

Chapter 2 THE NATURE OF MATERIALS

Multiple Choice Quiz

There are 35 correct answers in this multiple choice quiz (some questions have multiple answers that are correct). To achieve a perfect score on the quiz, all correct answers must be given. Each correct answer is worth 1 point. Each omitted answer or wrong answer reduces the score by 1 point. Percentage score on the quiz is based on the total number of correct answers.

- 2.1 The basic structural unit of matter is which one of the following: (a) atom, (b) electron, (c) element, (d) molecule, or (e) nucleus?

Answer. (a).

- 2.2 Approximately how many different elements have been identified (one best answer): (a) 10, (b) 50, (c) 100, (d) 200, or (e) 500?

Answer. (c).

- 2.3 In the Periodic Table, the elements can be divided into which of the following categories (three best answers): (a) ceramics, (b) gases, (c) liquids, (d) metals, (e) nonmetals, (f) polymers, (g) semi-metals, and (h) solids?

Answer. (d), (e), and (g).

- 2.4 The element with the lowest density and smallest atomic weight is which one of the following: (a) aluminum, (b) argon, (c) helium, (d) hydrogen, or (e) magnesium?

Answer. (d).

- 2.5 Which of the following bond types are classified as primary bonds (three correct answers): (a) covalent bonding, (b) hydrogen bonding, (c) ionic bonding, (d) metallic bonding, and (e) van der Waals forces?

Answer. (a), (c), and (d).

- 2.6 How many atoms are there in the body-centered cubic (BCC) unit cell (one correct answer): (a) 8, (b) 9, (c) 10, (d) 12, (e) 14, or (f) 17?

Answer. (b).

- 2.7 How many atoms are there in the face-centered cubic (FCC) unit cell (one correct answer): (a) 8, (b) 9, (c) 10, (d) 12, (e) 14, or (f) 17?

Answer. (e).

- 2.8 How many atoms are there in the hexagonal close-packed (HCP) unit cell (one correct answer): (a) 8, (b) 9, (c) 10, (d) 12, (e) 14, or (f) 17?

Answer. (f).

- 2.9 Which of the following are point defects in a crystal lattice structure (three correct answers): (a) edge dislocation, (b) grain boundaries, (c) interstitialcy, (d) Schottky defect, (e) screw dislocation, or (f) vacancy?

Answer. (c), (d), and (f).

- 2.10 Which one of the following crystal structures has the fewest slip directions and therefore the metals with this structure are generally more difficult to deform at room temperature: (a) BCC, (b) FCC, or (c) HCP?

Answer. (c).

- 2.11 Grain boundaries are an example of which one of the following types of crystal structure defects: (a) dislocation, (b) Frenkel defect, (c) line defects, (d) point defects, or (e) surface defects?

Answer. (e).

- 2.12 Twinning is which of the following (three best answers): (a) elastic deformation, (b) mechanism of plastic deformation, (c) more likely at high deformation rates, (d) more likely in metals with HCP structure, (e) slip mechanism, and (f) type of dislocation?

Answer. (b), (c), and (d).

- 2.13 Metals are characterized by which one of the following bonding types: (a) adhesive, (b) covalent, (c) hydrogen, (d) ionic, (e) metallic, and (f) van der Waals?

Answer. (e).

- 2.14 Ceramics are characterized by which two of the following bonding types: (a) adhesive, (b) covalent, (c) hydrogen, (d) ionic, (e) metallic, and (f) van der Waals?

Answer. (b) and (d).

- 2.15 Polymers are characterized by which two of the following bonding types: (a) adhesive, (b) covalent, (c) hydrogen, (d) ionic, (e) metallic, and (f) van der Waals?

Answer. (b) and (f).

- 2.16 In general, metals are characterized by which of the following properties (three best answers): (a) brittleness, (b) chemical inertness, (c) electrically insulating, (d) high electrical conductivity, (e) high hardness, (f) high thermal conductivity, (g) low density, and (h) low thermal conductivity?

Answer. (d), (e), and (f).

- 2.17 In general, ceramics are characterized by which of the following properties (four best answers): (a) brittleness, (b) chemical inertness, (c) electrically insulating, (d) high electrical conductivity, (e) high hardness, (f) high thermal conductivity, (g) low density, and (h) low thermal conductivity?

Answer. (a), (b), (c), and (e). Some students might have included (h) as an answer; however, ceramics are thermally resistant but that is not the same as low thermal conductivity.

- 2.18 In general, polymers are characterized by which of the following properties (three best answers): (a) brittleness, (b) chemical inertness, (c) electrically insulating, (d) high electrical conductivity, (e) high hardness, (f) high thermal conductivity, (g) low density, and (h) low thermal conductivity?

Answer. (c), (g), and (h).