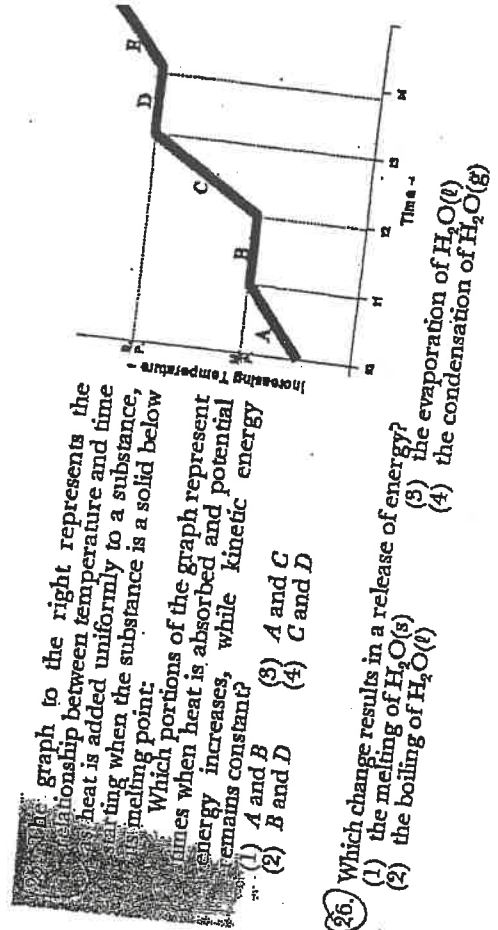
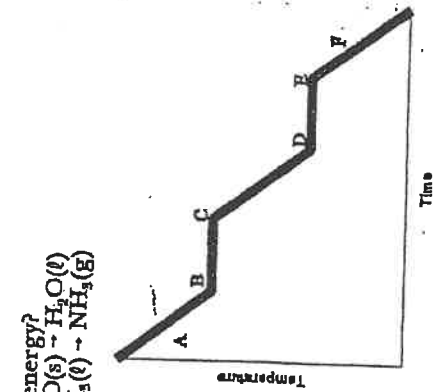


2. Which type of bonding accounts for the unusually high boiling point of water?
 (1) ionic bonding (2) covalent bonding (3) hydrogen bonding (4) network bonding
3. Oxygen, nitrogen and fluorine bond with hydrogen to form molecules. These molecules are attracted to each other by
 (1) ionic bonds (2) hydrogen bonds (3) electrovalent bonds (4) coordinate covalent bonds
4. The attractions that allow molecules of krypton to exist in the solid phase are due to
 (1) ionic bonds (2) covalent bonds (3) molecule-ion forces (4) van der Waals forces
5. The van der Waals forces of attraction between molecules always become stronger as molecular size
 (1) increases, and the distance between the molecules increases (2) increases, and the distance between the molecules decreases (3) decreases, and the distance between the molecules increases (4) decreases, and the distance between the molecules decreases
6. In which chemical system are molecule-ion attractions present?
 (1) $KCl(g)$ (2) $KCl(l)$ (3) $KCl(s)$ (4) $KCl(aq)$



11. Which compound contains both ionic and covalent bonds?
 (1) $HCl(g)$ (2) $NaCl(s)$ (3) $NH_4Cl(s)$ (4) $CCl_4(l)$
13. A solid substance is soft, has a low melting point, and is a poor conductor of electricity. The substance is most likely
 (1) an ionic solid (2) a network solid (3) a metallic solid (4) a molecular solid
14. The atoms in a molecule of hydrogen chloride are held together by
 (1) ionic bonds (2) polar covalent bonds (3) van der Waals forces (4) dipole-dipole attraction
15. The carbon atoms in a diamond are held together by
 (1) metallic bonds (2) hydrogen bonds (3) ionic bonds (4) covalent bonds
16. A certain substance is a poor conductor of heat and electricity and has a high melting point. The substance is most likely
 (1) Hg (2) He (3) CO_2 (4) SiO_2
17. Which compound is a network solid?
 (1) CH_4 (2) CO_2 (3) CaH_2 (4) SiO_2
18. Which type of bond would be formed when a hydrogen ion (H^+) reacts with an ammonia molecule (NH_3)?
 (1) a coordinate covalent bond (2) a nonpolar covalent bond (3) a metallic bond (4) an ionic bond
19. Which type of bonding involves positive ions immersed in a sea of mobile electrons?
 (1) ionic (2) nonpolar covalent (3) polar covalent (4) metallic



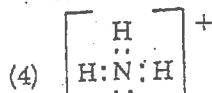
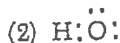
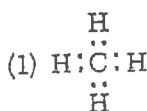
20. The heat of fusion of a substance is the energy measured during a
 (1) phase change (2) temperature change (3) chemical change (4) pressure change
21. The heat of fusion is defined as the energy required at constant temperature to change 1 unit mass of a
 (1) gas to a liquid (2) gas to a solid (3) solid to a gas (4) solid to a liquid
3. Which is the formula of a nonpolar molecule containing nonpolar bonds?
 (1) CO_2 (2) H_2 (3) NH_3 (4) H_2O
4. The forces of attraction which exist between hydrogen molecules in liquid hydrogen are due to
 (1) ionic bonds (2) hydrogen bonds (3) molecule-ion forces (4) van der Waals forces
5. As the distance between two iodine molecules increases, the attraction of the van der Waals forces between them
 (1) decreases (2) increases (3) remains the same
6. In which noble gas are van der Waals forces the greatest?
 (1) Ne (2) Xe (3) Kr (4) Ar

8. Hydrogen bonds are strongest between molecules of
 (1) HF (2) HCl (3) HBr (4) HI
9. Which atom will form the most polar bond with hydrogen?
 (1) F (2) Cl (3) Br (4) I

32. Which substance will conduct electricity in both the solid and liquid phases?
 (1) AgCl (2) Ag (3) H_2 (4) HCl
30. Which of the following elements has the lowest normal boiling point?

3. Hydrogen bonds are formed between molecules when hydrogen is covalently bonded to an element that has a
 (1) small atomic radius and low electronegativity
 (2) large atomic radius and low electronegativity
 (3) small atomic radius and high electronegativity
 (4) large atomic radius and high electronegativity
4. Hydrogen bonding is strongest between molecules of
 (1) H_2S (2) H_2O (3) H_2Se (4) H_2Te
5. Compared to the boiling point of H_2S , the boiling point of H_2O is relatively high. Which type of bonding causes this difference?
 (1) covalent (2) hydrogen (3) ionic (4) network
6. Which of the following liquids has the weakest van der Waal's forces of attraction between its molecules?
 (1) $Xe(l)$ (2) $Kr(l)$ (3) $Ne(l)$ (4) $He(l)$
7. Given the phase change: $H_2(g) \rightarrow H_2(l)$,
 Which kind of force acts between the molecules of H_2 during this phase change?
 (1) hydrogen bond (2) ionic bond (3) molecule-ion (4) van der Waals
8. Which sequence of Group 18 elements demonstrates a gradual decrease in the strength of the van der Waals forces?
 (1) $Ar(l), Kr(l), Ne(l), Xe(l)$ (2) $Kr(l), Xe(l), Ar(l), Ne(l)$
 (3) $Ne(l), Ar(l), Kr(l), Xe(l)$ (4) $Xe(l), Kr(l), Ar(l), Ne(l)$
9. The kind of attractions that result in the dissolving of sodium chloride in water are:
 (1) ion-ion (2) molecule-ion (3) atom-atom (4) molecule-atom
10. When calcium chloride is dissolved in water, to which end of the adjacent water molecules will a calcium ion be attracted?
 (1) the oxygen end, which is the negative pole
 (2) the oxygen end, which is the positive pole
 (3) the hydrogen end, which is the negative pole
 (4) the hydrogen end, which is the positive pole
11. Which type of attraction is directly involved when KCl dissolves in water?
 (1) molecule-molecule (2) molecule-atom (3) molecule-ion (4) ion-ion

2. The transfer of electrons from sodium atoms to chlorine atoms results in the formation of (1) coordinate covalent bonds (2) polar covalent bonds (3) nonpolar bonds (4) ionic bonds
3. What is a characteristic of ionic solids? (1) They conduct electricity. (2) They have high vapor pressures. (3) They have high melting points. (4) They are very malleable.
4. A certain solid, when it is in the liquid state or dissolved in water, will conduct electricity. In the solid state it will not conduct electricity. This solid must contain (1) ionic bonds (2) metallic bonds (3) covalent bonds (4) coordinate bonds
5. Which compound contains ionic bonds? (1) $NaH(s)$ (2) $C_6H_{12}O_6(s)$ (3) $CH_3OH(l)$ (4) $H_2O(l)$
6. A compound formed from potassium and chlorine will have (1) a molecular crystal structure (2) a high melting point (3) good heat conductivity in the solid state (4) poor electrical conductivity in solution
7. What type of bond exists in a molecule of iodine? (1) ionic (2) polar covalent (3) nonpolar covalent (4) metallic
8. A molecule of ammonia (NH_3) contains (1) ionic bonds, only (2) covalent bonds, only (3) both covalent and ionic bonds (4) neither covalent nor ionic bonds
9. Which sample of HCl most readily conducts electricity? (1) $HCl(s)$ (2) $HCl(l)$ (3) $HCl(g)$ (4) $HCl(aq)$
10. A proton (H^+) would be most likely to form a coordinate covalent bond with



17. In which sample are the particles arranged in a regular geometric pattern?
 (1) $HCl(l)$ (2) $NaCl(aq)$ (3) $N_2(g)$ (4) $I_2(s)$

18. Under the same conditions of temperature and pressure, a liquid differs from a gas because the particles of the liquid
 (1) are in constant straight-line motion
 (2) take the shape of the container they occupy
 (3) have no regular arrangement
 (4) have stronger forces of attraction between them

20. At which point do a liquid and a solid exist at equilibrium?
 (1) sublimation point (2) vaporization point (3) boiling point (4) melting point

21. At 1 atmosphere of pressure, the steam-water equilibrium occurs at a temperature of
 (1) 0 K (2) 100 K (3) 273 K (4) 373 K

13. Which diagram best represents the structure of a water molecule?



14. Molecule-ion attractions are found in

- (1) $K(s)$ (2) $Kr(g)$ (3) $KCl(l)$ (4) $KCl(aq)$

15. In an aqueous solution of an ionic salt, the oxygen atom of the water molecule is attracted to the

- (1) negative ion of the salt, due to the oxygen's partial positive charge
 (2) negative ion of the salt, due to oxygen's partial negative charge
 (3) positive ion of the salt, due to oxygen's partial positive charge
 (4) positive ion of the salt, due to oxygen's partial negative charge

16. In which system do molecule-ion attractions exist?

- (1) $NaCl(aq)$ (2) $NaCl(s)$ (3) $C_6H_{12}O_6(aq)$ (4) $C_6H_{12}O_6(s)$