Applied Physical Science
Matter

Course Objectives

1. Define matter.
2. Describe the physical characteristics of the 3 states of matter.
3. Define pressure for solids, liquids and gases.
4. Describe the relationship between pressure, temperature and volume for a gas.
5. Identify common units of pressure.
6. Distinguish between absolute pressure and gauge pressure.
7. Define fluid.
8. Identify common units of flow rate.
9. Describe the relationship between flow velocity and area.
10. Describe the relationship between flow velocity and pressure.
11. Describe Pascal's Principle and give examples of how it is applied.
12. Define material balance in a batch and a continuous process.
13. Apply the concept of conservation of matter to determine if a process system is balanced.

Key Terms (Define the following)

matter - _____

density - _____

pressure - _____

viscocity - _____

atmospheric pressure - _____

absolute pressure - _____

absolute pressure - _____

guage pressure - _____

laminar flow - _____

turbulent flow - _____

Bernoulli's Principle - _____

Pascal's Principle - _____

material balancing - _____

centrifugal force - _____

Principles

Boyle's Law

$P_1V_1 = P_2V_2$ (@ constant temperature)

- P_1 - initial volume
- V_1 - initial pressure
- P_2 - final pressure
- V_2 - final volume

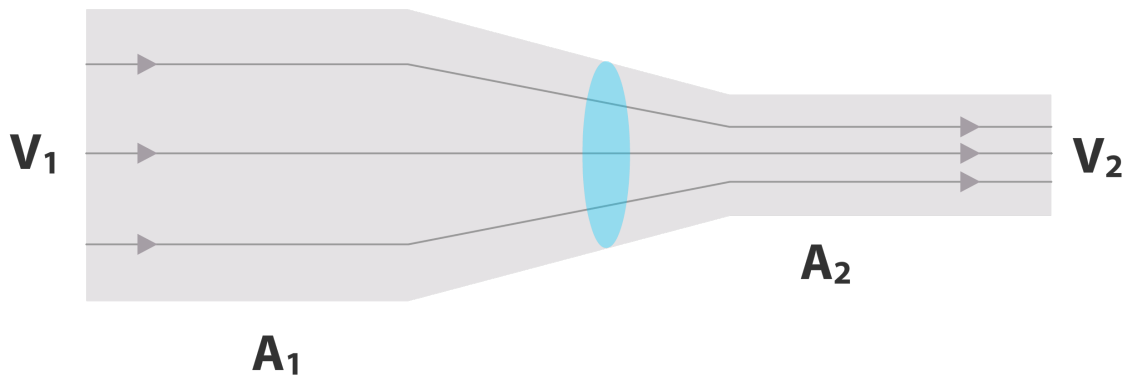
Charles's Law

$$\frac{V_1}{T_1} = \frac{V_2}{T_2}$$ (@ constant pressure)

- V_1 - initial volume
- T_1 - initial temperature
- V_2 - final volume
- T_2 - final temperature

Bernoulli's Principle

When velocity of a flow increases, pressure decreases.



Questions

1. Define pressure for
   solids - _____
   liquids - _____
   gases - _____

2. Describe the relationship between volume and pressure in a gas.

   _____
   _____

3. Describe the relationship between temperature and pressure in a gas.

   _____
   _____
   _____

4. Describe the relationship between the area of a container such as a pipe and the velocity of fluid

   _____
   _____
   _____

5. When velocity of a fluid flow increases, pressure _____ .

6. Give one example of an application of Pascal's Principle.

   _____

7. How might understanding Material Balance help an operator control a system?

   _____
   _____
   _____