

3. Write Names and Formulas of Compounds

- Compounds that contain a metal or the ammonium ion are ionic, whereas compounds that do not are covalent.
- The chemical name of an ionic compound indicates the two ions present in the compound, of which the positive ion is always given first.
- The chemical formula of an ionic compound shows the ratios of each ion present in the compound.
- The chemical name of a binary covalent compound includes element names and prefixes that indicate the number of each type of atom present in a molecule of the compound.

4. Balance and Explain the Meanings of Chemical Equations

- Chemical equations represent chemical changes by showing the reactants and products in a reaction.
- The law of conservation of mass states that mass is not created or destroyed in a chemical reaction.
- In a balanced chemical equation, the number of atoms of each kind of element is the same on both sides of the equation.

CHAPTER REVIEW ANSWERS

Checking Concepts

1.

Name of subatomic particle	Proton	Electron	Neutron
Relative mass	1836	1	1837
Charge	+	-	0
Location in the atom	Nucleus	Surrounding nucleus	Nucleus

2. (a) Alkali metals, alkaline earth metals, halogens, noble gases

(b) 1, 2, 17, and 18, respectively

(c) Alkali metals: extremely reactive metals
Alkaline earth metals: somewhat reactive metals

Halogens: very reactive non-metals

Noble gases: very unreactive non-metals

3. (a) Metal atoms lose electrons as they become positive ions.

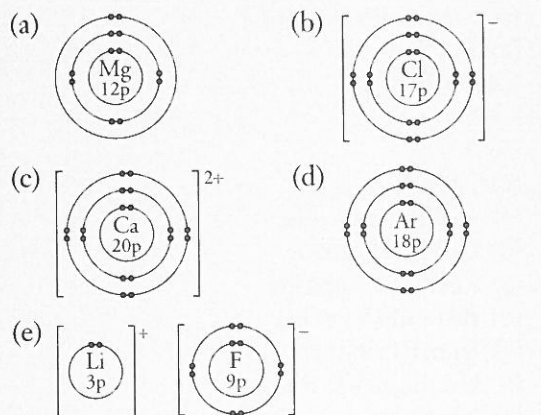
(b) Non-metal atoms gain electrons as they become negative ions.

4. Stable octet refers to the tendency of atoms to retain eight valence electrons (noble gases) or to gain, lose, or share electrons in order to attain eight valence electrons.

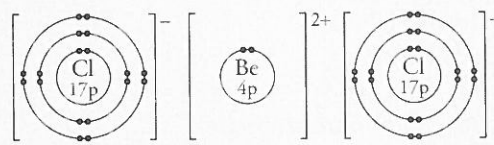
An octet is stable because once an atom or ion has eight valence electrons it becomes chemically less reactive.

5. (a) Multivalent refers to the ability of some metals to form a positive ion in more than one way.
(b) For example, iron is multivalent as it can form a 2+ or a 3+ ion.
(c) For example, calcium is not multivalent because it can form only a 2+ ion.
6. (a) Calcium, Ca
(b) Bromine, Br
(c) Thallium, Tl
(d) Lithium, Li
(e) Helium, He

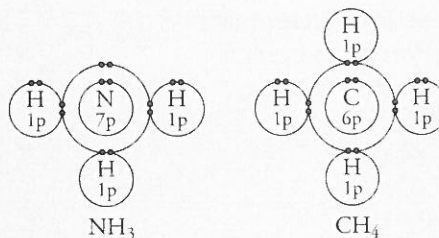
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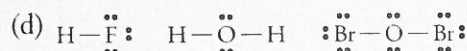
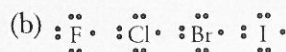
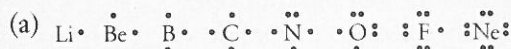
LiF

BeCl₂

(f)



8.



9. (a) Al
(b) K
(c) Ar
(d) O
10. (a) Ionic, for example: LiF
(b) Ionic, for example: AlN
(c) Covalent, for example: NH₃
(d) Covalent, for example: CF₄
11. The chart for this question is available for students to complete on BLM 2-22, Chapter 4 Review Chart.
(a) Sodium nitride, Na₃N
(b) Magnesium oxide, MgO
(c) Aluminum sulphide, Al₂S₃
(d) Gallium fluoride, GaF₃
(e) Silver selenide, Ag₂Se
(f) Zinc chloride, ZnCl₂
12. (a) AuF₃
(b) Pb₃N₄
(c) CuI
(d) Ni₂S₃
(e) CrO
13. (a) Tin(IV) chloride
(b) Gold(III) nitride
(c) Lead(IV) sulphide
(d) Bismuth(V) oxide
(e) Iron(III) iodide
(f) Uranium(VI) fluoride
14. (a) Na₂CO₃
(b) (NH₄)₃PO₄
(c) NH₄NO₃
(d) Fe(NO₂)₃
(e) Ca(ClO₄)₂
15. (a) Aluminum sulphate
(b) Ammonium acetate
(c) Iron(III) chromate
(d) Sodium dichromate
(e) Potassium cyanide
(f) Lead(II) hydrogen sulphide
16. (a) PCl₅
(b) NCl₃
(c) Si₆
(d) P₄O₁₀
(e) N₂O₃
17. (a) Dinitrogen tetrafluoride
(b) Phosphorus tribromide
(c) Nitrogen tribromide
(d) Carbon dioxide
18. The chart for this question is available for students to complete on BLM 2-22, Chapter 4 Review Chart.
(a) Ionic, calcium chloride
(b) Ionic, copper(II) chloride

- (c) Covalent, sulfur dichloride
(d) Ionic, cobalt(II) sulphide
19. (a) 4 hydrogen, 2 chlorine, 1 calcium, 2 oxygen
(b) 6 sodium, 2 phosphorous, 24 oxygen, 3 calcium, 6 nitrogen
20. (a) $2\text{KCl} + \text{Pb}(\text{NO}_3)_2 \rightarrow \text{PbCl}_2 + 2\text{KNO}_3$
(b) $2\text{Na} + \text{F}_2 \rightarrow 2\text{NaF}$
(c) $\text{C}_3\text{H}_8 + 5\text{O}_2 \rightarrow 3\text{CO}_2 + 4\text{H}_2\text{O}$
(d) $2\text{C}_4\text{H}_{10} + 13\text{O}_2 \rightarrow 8\text{CO}_2 + 10\text{H}_2\text{O}$
21. (a) The drop in pressure suggests that some of the oxygen gas reacted with the mercury and formed a new product (such as a solid).
(b) $10.8 \text{ g} \times 10.0 \text{ g} = 0.8 \text{ g}$ of gas was consumed
(c) The new substance might be mercury oxide.

Pause and Reflect Answer

Students' answers may vary but may cover some of these points:

- Compounds are substances that contain two or more elements chemically connected.
- Compounds form as a result of rearrangements of electrons that allow atoms or ions to be held together.
- Compounds exist as ionic (ionic bonds, ionic lattice) and covalent (covalent bonds, molecules).
- Covalent bonds form as valence electrons become shared between two atoms.
- Ionic bonds form as atoms gain or lose electrons (by trading them between atoms) to become ions, which are thereafter attracted to each other due to their opposite charge.