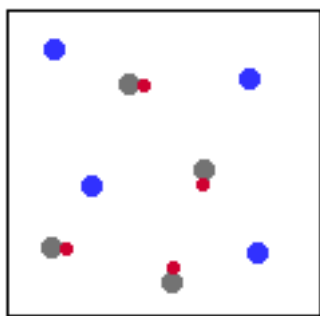
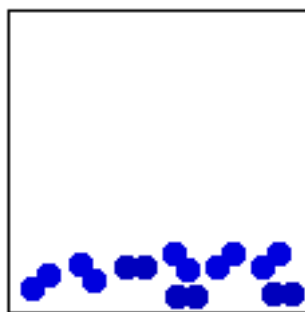


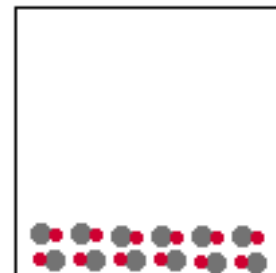
1. In each box below draw the atomic level diagram of the system as described below the box.



A gaseous solution of an element and a compound.



Liquid nitrogen.



A solid compound.

2. Would you expect the black ink in a 'felt' type pen to be a pure substance? Briefly describe an experiment to support your answer.

The ink of a felt type pen is not a pure substance. This was shown in laboratory when a strip of chromatography paper was dotted with a small spot of the ink from a felt pen. The strip of chromatography paper was placed into a Erlenmeyer flask which contained some liquid water. The strip height was adjusted so the bottom of the strip was just touching the water allowing the water to spread up the strip of paper. As the water traveled up the paper it separated the different colors contained in the black ink.

3. In a container of a gas with a fixed volume no gas can escape or enter the container. If the gas in the container is cooled to a low enough temperature it condenses and forms a liquid. Briefly, explain what is happening as the gas is cooled, and why condensation occurs.

As a gas is cooled the energy of the gas particles decreases. This causes the speed of the particles to slow down. In order for the gas to condense to a liquid (condensation) the particles must slow down enough that the attractions between particles causes the gas particles to aggregate. When the aggregates become large enough they condense forming a liquid.

4. Give an example of a homogeneous mixture and a heterogeneous mixture. Describe the difference between a homogeneous mixture and a heterogeneous mixture.

Sodium chloride dissolved in water forms a nice homogeneous mixture (solution). Toluene and water form a heterogeneous mixture. A homogeneous mixture is uniform in appearance, composition and properties. In the case of the sodium chloride solution it will look just like water, clear and colorless. If we leave the solution on the shelf for a long time the composition will not change, assuming water does not evaporate. The composition, appearance and properties of a heterogeneous mixture are not uniform. In class a heterogeneous mixture of toluene and water showed two distinct liquid layers, one was toluene the other water. So the composition and appearance was not uniform. Clearly the properties of the mixture would be different if the mixture was sampled from the top and then from the bottom.