



Annotated Lecture Slides for *States of Matter Basics*

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COURSE:

Introductory/Preparatory Chemistry

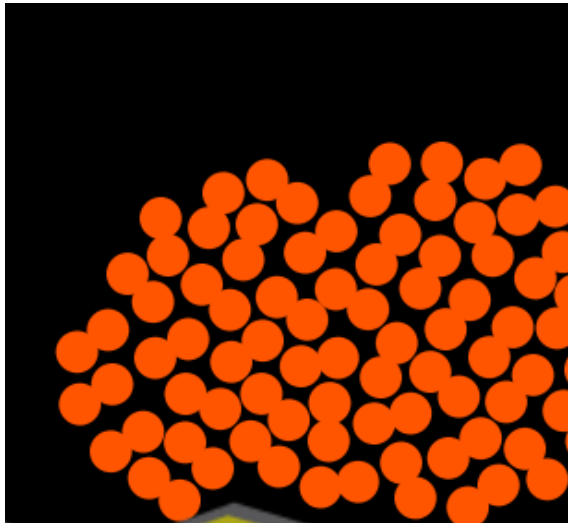
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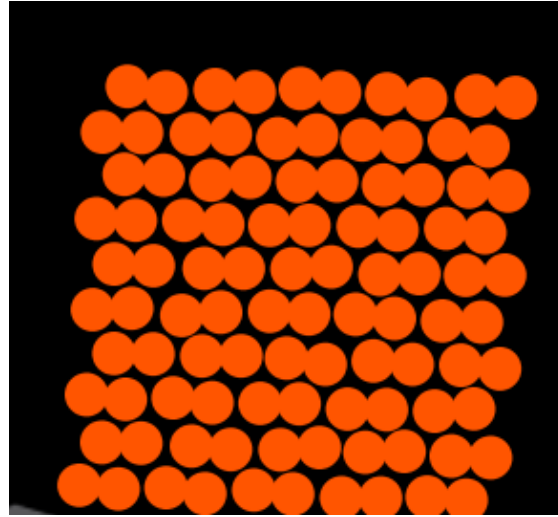
Learning goals for *States of Matter*

- Identify the familiar states of matter using atomic and molecular pictures .
- Interpret the unusual properties of water using atomic and molecular pictures.
- Predict how varying the temperature changes the behavior of the atoms or molecules.

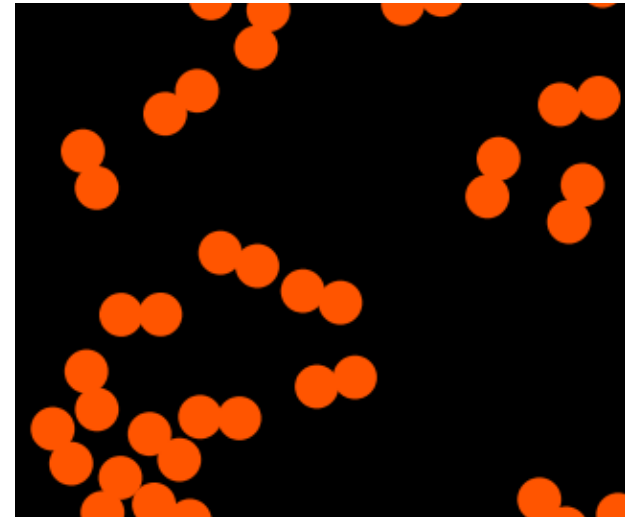
Which picture best describes oxygen gas?



a.

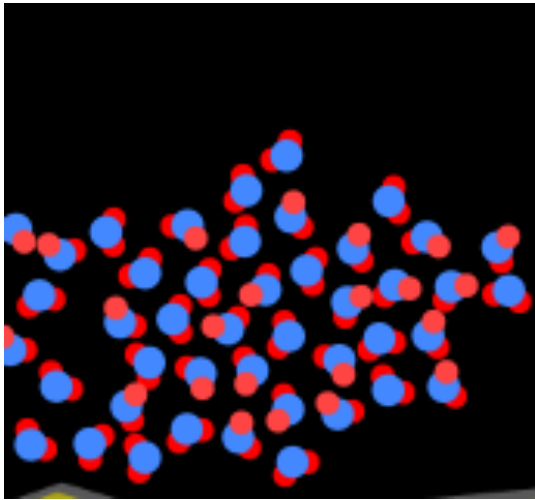


b.

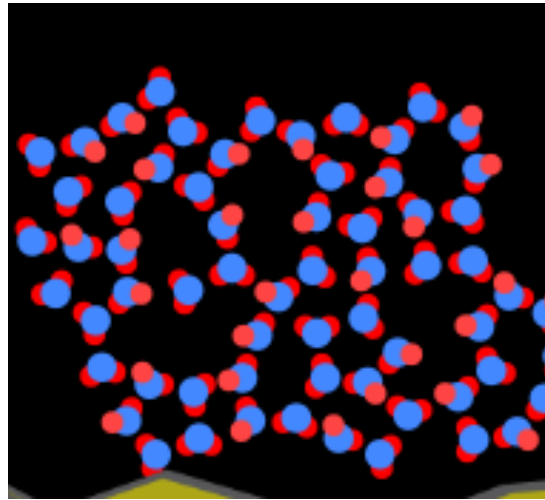


c.

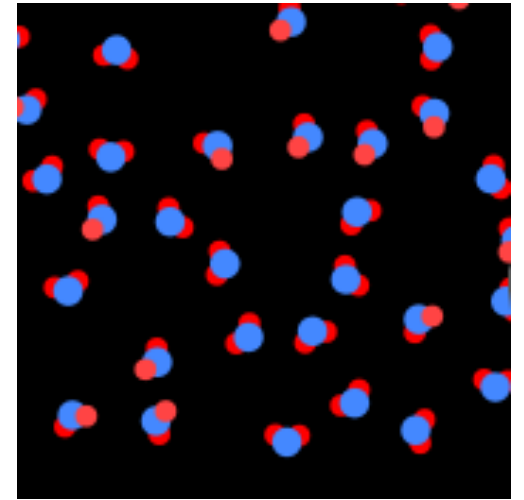
Which is most likely liquid water?



a.



b.



c.

What happens if you add energy using the heater?



- a. The atoms get larger.
- b. The atoms move faster.
- c. Both a. and b.
- d. Neither a. nor b.

What happens if you continue to add energy using the heater?



- a. No change other than all atoms speed up
- b. More atoms would condense
- c. More atoms would evaporate

States of Matter

- The state of matter always depends on the **temperature** and **pressure** under which the observation is made.
- For example:
 - Oxygen, a gas at room temperature, can be liquefied and even frozen (solidified) at very low temps.
 - Oxygen gas can also be liquefied at room temperature by increasing the pressure.
 - Iron, a hard solid at room temp, can be vaporized (made gaseous) above 3000°C.

Summary: States of Matter

State	Symbol	Definite Shape?	Definite Volume?	Example
Solid	s	yes	yes	Fe (s)
Liquid	l	no	yes	H ₂ O (l)
Gas	g	no	no	O ₂ (g)

Solutions in water are called aqueous and has the symbol “aq.”