ban in convenience stores involves mint and menthol e-cigarette products. The FDA will continue to permit sales of those flavors because menthol is permitted in regular cigarettes, and the agency doesn’t want to give traditional cigarettes an advantage over e-cigarettes. But the FDA may extend the sales restriction to those flavors if teen vaping doesn’t decline, officials said.

Gottlieb’s actions apply to a specific kind of vaping product that dominates the youth market — e-cigarettes that use prepackaged flavor cartridges, or pods. That includes the wildly popular vaping products by Juul Labs. The restrictions don’t apply to the “open-tank” systems available in vape shops.

Research indicates many e-cigarette users are likely to become addicted to nicotine and some will probably end up on regular cigarettes, a product that kills half of its long-term users. Moreover, the long-term health consequences of vaping are not known.

At the same time, vaping devotees and “harm-reduction” advocates have said e-cigarettes represent a powerful tool in helping adult smokers to quit more dangerous cigarettes. They have warned that making it harder for adults to buy e-cigarettes — or depriving them of flavored products — will be detrimental.

“We have to be really careful not to overreact to the youth problem,” said David Abrams, professor of social and behavioral sciences at New York University.

Juul, which accounts for more than 70 percent of the retail market, is sold in tens of thousands of retail outlets.

Gottlieb’s steps will almost certainly be criticized as too aggressive by the industry and too weak by public health groups and Democratic lawmakers, whose election victory will probably embolden them in efforts to curb youths’ use of e-cigarettes.

The tobacco-control groups are demanding restrictions on marketing and a ban on all e-cigarette flavors until manufacturers can prove that such flavors benefit public health by helping adults quit smoking regular cigarettes without increasing vaping by youths.

“As long as the FDA allows these companies to peddle these flavors, you will see a steady increase in kids addicted to this product,” said Sen. Richard J. Durbin (D-Ill.) in a recent interview.

Gottlieb has resisted an across-the-board ban because he wants to ensure that flavored products are available to adults who want to use them as aids to quit smoking regular cigarettes. Such devices could be a potentially less harmful source of nicotine, he said. “We know that adults transition off combustible products and that flavors play a role in that,” he said in an interview. “We don’t want to foreclose the opportunity for adults to get these products.”

Adult smoking rates in the United States dropped to their lowest level last year, at 14 percent, continuing a downward trend after a peak in 1965, but cigarettes kill an estimated 480,000 Americans per year.

The flavored e-cigarette products will be available in vape and tobacco shops, which the FDA believes are more careful about verifying the age of the purchasers. It’s also possible that some flavored products could return to convenience stores — but only if the manufacturers prove a public health benefit and get specific authorization from the agency, which could take years. Under federal law, tobacco products can’t be sold to people under 18. In some states and localities, the age is higher.

Gottlieb also is expected to warn that further e-cigarette restrictions might occur if use by youths doesn’t start to decline.

FDA officials, who recently conducted a crackdown on underage retail sales of e-cigarettes to minors and are investigating whether [products are being sold illegally](#), were alarmed by the number of violations in convenience stores.

Gregory Conley, president of the American Vaping Association, a consumer group, has stressed the importance of having e-cigarettes available to adults in convenience stores and online — especially those who live in rural areas that might not have vape shops. “Severely restricting the availability of these devices does not seem to be in the interest of public health,” he said.

Convenience-store interests already have started questioning Gottlieb’s legal ability to restrict the sale of e-cigarettes to a specific type of store.

Juul, a sleek e-cigarette introduced in 2015, has taken much of the blame for the rise in use by youths. A technical and design breakthrough, the e-cigarette looks like a USB flash drive and, in a break from past vaping products, delivers high levels of nicotine that are smooth, not harsh. Each of its pods, which come in such flavors as mango and cucumber, provides as much nicotine as a pack of cigarettes.

The company’s early marketing strategy included a launch party with attractive young models whose images were shared widely on social media sites such as Twitter and Instagram.

Today, the company is engulfed in a backlash resulting from the surge in youth use. Company officials say that the early marketing campaign was short-lived and didn't have an impact on sales.

Now the San Francisco-based company is running advertisements that tout its role in helping smokers quit traditional cigarettes. The ads carry the tagline, "The alternative for adult smokers." It also has pledged \$30 million to reduce underage use. Along with four other e-cigarette makers, it is planning to submit plans to Gottlieb on cutting use by youths.

Adapted from [https://www.washingtonpost.com/national/health-science/fda-plans-to-impose-severe-restrictions-on-e-cigarettes/2018/11/08/91253cf2-e3a1-11e8-8f5f-a55347f48762\\_story.html?noredirect=on&utm\\_term=.1e4aa36e0a1e](https://www.washingtonpost.com/national/health-science/fda-plans-to-impose-severe-restrictions-on-e-cigarettes/2018/11/08/91253cf2-e3a1-11e8-8f5f-a55347f48762_story.html?noredirect=on&utm_term=.1e4aa36e0a1e)

# HISTORY OF TOBACCO AND VAPING<sup>1</sup>

## More on the history of tobacco use

Tobacco was used in the Americas long before it was introduced in Europe. Although Mayan drawings showing tobacco use date back to between 600 and 900 A.D., Native Americans didn't use tobacco on a regular basis like current smokers. It was usually smoked through ceremonial pipes to seal treaties or in religious ceremonies as a way to send prayers to the spirits through the smoke. Native shamans recognized that in high concentrations tobacco could be hallucinogenic.

Early explorers brought tobacco back to Europe from the Americas. It quickly gained popularity and created a commercial market for American settlers who grew tobacco as a primary cash crop. George Washington initially grew tobacco as a cash crop, but eventually decided that growing wheat was more financially sustainable. In the 1800s people did not smoke regularly. During this time, tobacco was chewed, smoked in pipes, or hand rolled into cigarettes or cigars.

Commercially made cigarettes were introduced in 1865, providing easy access to tobacco smoking. Thereafter, sales increased rapidly—particularly to the armed services. During World War I and II soldiers were given free cigarettes every day. As women became more independent during the Second World War, companies began to shift marketing techniques and advertising to attract female smokers.

In the 1950s medical studies began to connect smoking to lung cancer. In response, “filter tip cigarettes” were introduced as a safe solution to these hazards. Filters retain much of the tar and nicotine. So with each puff, the smoker receives more air and less tar and nicotine. The problem is that the nicotine-addicted smoker must continue to smoke additional filtered cigarettes until the body's need for nicotine is satisfied.

In 1964 the U.S. Surgeon General reported the dangers of tar and nicotine in cigarettes. The following year, the U.S. Congress passed the Cigarette Labeling and Advertising Act. This law required that a label stating, "Cigarettes may be hazardous to your health." be placed on every pack of cigarettes.

In the 1980s, as a response to this law, cigarette companies introduced formulas with reduced tar and they added filters to more of their products to reduce customer fear. The Comprehensive Smoking Education Act was passed by Congress in 1984. This required cigarette companies to change their warnings every three months by rotating these four different labels: Public Law 98-474, "Comprehensive Smoking Education Act, 1984".

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<sup>1</sup> This text is used with permission from ACS. It is a shortened version of the original content taken from *ChemMatters* “Let's Talk about E-Cigarettes” – Teacher's Guide, ChemMatter (2016)

## Cigarette Health Warnings

SURGEON GENERAL'S WARNING: Smoking Causes Lung Cancer, Heart Disease, Emphysema, And May Complicate Pregnancy.

SURGEON GENERAL'S WARNING: Quitting Smoking Now Greatly Reduces Serious Risks to Your Health.

SURGEON GENERAL'S WARNING: Smoking By Pregnant Women May Result in Fetal Injury, Premature Birth, And Low Birth Weight.

SURGEON GENERAL'S WARNING: Cigarette Smoke Contains Carbon Monoxide.

As it has become more difficult to sell cigarettes in the U.S., tobacco companies began looking for markets in South America, Asia and the Middle East. Where possible, they have moved their tobacco growing operations to the areas of greatest sales.

([http://healthliteracy.worlded.org/docs/tobacco/Unit1/2history\\_of.html](http://healthliteracy.worlded.org/docs/tobacco/Unit1/2history_of.html))

A comparison of toxics released in traditional cigarette smoke and in e-cigarette vapor is shown in the chart below:

| Comparison of sample toxicants emitted by tobacco cigarettes and e-cigarettes |   |   |   |
|---|---|---|---|
| Toxic compound  | Tobacco cigarette<br>( $\mu\text{g}$ in mainstream smoke) | E-cigarette<br>( $\mu\text{g}$ per 15 puffs*) | Average ratio<br>(conventional vs electronic cigarette) |
| Formaldehyde  | 1.6-52  | 0.20-5.61                                     | 9   |
| Acetaldehyde  | 52-140  | 0.11-1.36                                     | 450   |
| Acrolein  | 2.4-62  | 0.07-4.19                                     | 15  |
| Toluene   | 8.3-70  | 0.02-0.63                                     | 120   |
| NNN**   | 0.005-0.19  | 0.00008-0.00043                               | 380   |
| NNK**   | 0.012-0.11  | 0.00011-0.00283                               | 40  |

\* The authors assumed smokers of e-cigarettes would take an average of 15 puffs per vaping session, corresponding to smoking one tobacco cigarette.  
 \*\* Tobacco-specific nitrosamine, a carcinogenic compound that originates in the curing and processing of tobacco.  
 Adapted from Goniewicz et al. (2014)<sup>4</sup>

(<http://ehp.niehs.nih.gov/122-a244/>)

## More on the history of e-cigarettes

Electronic cigarettes are basically battery-operated nicotine delivery systems that vaporize liquid. This vapor is inhaled instead of smoke from the burning of tobacco in regular cigarettes. Electronic cigarettes are designed to simulate the cigarette smoking experience. Many have added flavorings to additionally appeal to users.

Herbert A. Gilbert invented a "smokeless non-tobacco cigarette" in 1963 and received U.S. Patent number 3200819 for his invention on August 17, 1965. His design is used in current e-cigarettes.  
 (<http://www.ecigarettedirect.co.uk/ashtray-blog/2013/10/interview-inventor-e-cigarette-herbert-a-gilbert.html>)

Although Gilbert was a heavy smoker, his original intent was to develop an easily hand-held device to be used as a warm respiratory inhalant of non-tobacco fluids. Quoting from his patent application:

The present invention relates to a smokeless nontobacco cigarette and has for an object to provide a safe and harmless means for and method of smoking by replacing burning tobacco and paper with heated, moist, flavored air; or by inhaling warm medication into the lungs in case of a respiratory ailment under direction of a physician. Another object of the invention is to provide an article of manufacture resembling a cigarette by which air may be drawn through a porous substance of a cartridge which has been moistened with a chemically harmless flavoring preparation, combining moisture and taste following which the moist and flavored air passes through a section of the device heated by a suitable heating element so that warm, moist and flavored air is drawn into the mouth and if desired into the lungs of the user.

A further object of the invention is to provide a smokeless non-tobacco cigarette in which provision is made for circulating the fluid around the heating element in a turbulent manner to suitably raise the temperature of the inhalant mixture, with the purpose that the temperature of the flavored air may approximate that of cigarette smoke.

<http://www.google.com/patents/US3200819>

Watch this video once you have read the history of tobacco and e-cig and add info to your star.

<https://www.youtube.com/watch?v=VHqa1dRMsxE>



**Use this page to complete your final model!**  
**Name:** \_\_\_\_\_ **Block:** \_\_\_\_\_

Use your reflection of the initial models and mid model to help you think about improvements you will make to your final model.

**Final model:** Your friend has been vaping nicotine containing e-cigarettes for a while now. When she first started vaping, she had more energy, a smaller appetite, and more focus, and she generally felt happier. Now that she has vaped nicotine containing e-cigarettes for a while, she realizes that she feels tired, irritable and unfocused if she doesn't vape about the same amount every day. She also finds that if she vapes higher amounts of nicotine than normal, she feels her heart beat faster and starts to sweat. Draw a model to explain what is occurring within your friend's body systems that require her to have the same amount of nicotine in the e-cigarette to feel normal.

You can model your ideas in any way that makes sense to you such as words, drawings, symbols, numbers, and analogies. Underneath your representation, explain your model in words (sentences or bullet points)

**Your model must show these things:**

- Homeostasis/ Feedback loops
- Organ systems (endocrine, respiratory, nervous, circulatory)
- Diffusion
- How nicotine gets through the body
- Neurotransmitter at the synapse

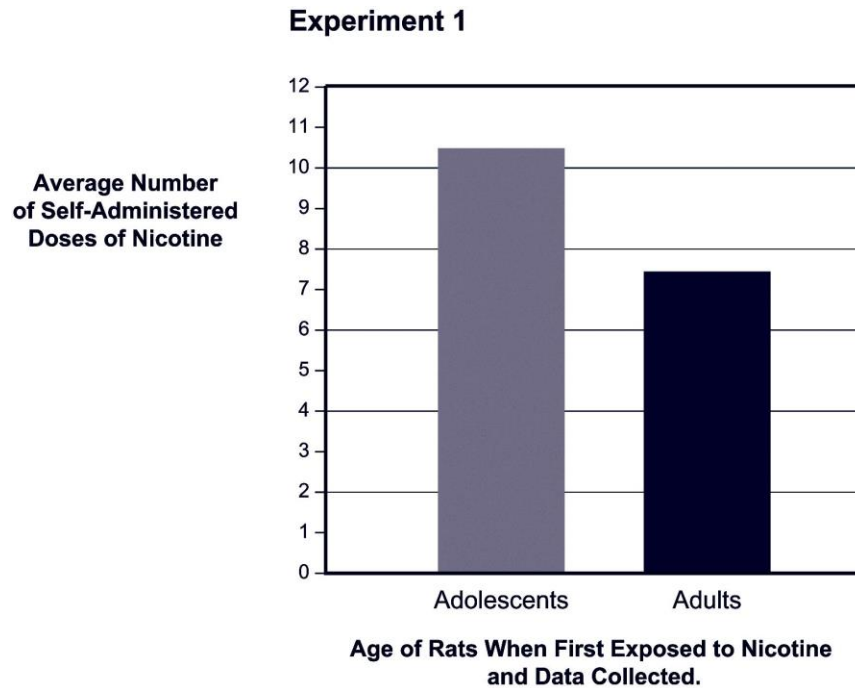




# Analyzing Scientific Data: Experiment 1

---

The following graph shows the average number of times the rats pressed the lever to get a dose of nicotine. Use the information in the graph to answer the questions that follow.



1. What is the difference between the two groups of rats in this experiment?

---

2. What is the question that the scientists are trying to answer using these two groups?

---

3. What is the average number of self-administered doses in the adolescent group?

---

4. What is the average number of self-administered doses in the adult group?

---

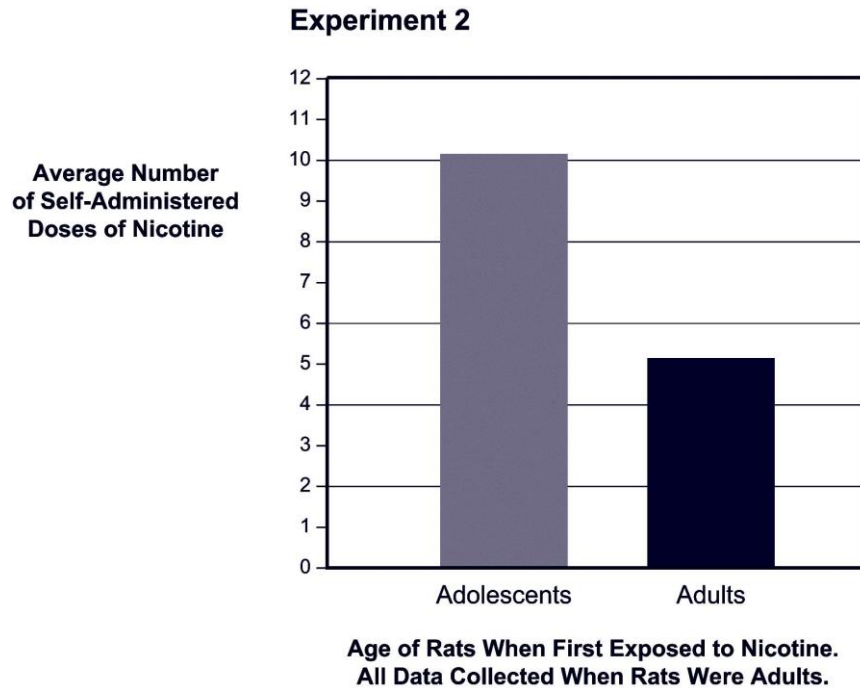
5. What conclusion can you make from these data?

---

# Analyzing Scientific Data: Experiment 2

---

The following graph shows the average number of times the rats pressed the lever to get a dose of nicotine. Use the information in the graph to answer the questions that follow.



1. What is the difference between the two groups of rats in this experiment?

---

2. What is the question that the scientists are trying to answer using these two groups?

---

3. What is the average number of self-administered doses in the adolescent group?

---

4. What is the average number of self-administered doses in the adult group?

---

5. What conclusion can you make from these data?

---

## *Drawing Conclusions from the Data*

---

If the response of humans to drugs is similar to that of the rats, which of these statements would you predict to be correct?

1. The effect of drugs on an adolescent is not different than on an adult.
2. Using drugs during adolescence can affect a person's response to drugs later in life.
3. Using nicotine as an adolescent is harmful because nicotine can cause health problems later in life.
4. The response of an adolescent to drugs may be different from that of an adult.
5. Using nicotine as an adolescent can lead to the use of other drugs.
6. Scientists cannot predict anything about the effects of drugs on humans from studying rats.

Note: Adapted from "Drug Abuse, Addiction, and the Adolescent Brain" – BSCS (2008)

**Name:**

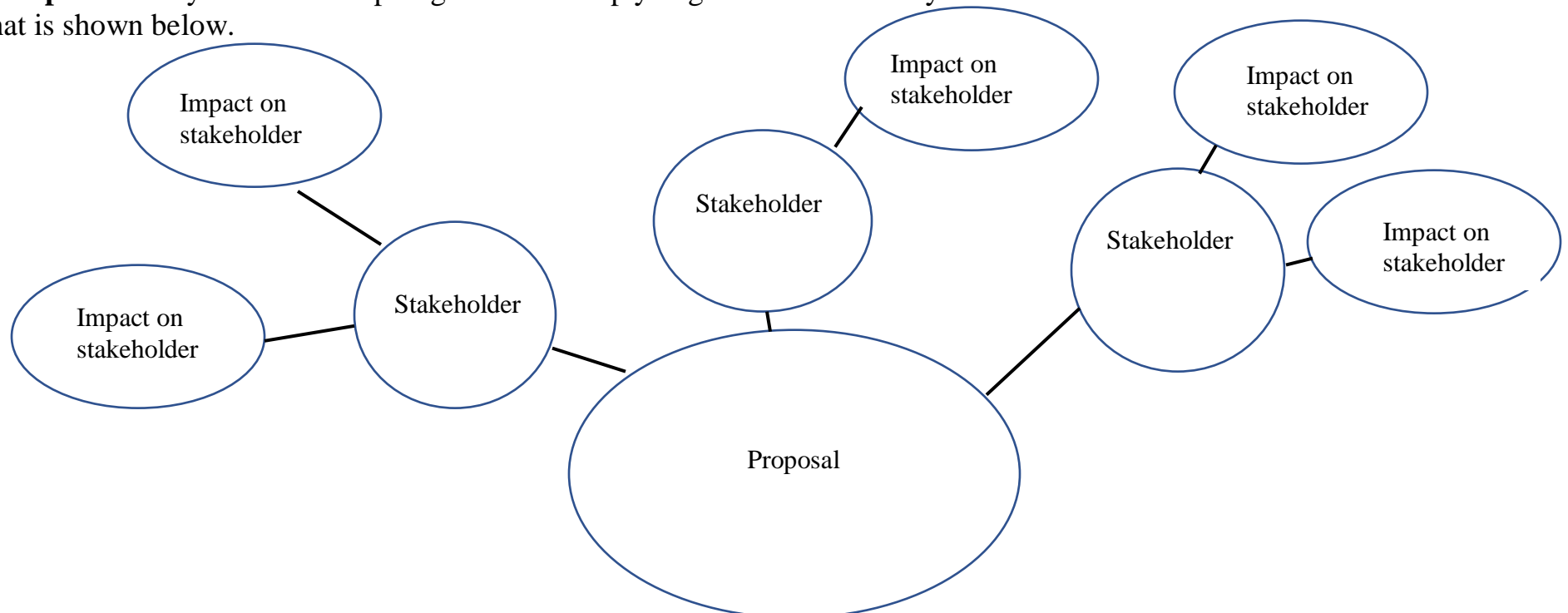
**Block:**

## **Causal map: “How should e-cigarettes be regulated?”**

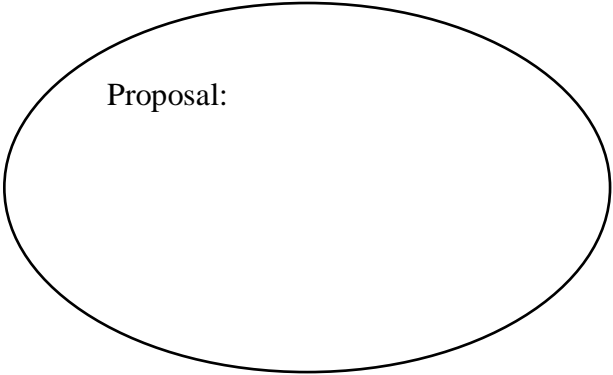
The point of this activity is to get you thinking about how your proposal to how e-cigs should be regulated can have a positive or negative impact on many different stockholders. It is important that you address both the positive and negative impacts of your proposal so that you can better understand how decisions we make impact society. This activity will help you when working on your final project for this unit.

**Directions:** On the back of this page write how you propose how you think e-cigs should be regulated. Branching out around that middle circle write *all* the people that will be affected by your proposed regulation (both positively and negatively). Once you have all the stockholder that will be impacted draw additional bubbles branching off the stockholder bubble’s explaining how they will be impacted.

**Example** of how your causal map might look to help you get started. **NOTE** you should have more additional bubbles than what is shown below.



On the back side of this sheet start making your causal maps of your proposal with possible impacts.



Proposal:

**NAME:**

**BLOCK:**

# **How should vaping be regulated?**

## **Vaping culminating project**

**Task:** It is your job to create a product that teaches your peers about vaping and the possible widespread impacts of regulation that you are proposing. Your project can be in the form of a **pamphlet, Video PSA, Poster, Claim evidence reasoning, PowerPoint, Prezi or Newspaper article** on “How Should Vaping be Regulated”.

Here are some resources to help you organize your final product:

[Template 1](#) (brochure)  
[Making a great brochure](#)  
[How to write a brochure](#)  
[Newspaper template](#)  
[How to write a newspaper article](#)  
[Newspaper template 2](#)  
[PSA template](#)  
[PSA template 2](#)  
Health [Poster samples/ideas](#)

The product should include:

- A description of vaping and proposed regulation (How is your policy informed by science?)
  - Full credit must include:
    - Evidence based arguments from the science point of the star
    - Evidence from at least 3 other points of the star
- An explanation of the widespread impact of your proposed regulation (Causal Map)
  - With and in depth explanation on the impact of each stockholder involved

**Use the attached rubric to get an idea on how you will be graded and what is expected from your project 😊**

## Scoring Criteria

| Criteria   | Exceeds Expectations (Advanced)  | Meets Expectations (Proficient)  | Nearly Meets Expectations (Basic)   | Beginning to meet Expectations (Below Basic)                           |
|--|--|--|---|--|
| <p><b>What is vaping:</b> A description of vaping and misconceptions related to vaping.</p>  | <p>Meets prior components and includes <u>more than one</u> misconception.</p>   | <p>Includes a description of vaping and a misconception related to vaping.</p>                                 | <p>Product may not include a complete description and/or misconception of vaping.</p>   | <p>Product may be missing more than one of the major components.</p>   |
| <p><b>What is your proposal to “how should e-cigarettes be regulated” with supporting evidence to your stance:</b> Use the star chart to state facts that support your proposal.</p> | <p>Meets prior components and includes your stance on vaping and why you take that stance <u>using more than 3 pieces of evidence.</u></p> | <p>Includes your stance on vaping and why you take that stance <u>using at least 3 pieces of evidence.</u></p> | <p>Includes your stance on vaping and includes at least 2 pieces of evidence supporting your stance.</p>                        | <p>Includes a stance but is not supported by evidence.</p>             |
| <p><b>Impacts of your proposal:</b> Statement of your proposal for regulation and impact of regulation</p>   | <p>Meets prior components and includes impact of regulation from <u>multiple perspectives (in depth)</u></p>                               | <p>Includes a description of the proposal and includes <u>one impact of the regulation (in depth)</u></p>      | <p>Description of the proposal covers some of the details of the proposal and may be missing the impacts if it were passed.</p> | <p>Description lacks major details and/or impacts of the proposal.</p> |

Name \_\_\_\_\_ Date \_\_\_\_\_ Block \_\_\_\_\_

## Bio Unit 3 Study Guide

1. What does mean when something is semi/permeable?
2. How does the balloon activity we did in class relate to a cell's semipermeable membrane?
3. What is a receptor protein?
4. Draw how nicotine interacts with a receptor protein.
5. What is diffusion? What molecules use diffusion?
6. In passive transport (diffusion), materials move from \_\_\_\_\_ concentration to \_\_\_\_\_ concentration.
7. What kinds of materials are moved in and out of the cell during passive transport (diffusion)?
8. In active transport, materials move from \_\_\_\_\_ concentration to \_\_\_\_\_ concentration.
9. How is active transport different than passive transport (think about what molecules are



moving, energy requirements, and concentration direction of movement)?

10. What kinds of materials are moved in and out of the cell during active transport?

11. Define homeostasis.

12. Define what a **positive** feedback loop is and give an example.

13. Define what a **negative** feedback loop is and give an example.

14. What is the effect of nicotine on the nervous system?

15. What is the effect of nicotine on the endocrine system?

15. What is the effect of nicotine on the cardiovascular system?

16. Insulin is a chemical released by your pancreas to return your blood sugar levels to a normal state. What type of feedback loop does insulin have on your body?

17. List the levels of biological organization, start with the smallest level – the atom.

18. Living things use what atom (element) as the basis of life?

19. What are 2 reasons that Carbon makes an excellent basic element for life?

20. List the 6 elements most commonly found in living things.

21. Fill in the table about macromolecules. Make sure that you can identify an example and function of each macromolecule when given a list!!

| Macromolecule | Example | Function |
|---------------|---------|----------|
| Carbohydrate  |         |          |
| Lipid         |         |          |
| Protein       |         |          |
| Nucleic Acid  |         |          |