

Metallic Bonds and Intermolecular Forces

Aim

- Examine bonds that are not chemical bonds

Notes

Metallic bonds

★ Formation

- in metals, electrons are easily lost or transferred
- the electrons in metallic substances are not always associated with any particular atom
- as a result, the particles of a metal are usually positive ions surrounded by mobile electrons to which they are attracted

★ Properties

- strong bonds result in high melting points
- mobile electrons result in luster, flexibility, and good conductivity

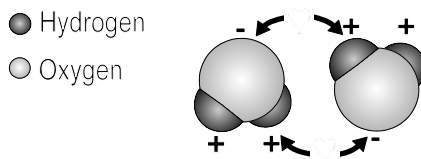
Intermolecular attractions - forces of attraction between particles that are not chemically bonded

★ Dipole-dipole attraction

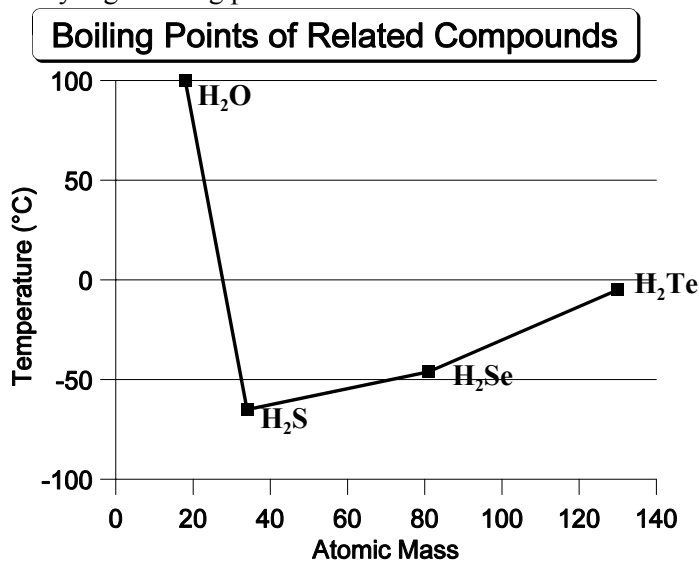
- Dipole - a polar molecule, or a molecule with an asymmetric, or unequal, distribution of charge causing one end of the molecule to be positive while the other is negative
- Definition - force of attraction between the positive end of one dipole and the negative end of another

★ Hydrogen bonding

- Definition - an intermolecular force linking an electropositive hydrogen that is covalently bonded to a small electronegative element such as oxygen, nitrogen, or fluorine, to another electronegative element of the same or another molecule



- Evidence - uncharacteristically high boiling point of water



Answer the questions below by circling the number of the correct response

- Which substance will conduct electricity in both the solid phase and the liquid phase?
(1) AgCl (2) H₂
(3) Ag (4) HCl
- Hydrogen bonds are strongest between molecules of
(1) HBr(g) (3) HF(g)
(2) HI(g) (4) HCl(g)
- Which molecule is a dipole?
(1) H₂ (3) CH₄
(2) N₂ (4) HCl
- The strongest hydrogen bonds are formed between molecules of
(1) H₂Te (3) H₂O
(2) H₂Se (4) H₂S
- What type of bonds are present in a strip of magnesium ribbon?
1 covalent 3 metallic
2 ionic 4 van der Waals
- Hydrogen bonds are most likely to exist between molecules of
(1) H₂ (3) HI
(2) CH₄ (4) H₂O
- Which substance, in the solid state, is the best conductor of electricity?
(1) Ag (3) NaCl
(2) I₂ (4) CO₂
- Which is the predominate type of attraction between molecules of HF in the liquid state?
1 hydrogen bonding 3 ionic bonding
2 electrovalent bonding 4 covalent bonding
- Which substance exists as a metallic crystals
(1) Ar (3) SiO₂
(2) Au (4) CO₂
- Mobile electrons are a distinguishing characteristic of
1 an ionic bond 3 a metallic bond
2 an electrovalent bond 4 a covalent bond
- Which kinds of bonds are found in a sample of H₂O(s)?
1 hydrogen bonds, only
2 covalent bonds, only
3 both ionic and hydrogen bonds
4 both covalent and hydrogen bonds
- Which substance is made up of molecules that are dipoles?
(1) N₂ (3) CH₄
(2) H₂O (4) CO₂
- Which element consists of positive ions immersed in a "sea" of mobile electrons?
1 sulfur 3 calcium
2 nitrogen 4 chlorine