

CHEMISTRY • CLASS 11

4

CHAPTER

Chemical Bonding and Molecular Structure

NCERT SOLUTIONS



EXERCISE SOLUTIONS: 4.1-4.2

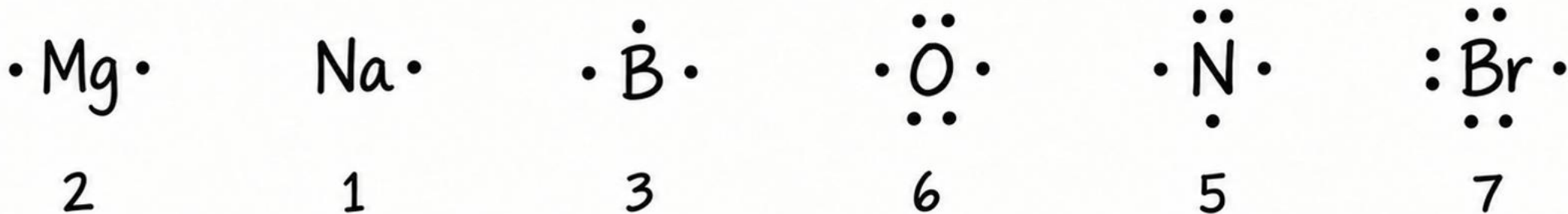
4.1 Explain the formation of a chemical bond.

Answer: A chemical bond is the attractive interaction that holds atoms or ions together. A bond forms when the combined system has lower energy than the separated particles.

Atoms may share valence electrons to form covalent bonds. Electron transfer can produce oppositely charged ions held together by electrostatic attraction. In many simple compounds, bonding gives a filled outer shell: an octet, or a duplet for hydrogen.

4.2 Write Lewis dot symbols for Mg, Na, B, O, N and Br.

Answer:

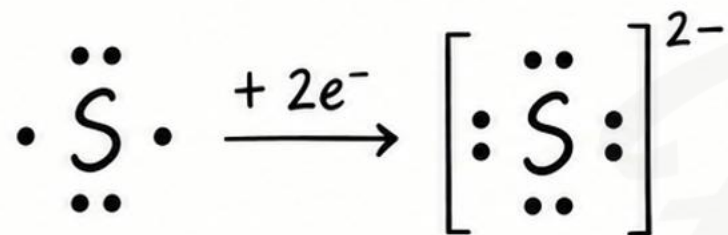


Only valence electrons are shown. Dot orientation may vary, but the total must be correct.

EXERCISE SOLUTIONS: 4.3

4.3 Write Lewis symbols for S and S^{2-} ; Al and Al^{3+} ; H and H^{-} .

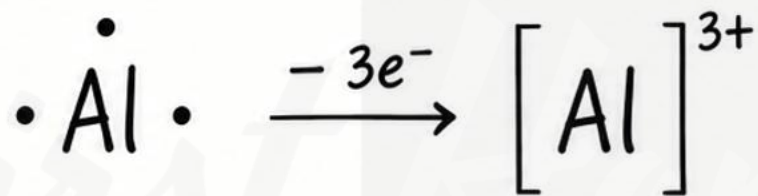
Answer:



S: 6 valence
electrons

S^{2-} : complete
octet

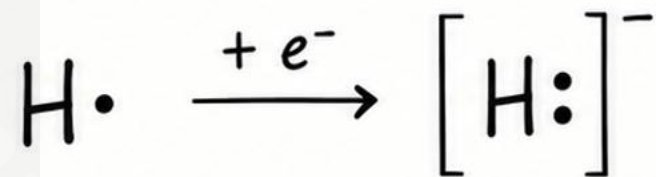
Answer:



Al: 3 valence
electrons

The three original
outer electrons are
lost; the ion has a
filled inner shell.

Answer:



H: 1 electron

H^{-} : 2 electrons
(duplet)

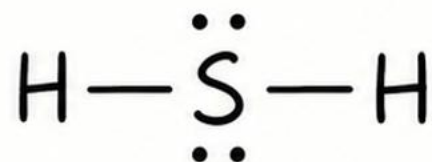
Anions gain electrons; cations lose electrons. The charge is not an extra electron dot.

EXERCISE SOLUTIONS: 4.4 — H_2S - SiCl_4 - BeF_2

4.4 Write Lewis structures: H_2S , SiCl_4 and BeF_2 .

(a) H_2S

Answer:

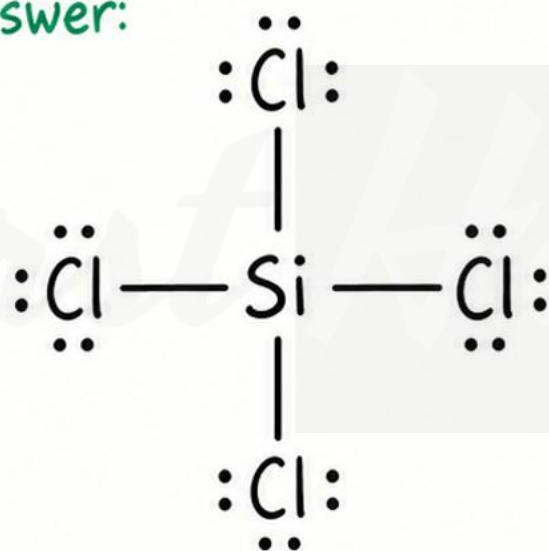


Valence electrons = $2(1) + 6 = 8$

Two shared pairs and two lone pairs on sulfur.

(b) SiCl_4

Answer:

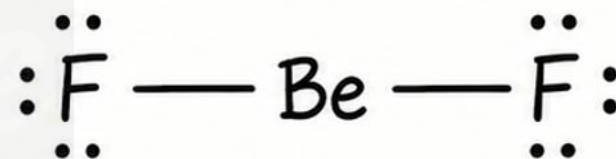


Valence electrons = $4 + 4(7) = 32$

Four single bonds complete the silicon octet.

(c) BeF_2

Answer:



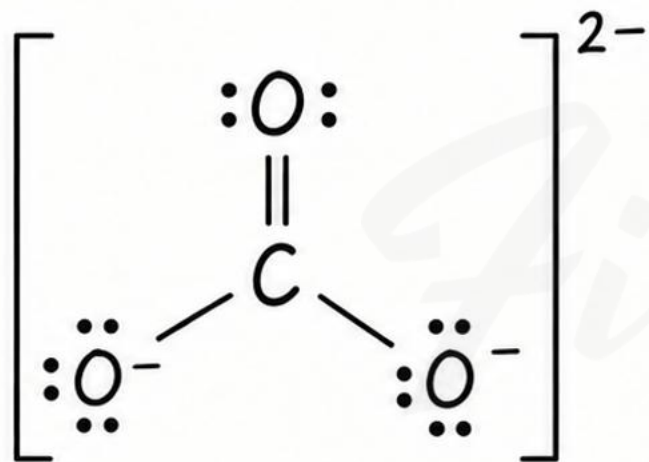
Valence electrons = $2 + 2(7) = 16$

Beryllium has only four electrons around it: an incomplete-octet exception.

EXERCISE SOLUTIONS: 4.4 – CO_3^{2-} – HCOOH

4.4 Continued: write Lewis structures of CO_3^{2-} and HCOOH .

CO_3^{2-} :

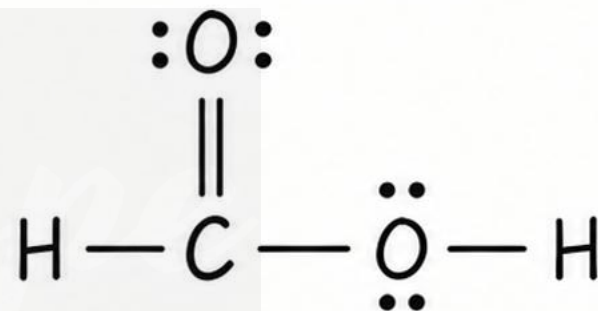


Valence electrons = $4 + 3(6) + 2 = 24$

Answer:

One valid canonical form is shown. The double bond can be drawn to any of the three oxygen atoms.

HCOOH :



Valence electrons = $2(1) + 4 + 2(6) = 18$

Answer:

Each carbon and oxygen has an octet; each hydrogen has a duplet.



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