

**Chapter 1** 1.1 has mass, occupies space 1.3 (a) matter (b) matter (c) energy (d) energy (e) matter (f) matter 1.5 (a) shape (b) volume 1.7 (a) does not, yes (b) does, no (c) does, yes (d) does, yes 1.9 (a) physical (b) chemical (c) chemical (d) physical 1.11 (a) chemical (b) physical (c) chemical (d) physical 1.13 (a) physical (b) physical (c) chemical (d) physical 1.15 (a) chemical (b) physical (c) chemical (d) physical 1.17 (a) physical (b) physical (c) chemical (d) physical 1.19 (a) false (b) true (c) false (d) true 1.21 (a) heterogeneous mixture (b) homogeneous mixture (c) pure substance (d) heterogeneous mixture 1.23 (a) homogeneous mixture, one phase (b) heterogeneous mixture, two phases (c) heterogeneous mixture, three phases (d) heterogeneous mixture, three phases 1.25 (a) compound (b) compound (c) classification not possible (d) classification not possible 1.27 (a) A, classification not possible; B, classification not possible; C, compound (b) D, compound; E, classification not possible; F, classification not possible; G, classification not possible 1.29 (a) true (b) false (c) false (d) false 1.31 (a) true (b) false (c) false (d) false 1.33 (a) true (b) true (c) false (d) true 1.35 (a) more abundant (b) less abundant (c) less abundant (d) more abundant 1.37 (a) nitrogen (b) nickel (c) lead (d) tin 1.39 (a) Al (b) Ne (c) H (d) U 1.41 (a) Na, S (b) Mg, Mn (c) Ca, Cd (d) As, Ar 1.43 (a) no (b) yes (c) yes (d) no 1.45 (a) heteroatomic molecules (b) heteroatomic molecules (c) homoatomic molecules (d) heteroatomic molecules 1.47 (a) triatomic molecules (b) triatomic molecules (c) diatomic molecules (d) diatomic molecules 1.49 (a) compound (b) compound (c) element (d) compound 1.51 (a) true (b) false; Triatomic molecules must contain at least one kind of atom. (c) true (d) false; Both homoatomic and heteroatomic molecules may contain three or more atoms. 1.53 (a)  (b)  (c)  (d)  1.55 (a) H<sub>2</sub>O (b) CO<sub>2</sub> (c) O<sub>2</sub> (d) CO 1.57 (a) compound (b) compound (c) element (d) element 1.59 (a) lithium, chlorine, oxygen (b) carbon, oxygen (c) cobalt (d) sulfur 1.61 (a) C<sub>12</sub>H<sub>22</sub>O<sub>11</sub> (b) C<sub>8</sub>H<sub>10</sub>N<sub>4</sub>O<sub>2</sub> 1.63 (a) HCN (b) H<sub>2</sub>SO<sub>4</sub> 1.65 (a) BaCl<sub>2</sub> (b) HNO<sub>3</sub> (c) Na<sub>3</sub>PO<sub>4</sub> (d) Mg(OH)<sub>2</sub> 1.67 (a) diagram I (b) diagram III (c) diagram II (d) diagrams I and IV 1.68 (a) diagram III (b) diagrams I and IV (c) diagram I (d) diagram III 1.69 (a) element (b) compound (c) mixture (d) compound 1.70 (a) homogeneous mixture (b) heterogeneous mixture (c) compound (d) compound 1.71 (a) element (b) mixture (c) mixture (d) compound 1.72 (a) changes 3 and 4 (b) changes 1 and 2 (c) change 2 (d) change 1 1.73 (a) B-Ar-Ba-Ra (b) Eu-Ge-Ne (c) He-At-H-Er (d) Al-La-N 1.74 (a) same, both 4 (b) more, 6 and 5 (c) same, both 5 (d) fewer, 13 and 15 1.75 (a) 1 + 2 + x = 6; x = 3 (b) 2 + 3 + 3x = 17; x = 4 (c) 1 + x + x = 5; x = 2 (d) x + 2x + x = 8; x = 2 1.76 (a) 2 (N<sub>2</sub>, NH<sub>3</sub>) (b) 4 (N, H, C, Cl) (c) 110; 5(2 + 6 + 4 + 5 + 5) (d) 56; 4(4 + 3 + 4 + 3) 1.77 b 1.78 a 1.79 c 1.80 c 1.81 d 1.82 d 1.83 c 1.84 b 1.85 d 1.86 c