1. The best determiner of the polarity of a molecule is its _____.

(A) intermolecular bond
(B) intramolecular bond
(C) magnetic strength
(D) crystal structure

The correct answer is B. The intramolecular bond determines the polarity of the molecule. The ionic intramolecular bond produces a very polar bond, because one atom gives and the other atom takes the electron instead of the atoms sharing the electron. The intermolecular bond refers to the attraction of one molecule for another. That attraction increases as the polarity of the intramolecular bond increases. Magnetic strength and crystal structure do not affect the polarity of a molecule.

2. What determines the polarity of a molecule?

(A) the distribution of electrons in the molecule
(B) the orientation of the molecule
(C) the mobility of the molecule
(D) the shape of the molecule

The correct answer is A. The polarity of a molecule is how positive one side of the molecule is and how negative the other side is. That difference in electrical charge is determined by the distribution of electrons in the molecule.

3. Which statement is true?

(A) The more polar a molecule is, the stickier it is.
(B) The smaller a molecule is, the stickier it is.
(C) The more mobile a molecule is, the stickier it is.
(D) The more energy a molecule has, the stickier it is.

The correct answer is A. Stickiness, or the attraction of one molecule for another, is determined by the electrical attraction between molecules, in other words, the intramolecular bond. The electrical attraction between molecules is strongest when one side of a molecule is positive and the other side negative, i.e., when molecules are polar.

4. The reason ionic crystals crack so easily when tapped with a hammer is that _____.

(A) ionic crystals transmit the mechanical force of a hammer very rapidly
(B) electrical repulsion develops between columns when the crystal is tapped
(C) hammering a crystal causes the atoms inside the crystal to rapidly heat up and vibrate apart
(D) hammering a crystal stuns the electrical force holding the positive and negative ions in the crystal together

The correct answer is B. Tapping an ionic crystal shoves the ions in one column forward, causing positive ions to now sit next to positive ions and negative next to negative. The electrical repulsion between positive and positive, and negative and negative, splits the crystal.

5. The reason ionic crystals resist heat so well is that _____.

(A) the intramolecular bonds inside the crystal are so strong
(B) the intermolecular bonds inside the crystal are so strong
(C) both the intramolecular and intermolecular bonds are so strong
(D) the intramolecular and intermolecular bonds do not transfer heat well

The correct answer is C. In an ionic crystal, there is no real difference between the intramolecular bonds and the intermolecular bonds, because each positive ion is attached in all six directions (up-down, front-back, left-right) to negative ions, and vice-versa. The rigidity of the bonds between positive and negative ions causes heat to be transferred rapidly through a crystal, because when ions at one end of the crystal start heating up and jiggling the crystal, the jiggling is felt through the crystal.

6. When sodium and chlorine atoms formed sodium and chloride ions in an ionic crystal _____.

(A) every pair of sodium and chloride ions became indistinguishable from every other pair of sodium and chloride ions
(B) every pair of sodium and chloride ions became a “formula unit”
(C) every other atom became a positive ion
(D) All three answers are true.

The correct answer is D. In ionic crystals, positive ions are surrounded by negative ions, and vice versa. The original molecule cannot be identified so any pair of positive and negative ions is called a “formula unit.”

7. Because sodium chloride crystals consist of sodium and chloride ions lined up in rows and columns _____.

(A) sodium chloride crystals form flat, thin plates
(B) sodium chloride crystals form cubes
(C) there are open spaces between the rows and columns that make sodium chloride crystals transparent
(D) sodium chloride crystals can be compressed

The correct answer is B. Under a magnifying glass, sodium chloride crystals – table salt – are cubic with straight edges on all four sides.