

GASSES

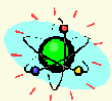
PhET Gas Properties Simulation

<http://phet.colorado.edu/en/simulation/gas-properties>



Jun 3-3:07 PM

Remember: (do not need to copy)

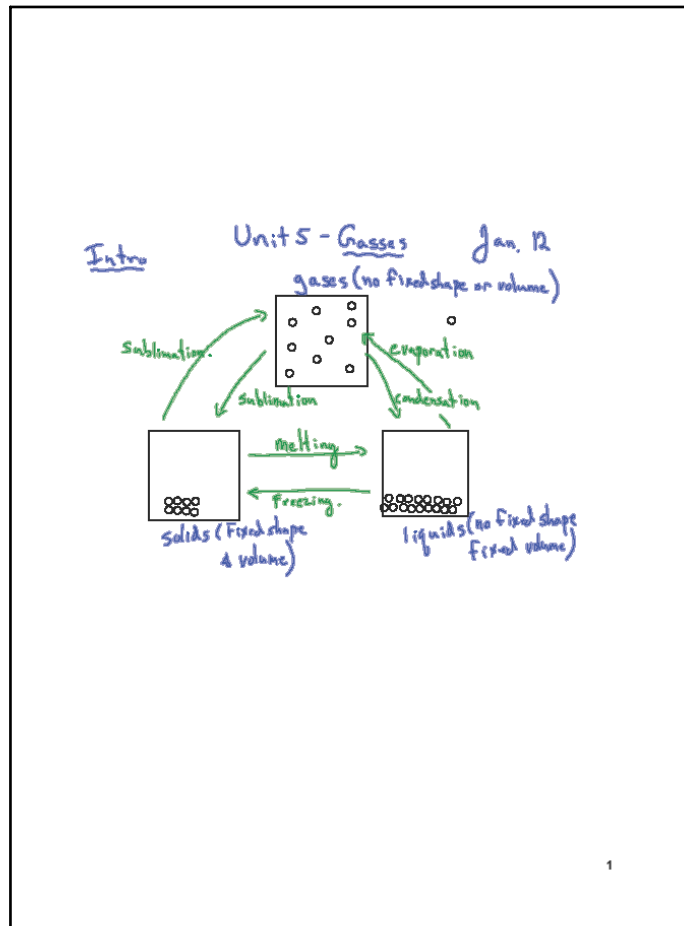


The Particle Theory of Matter

1. All matter is made up of tiny particles
2. All particles of one substance are the same. Different substances are made of different particles.
3. The spaces between the particles are large compared to the sizes of the particles themselves.
4. The particles are always moving. The more energy that particles have, the faster they move.
5. There are attracting forces among the particles. These forces are stronger when the particles are closer together.

Complete BLM 11-1 Molecules,
Changes of State and Energy

May 27-3:10 PM



Jun 4-11:17 AM

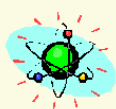
Types of Molecular Motion

Kinetic energy, the energy of motion, can be absorbed by molecules in three different ways as follows:

- 1. Translational motion** in which the entire molecule moves from place to place. *gasses*
- 2. Rotational motion** in which the molecule spins around like a propellar. *gasses + liquids*
- 3. Vibrational motion** in which the atoms in a molecule or the molecules in a solid vibrate back and forth about the same fixed location *gasses + liquids + Solids*

Unit 4: Gases and Atmospheric Chemistry

May 27-3:10 PM



Kinetic Molecular Theory of Gases

1. All matter is made up of **tiny particles**.
2. The particles are in constant **motion**. The higher the temperature, the more energy of motion (kinetic energy).
3. There are forces of attraction and repulsion between particles. The closer they approach each other, the stronger this attraction becomes. When particles come into contact, they repel each other strongly.
4. In the gaseous state, particles are far apart. The volume of the particles is very small compared to the volume that the gas occupies (**assume zero volume**).

Unit 4: Gases and Atmospheric Chemistry

May 27-3:10 PM



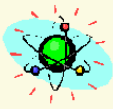
Kinetic Molecular Theory of Gases

5. The forces of attraction between gas particles are very small.
6. Particles are elastic. No energy is released or absorbed upon collision. Total energy before collision = total energy after collision. *It is transferred.*

Note: Gases exert pressure on the walls of their container as they collide with ~~walls of the container~~ walls. The faster or the harder the collision (with the same number of particles) leads to higher pressure. The more often the collisions occur (more particles or particles move faster) leads to higher pressure.

Unit 4: Gases and Atmospheric Chemistry

May 27-3:10 PM



Ideal Gas

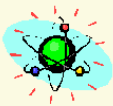
- The ideal gas is made up of tiny particles that occupy zero volume and have no forces of attraction between the particles.
- Most gases have some forces of attraction and occupy some volume. We neglect these forces and volume for our study of gases. We will, therefore, state the laws as applying to all gases.

Read pages 414-423.

Answer questions ~~1,2,3~~ on page 423. #1,2,4, 6,7

Unit 4: Gases and Atmospheric Chemistry

May 27-3:10 PM



Pressure

Pressure is force per unit area.

Running Shoes vs. Heels

m } F m } F
 g g

$A = \text{bigger}$ $A = \text{smaller}$

$P = 21 \text{ kPa}$ $P = 5000 \text{ kPa}$

Since atmospheric pressure is approximately 100kPa

Standard atmospheric pressure is 101.3kPa

Unit 4: Gases and Atmospheric Chemistry

mass x gravity
kg 9.8 N/kg

$$P = \frac{F}{A}$$

$$= \frac{N}{m^2}$$

= Pascal (Pa)

May 27-3:10 PM



Converting Units of Pressure

Use the following conversion units to change gas pressure units in BLM 11-2:

$$101.3 \text{ kPa} = 760 \text{ mm Hg} = 760.0 \text{ torr} = 1.00 \text{ atm} = 14.7 \text{ p.s.i.}$$

$$100.0 \text{ kPa} = 1.00 \text{ bar} = 750.0 \text{ mm Hg} = 14.5 \text{ p.s.i.}$$

(You will be given these conversions on a quiz or test.)

Reference Pages: read pages 424-435. Answer questions 1-6 on page 435.

$$20.0 \text{ kPa} \times \frac{760 \text{ mm Hg}}{101.3 \text{ kPa}} = \text{_____ mm Hg}$$

Unit 4: Gases and Atmospheric Chemistry

$$0.83 \text{ atm} \frac{101.3 \text{ kPa}}{1.00 \text{ atm}} = \text{_____ kPa}$$

May 27-3:10 PM