

Chapter 1

1. List six different property classifications of materials that determine their applicability.
2. Cite the four components that are involved in the design, production, and utilization of materials, and briefly describe the interrelationships between these components.
3. Cite three criteria that are important in the materials selection process.
4. (a) List the three primary classifications of solid materials, and then cite the distinctive chemical feature of each.

Chapter 2

1. (a) What is an isotope? (b) Why are the atomic weights of the elements not integers? Cite two reasons.
2. Cite the difference between atomic mass and atomic weight.
3. Silicon has three naturally-occurring isotopes: 92.23% of ^{28}Si , with an atomic weight of 27.9769 amu, 4.68% of ^{29}Si , with an atomic weight of 28.9765 amu, and 3.09% of ^{30}Si , with an atomic weight of 29.9738 amu. On the basis of these data, confirm that the average atomic weight of Si is 28.0854 amu.
4. Briefly cite the main differences between ionic, covalent, and metallic bonding. (b) State the Pauli exclusion principle.
5. What type(s) of bonding would be expected for each of the following materials: brass (a copper-zinc alloy), rubber, barium sulfide (BaS), solid xenon, bronze, nylon, and aluminum phosphide (AlP)?
6. Explain why hydrogen fluoride (HF) has a higher boiling temperature than hydrogen chloride (HCl) (19.4 vs. $-85\text{ }^\circ\text{C}$), even though HF has a lower molecular weight.