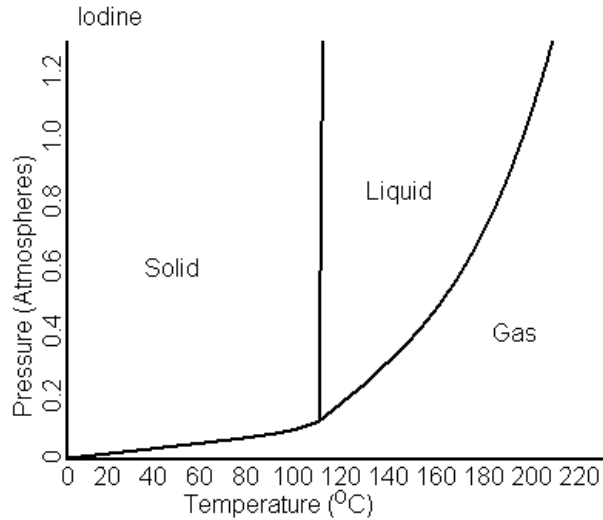


WUCT: Chemistry of Forensics Sample Question

1. You've arrived at the scene of a robbery. Last night, someone broke into the pizzeria and took all the money from the safe. Unfortunately, the owner of the pizzeria forgot to replace her old security cameras, so there was no footage recovered of the suspect. Investigating the scene of the crime, you must use your knowledge of chemistry to get some leads and find the culprit. As you enter the restaurant, you notice a trail of an unknown substance leading from the point of entry to the safe in the back of the restaurant. You take a sample of the mysterious powder and send it to the lab for some tests to determine its identity.
 - a. Paper chromatography is a common method of determining the identity of an unknown substance. To perform paper chromatography, an unknown sample is spotted onto a slip of chromatography paper along with known substances, and one end is placed in an organic solvent.
 - i. Substances that dissolve better in the chosen solvent will move further up the chromatography paper with the solvent front. If the chosen solvent is a mixture of ethyl acetate: butanol: acetic acid: water in 80:10:5:5 proportionality, what kinds of compounds will travel farthest on the chromatography paper?
 - ii. Rank the following substances by how they move on chromatography paper from farthest to the shortest distance: sucrose, graphite, and copper (II) sulfate.
 - iii. This is a simplified example to explain the concept of paper chromatography, but in the real world, investigators may already have an idea of what substances they find are. Why can chromatography still be useful in these cases?

- e. Another technique for finding fingerprints on porous and non-porous surfaces like paper and cardboard is iodine fuming.
- According to the following state diagram of Iodine, what state would you expect to find this element at standard temperature and pressure?



- Iodine fuming is performed by placing the sample in a closed container with solid iodine. The oils from the prints are quenched with iodine vapor to produce a temporary stain. By what process is the container saturated with iodine vapor?