

- (b) an arrangement of eight electrons in the outermost shell
 (c) outermost shell that contains electrons
 (d) electrons in the outermost shell

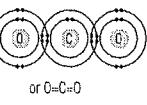
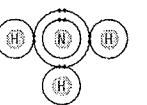
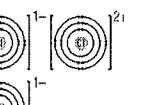
2.

Atom/Ion	Atomic Number	Number of Protons	Number of Electrons	Number of Neutrons	Number of Electron Shells
neon atom	10	20	10	10	2
fluorine atom	9	9	9	10	2
fluorine ion	9	9	10	10	2
sodium atom	11	11	11	12	3
sodium ion	11	11	10	12	2

3.

neon atom	fluorine atom	fluorine ion	sodium atom	sodium ion
N 10p 10n 2e 8e	F 9p 10n 2e 7e	F 9p 10n 2e 8e	Na 11p 12n 2e 8e 1e	Na 11p 12n 2e 8e

4.

carbon dioxide (CO_2)	ammonia (NH_3)	calcium chloride (CaCl_2)
 or $\text{O}=\text{C}=\text{O}$		

Illustrating Concepts

Lewis diagrams

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1. (a) a diagram that illustrates chemical bonding by showing only an atom's valence electrons and the chemical symbol

(b) pair of electrons in the valence shell that is not used in bonding

(c) pair of electrons involved in a covalent bond

2. (a) $\cdot \ddot{\text{B}} \cdot$

(b) $\cdot \ddot{\text{N}} \cdot$

(c) $\cdot \ddot{\text{Al}} \cdot$

(d) $\cdot \ddot{\text{Cl}} \cdot$

3. (a) $\left[\text{Na} \right]^{+} \left[\begin{array}{c} \cdot \ddot{\text{O}} \cdot \\ \cdot \ddot{\text{O}} \cdot \end{array} \right]^{2-} \left[\text{Na} \right]^{+}$

(b) $\left[\text{K} \right]^{+} \left[\begin{array}{c} \cdot \ddot{\text{Cl}} \cdot \\ \cdot \ddot{\text{Cl}} \cdot \end{array} \right]^{-}$

UNIT 2 Chemical Reactions and Radioactivity

Chapter 4 Atomic theory explains the formation of compounds.

Section 4.1 Atomic Theory and Bonding

Comprehension

The atom and the subatomic particles

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1. (a) atomic number
 (b) symbol
 (c) name
 (d) average atomic mass
 (e) common ion charge
 (f) other ion charge
2. (a) 35
 (b) 79.9
 (c) 1–
 (d) 35
 (e) bromine
 (f) 45

3.

Element Name	Atomic Number	Ion Charge	Number of Protons	Number of Electrons	Number of Neutrons
potassium	19	1+	19	18	20
phosphorus	15	0	15	15	16
lithium	3	0	3	3	4
calcium	20	2+	20	18	20
nitrogen	7	3–	7	10	7
boron	5	0	5	5	6
argon	18	0	18	18	22
aluminum	13	3+	13	10	14
chlorine	17	0	17	17	19
sodium	11	1+	11	10	12

Applying Knowledge

Bohr diagrams

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1. (a) a diagram that shows how many electrons are in each shell surrounding the nucleus

