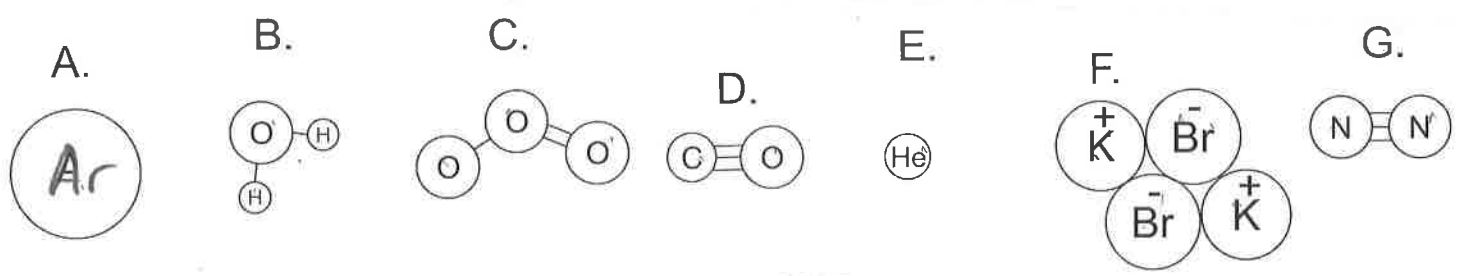
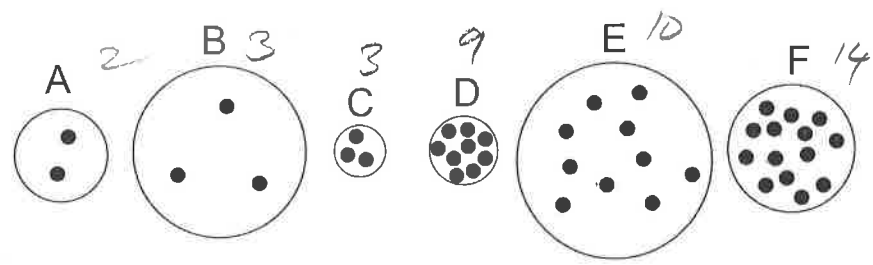


1. Define mass. Amount of stuff in an object
2. Define volume. Size
3. Define density. Crowdedness
4. Define weight. Force of Gravity (more mass = more weight)

The objects on the right are mostly empty space. The circle is the edge of each object. The dots inside represent all of each object's mass. The empty space inside the objects has no air or mass of any kind.

5. Which object has the most weight? F
6. Which object has the least weight? A
7. Which object has the most volume? E
8. Which object has the least volume? C
9. Which object is most dense? D
10. Which object is least dense? B
11. Which object has the most mass? F
12. Which object has the least mass? A
13. Which object is most likely to sink? D
14. Which object is most likely to float? B



15. How many atoms are shown in the diagrams above? 16
16. How many elements are shown in the diagrams above? Ar, O, H, C, He, K, Br, N
17. How many ions are shown in the diagrams above? 8
18. Which lettered items are compounds? 4
19. Which lettered items are molecules? B, C, D, G

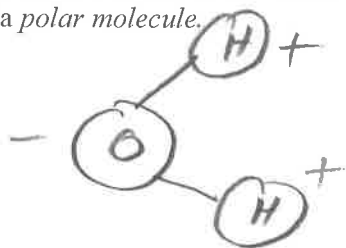
For #20-35, fill in the blanks.

20. Kinetic Energy: Energy of motion.
21. Temperature A measure of the average kinetic energy of the particles (atoms and/or molecules) in a substance. This is higher when the particles are faster.
22. Thermal Energy The total of all of the kinetic energies of the particles (atoms and/or molecules) in a substance.
23. Liquid This is the state of matter in which molecules (or individual atoms) are touching one another, but they are sliding, bumping, moving around and changing positions.
24. Gas This is the state of matter in which molecules (or individual atoms) are flying free, but they occasionally bump into one another.
25. Solid This is the state of matter in which molecules (or individual atoms) are locked in place, touching one another, and vibrating.
26. conduction Heat transfer by touch
27. radiation Heat transfer by electromagnetic waves
28. convection Heat transfer by warm currents flowing from one place to another
29. Condensation The process of turning from a gas to a liquid
30. Melting The process of turning from a solid to a liquid
31. Evaporation The process of turning from a liquid to a gas
32. Freezing The process of turning from a liquid to a solid
33. Absolute zero This is the temperature at which all molecular motion stops.
34. Heat This is any transfer of thermal energy from a warmer object to a colder object
35. Polar molecule This describes a molecule that has a positive end and a negative end.

36. An iceberg has more thermal energy than a hot cup of coffee. Explain why.

An iceberg has many more molecules, so it has a greater total amount of energy.

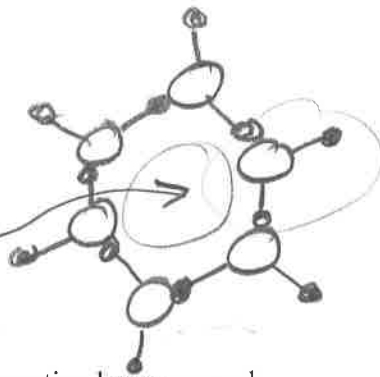
37. Draw one water molecule. Label the atoms. Show and explain why water is called a polar molecule.



Water is a polar molecule because it has a positive end and a negative end.

38. Draw 6 water molecules as they arrange themselves in their solid form. Use your diagram to explain why ice is less dense than liquid water.

Empty space makes Ice less dense



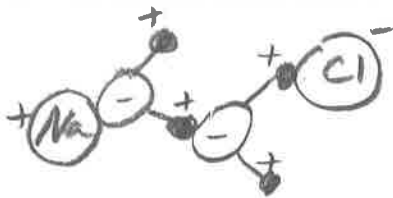
39. Humans sweat in order to stay cool. Explain how sweating keeps us cool.

- Sweat evaporates
- Sweat needs energy to evaporate.
- Sweat takes this energy from us.

40. Explain why air expands when you heat it up.

- Heating speeds up air molecules
- Faster molecules push outward

41. The chemical formula for table salt is  $\text{Na}^+\text{Cl}^-$ . Draw some table salt ions and some water molecules, and show how the salt ions attach themselves to water molecules.



42. What causes the air pressure we experience every day?

Weight of air above us.

43. What is the approximate strength of the air pressure in this room? 14.7 psi

44. Where is air pressure stronger, at higher altitudes or at lower altitudes? Explain why.

Lower. There is more air above us.

45. Explain why your ears hurt when you rise quickly to a higher altitude.

When you rise, the air pressure outside your head becomes weaker than pressure in your head, so your eardrums stretch outward.

46. When you squeeze a sealed plastic bottle containing smoke, air, and a little bit of water...

a. What happens to the temperature of the air in the bottle?

Heats up

b. Does water in the bottle condense or evaporate? Explain why.

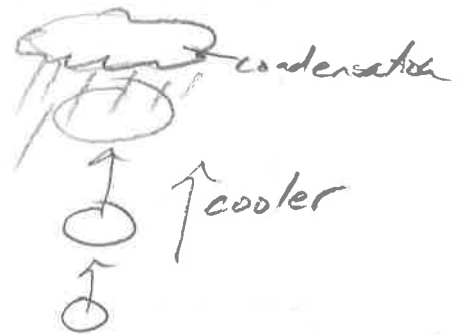
It Evaporates, because heating makes water evaporate.

c. Is the air in the bottle clear when you squeeze, or is it cloudy?

Clear. Water is turning to a gas, so it is invisible.

47. When you make a cloud in a bottle, why is it necessary to add smoke?

Water needs a surface to condense on.



48. A blob of air rises up into the sky.

a. What happens to the volume of the air as it rises?

Expands

b. Explain why the volume of the air changes in this way.

There is less pressure around it.

c. If there is water in the rising air, is that water more likely to evaporate or condense as the ~~blob~~<sup>blob</sup> rises?

Condense.

d. Provide a reason for your answer to part c.

Air cools down when it expands.

e. Is this air in the ~~blob~~<sup>blob</sup> more likely to become clearer or cloudier?

49. When air sinks down from high in the sky, that air becomes clear, rather than cloudy. Explain why.

- Sinking air encounters more pressure
- Pressure squeezes the air
- Air heats up
- Water in the air evaporates.