Lesson Plan Chemistry

Teacher: Pedro Blaya

Subject: Chemistry

Title : The gas behaivior	**Time : two class period (55' each)**
Subject *: Chemistry*	
Aim: Understand how the gas do when change variables like temperature, pressure and volume	
Key CS elements: decomposition, pattern recognition, abstraction, algorithm design	
Age group : 2nd ESO, 13-14 years old.	
Learning situations: classrooms • Apply computational thinking skills to design and implement a method for resolving problems related with gasses.	**Activity type :** • Solve problems related to gasses. Varying the initial conditions of pressure, temperature and volume
Resources : Calculator, computer with internet conexion.	

Learning development:

1. Decomposing: (25')

Find the laws of the gasses in the simulation of this web:
https://phet.colorado.edu/sims/html/gas-properties/latest/gas-properties_all.html?locale=es

The students have to find how the gasses behave changing variables like temperature while pressure is constant. Charl's law

If the temperature is constant, Boyle's law.
and last one, Gay lussac's law

2. Pattern recognition: (30')

Pattern recognition in this context involves identifying recurring relationships between the variables of temperature, pressure, and volume when they change in different scenarios.

The students have to find the relationship between the variables if one of them is constant.

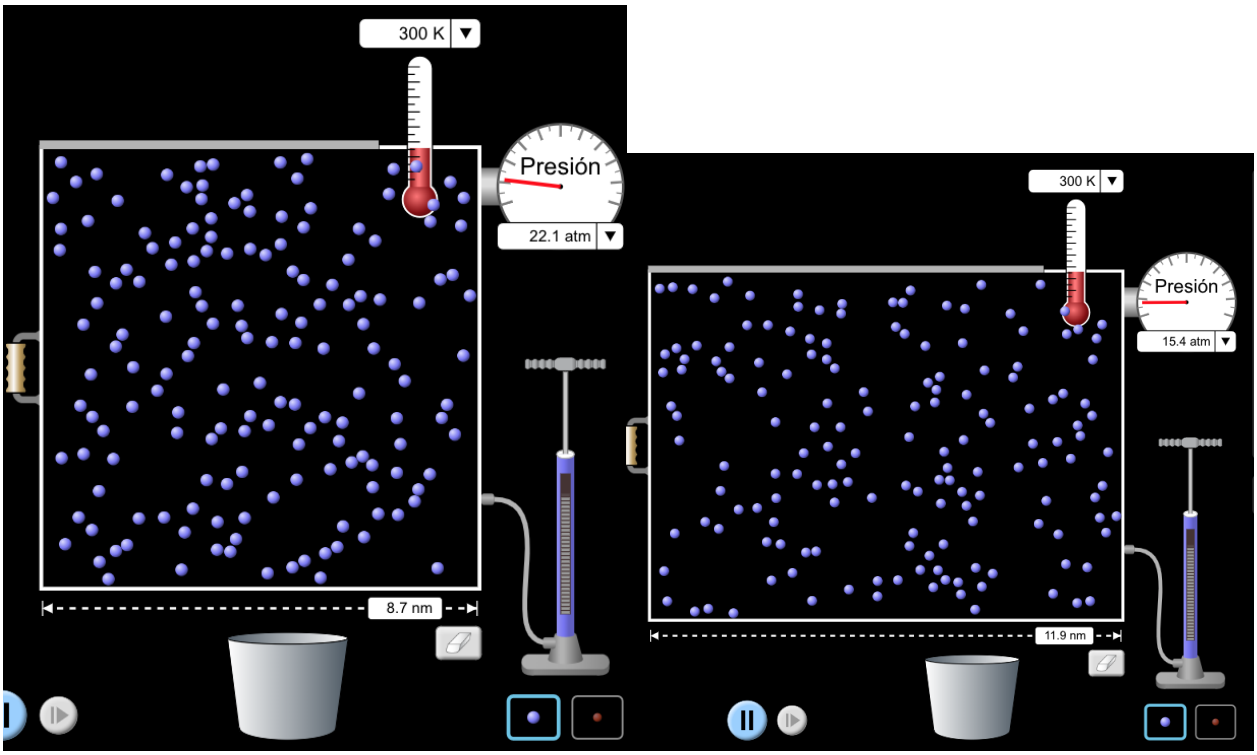
- While temperature is constant, volume and pressure are inversely proportional
- While pressure is constant, volume and temperature are directly proportional
- while volume is constant, temperature and pressure are directly proportional

3. Abstraction:

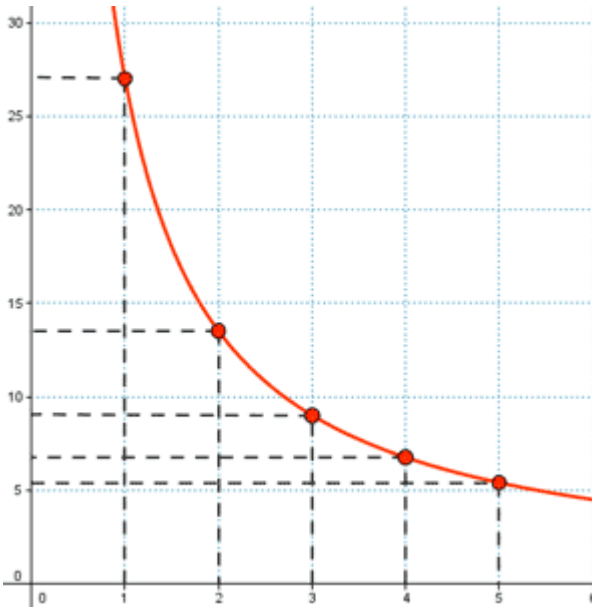
Abstraction involves simplifying the complex behavior of gases by focusing on the core relationships between **temperature**, **pressure**, and **volume** without being overwhelmed by the minute details of molecular interactions.

Graphing and Interpretation (20 minutes):

- Assist students in creating graphs of their data using graphing software or a spreadsheet program.
- Instruct them to interpret their graphs and draw conclusions about the accuracy of their measurements



the student have to draw the function P vs V. write down in a table the data and make de function. must be like:



the students have to make the other two simulations.

4. Algorithm design:

The algorithm design for exploring the relationships between gas variables (temperature, pressure, and volume) provides a structured, step-by-step approach to understanding how changes in one variable affect the others**.**

Step 1: Introduce Variables

- Define the three main variables: temperature (T), pressure (P), and volume (V).
- Explain that we will analyze how changing one variable affects the others while keeping the third constant.

Step 2: Investigate Boyle's Law (Pressure-Volume Relationship)

- Input: Keep temperature constant, change volume.
- Process: Measure the pressure as the volume of gas changes.
- Output: Record the changes in pressure.
- Conclusion: Identify that pressure increases as volume decreases (and vice versa), demonstrating an inverse relationship.

Step 3: Investigate Charles's Law (Temperature-Volume Relationship)

- Input: Keep pressure constant, change temperature.
- Process: Heat the gas and measure how the volume changes as temperature increases.
- Output: Record the changes in volume.
- Conclusion: Identify that volume increases as temperature increases, demonstrating a direct relationship.

Step 4: Investigate Gay-Lussac's Law (Temperature-Pressure Relationship)

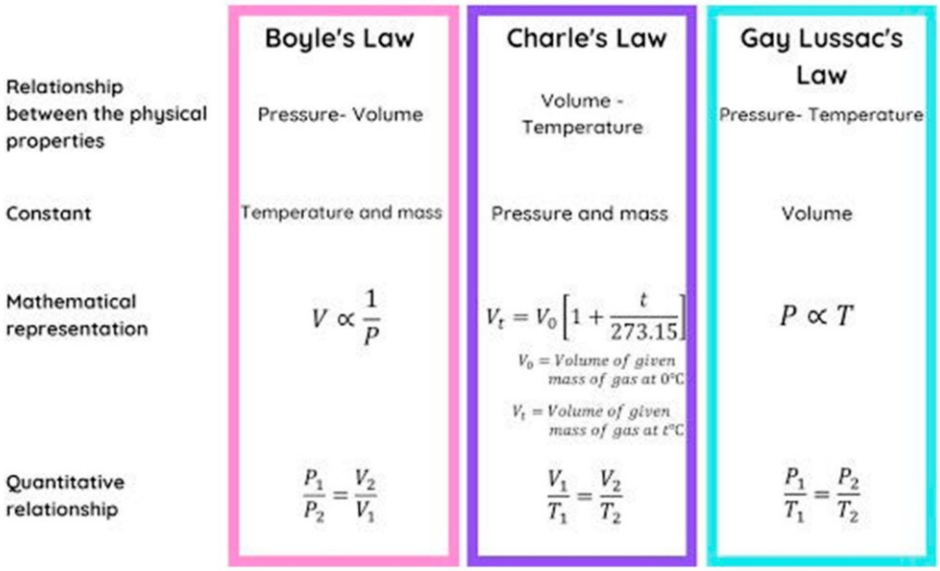
- Input: Keep volume constant, change temperature.
- Process: Heat the gas and measure how the pressure changes as temperature increases.
- Output: Record the changes in pressure.
- Conclusion: Identify that pressure increases as temperature increases, demonstrating a direct relationship.

Step 5: Analyze Results

- Compare the results from all experiments to recognize the established gas laws.
- Predict future outcomes based on these observed patterns.

Step 6: Apply the Algorithm to Real-World Problems

- Use the established relationships (Boyle's, Charles's, and Gay-Lussac's laws) to solve practical problems or scenarios involving gas behavior (e.g., inflating a balloon, tire pressure changes with temperature, etc.).



Data	***Select the Law***	***Resolve***
Very important: are the variables in the same unity? Changed if they are not.	Boyle´s Law Charle´s Law Gay Lussac´s Law	Write the equation: Resolve:
Result: *Don forget write the unity*		

Assessment: