

### Liquids and Solids Review Worksheet Answers

1. Which is the highest? **Rn** Which is the lowest? **He** Explain. **The higher the mass, the greater the London dispersion forces and the stronger the interaction.**
2.
  - a. **gas to solid through deposition, solid to liquid through melting.**
  - b. **solid to liquid through melting, then liquid to gas through boiling**
3.
  - a. **they are both nonpolar molecules so the only intermolecular force is dispersion forces and the  $\text{CBr}_4$  has more electrons than  $\text{CCl}_4$  so it is more polarizable and has stronger interactions. This is what leads to the increase in the normal boiling point.**
  - b. **The intermolecular forces in  $\text{HCl}$  are dipole-dipole forces. The intermolecular forces in  $\text{HF}$  are H-bonding which is much stronger than dipole-dipole forces. This is why it takes so much more energy to boil a sample of  $\text{HF}$ .**
  - c. **The  $\text{NH}_3$  is a polar molecule which exhibits hydrogen bonding between the molecules, which is a very strong intermolecular force. In  $\text{CH}_4$ , the intermolecular forces are weak dispersion forces because the molecule is nonpolar and is small.**
  - d. **Both molecules are nonpolar, but hexane has greater dispersion forces because it is greater in size (more electrons, more polarizable).**
  - e.  **$\text{Si}$  is a network solid and because of this, each  $\text{Si}$  atom is covalently bonded to other  $\text{Si}$  atoms in the solid phase. A lot of energy is required to break these covalent bonds, giving it a much higher melting point.  $\text{Cl}_2$  is a diatomic molecule that has only dispersion forces holding the molecules together in the solid phase. These interactions are much weaker than those in  $\text{Si}$  so they take much less energy to break.**
  - f. **Magnitude of charge is greater so the strength of attraction is greater in  $\text{MgO}$  so it takes more energy to break these interactions.**
4.
  - a. **LD**
  - b. **dipole-dipole**
  - c. **H-bonds**
5.
  - a. **LD**
  - b. **LD and dipole-dipole**
  - c. **H-bonds, LD and dipole-dipole**
6.
  - a. **LD**
  - b. **H-bonds and LD (and dipole-dipole)**
  - c. **dipole-dipole**
7. **Te. Because it has the largest electron density, so it can have the largest internal, temporary dipole created.**
8.  **$\text{CH}_4$ ,  $\text{SiH}_4$ ,  $\text{SiCl}_4$ ,  $\text{GeCl}_4$ ,  $\text{GeBr}_4$**
9. **Same order as given in #7**