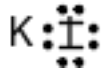
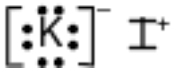
Electron Dot Diagrams (Lewis Structures)

1 Which part of a calcium atom in the ground state is represented by the dots in its Lewis electron-dot diagram?
(1) the electrons in the first shell
(2) the electrons in the fourth shell
(3) the protons in the nucleus
(4) the neutrons in the nucleus

2 Which Lewis electron-dot diagram represents the bonding in potassium iodide?

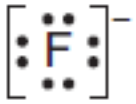
(1) 

(3) 

(2) 

(4) 

3 Which Lewis electron-dot diagram represents a fluoride ion?

(1) 

(3) 

(2) 

(4) 

Base your answers to questions 4 on the information below and on your knowledge of chemistry.

Solid sodium chloride, also known as table salt, can be obtained by the solar evaporation of seawater and from underground mining. Liquid sodium chloride can be decomposed by electrolysis to produce liquid sodium and chlorine gas, as represented by the equation below.

$2NaCl(\ell) \rightarrow 2Na(\ell) + Cl_2(g)$

4 Draw a Lewis electron-dot diagram of a Cl_2 molecule.

Base your answers to questions 5 on the information below and on your knowledge of chemistry.

The formulas and names of four chloride compounds are shown in the table below.

Formula	Name
CCl_4	carbon tetrachloride
RbCl	rubidium chloride
CsCl	cesium chloride
HCl	hydrogen chloride

5 In the space in your answer booklet, draw a Lewis electron-dot diagram for a molecule of HCl.

6 Draw a Lewis electron-dot diagram for a molecule of H_2O.

7 Draw a Lewis electron-dot diagram for a molecule of hydrogen fluoride, HF.

Base your answers to questions 8 on the information below and on your knowledge of chemistry.

The equation below represents a chemical reaction at 1 atm and 298 K.

$2H_2(g) + O_2(g) \rightarrow 2H_2O(g)$

8 Draw a Lewis electron-dot diagram for a water molecule.

Base your answers to questions 9 on the information below and on your knowledge of chemistry.

The radius of a lithium atom is 130. picometers, and the radius of a fluorine atom is 60. picometers. The radius of a lithium ion, Li^+, is 59 picometers, and the radius of a fluoride ion, F^-, is 133 picometers.

9 Draw a Lewis electron-dot diagram for a fluoride ion.

10 Draw a Lewis electron-dot diagram for a chloride ion, Cl^-.

Base your answers to questions 11 on the information below and on your knowledge of chemistry.

The Lewis electron-dot diagrams for three substances are shown below.

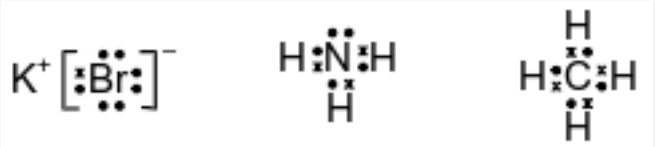
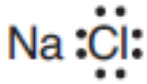


Diagram 1 Diagram 2 Diagram 3

11 Draw a Lewis electron-dot diagram for a molecule of Br_2.

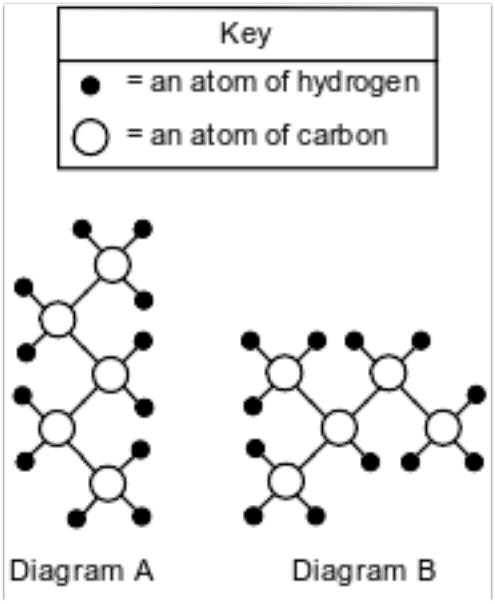
12 A student drew the Lewis electron-dot diagram below to represent sodium chloride.



Explain why this diagram is not an accurate representation for the bonding in NaCl.

Base your answers to questions 13 on the information below and on your knowledge of chemistry.

The diagrams below represent ball-and-stick models of two molecules. In a ball-and-stick model, each ball represents an atom, and the sticks between balls represent chemical bonds.



13 Draw a Lewis electron-dot diagram for an atom of the element present in all organic compounds.

14 Draw a Lewis electron-dot diagram for a molecule of bromomethane, CH_3Br.

Base your answers to questions 15 on the information below and on your knowledge of chemistry.

Silver-plated utensils were popular before stainless steel became widely used to make eating utensils. Silver tarnishes when it comes in contact with hydrogen sulfide, H_2S, which is found in the air and in some foods. However, stainless steel does not tarnish when it comes in contact with hydrogen sulfide.

15 Draw a Lewis electron-dot diagram for the compound that tarnishes silver.

Answer Keys

1 2

2 1

3 1

4 Allow 1 credit.

- Examples of 1-credit responses:
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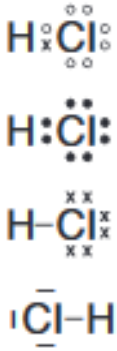
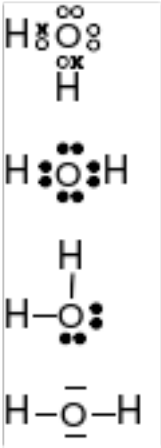
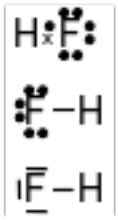
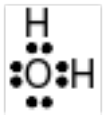
5 Allow 1 credit.

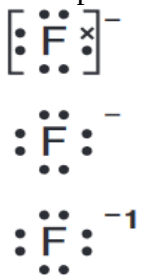
- Examples of 1-credit responses:
- 

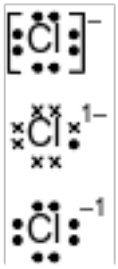
6 Allow 1 credit.

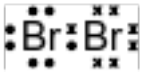
- Examples of 1-credit responses:
- 

7 Allow 1 credit.
- Examples of 1-credit responses:
- 

8 Allow 1 credit.
- Examples of 1-credit responses:
- 

9 Allow 1 credit. The positions of the dots may vary.
- Examples of 1-credit responses:
- 

10 Allow 1 credit. The position of electrons may vary.
- Examples of 1-credit responses:
- 

11 Allow 1 credit. The positions of the electrons can vary.
- Examples of 1-credit responses:
- 

12 Allow 1 credit. Acceptable responses include, but are not limited to:
- Ion charges are not shown.
- No electron transfer is shown in the diagram.
- The student's diagram represents a molecular compound.

13 Allow 1 credit. The positions of the dots can vary.

- Examples of 1-credit responses:
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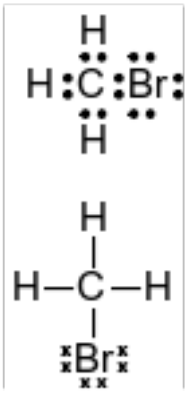
14 Allow 1 credit. The position of the electrons can vary.

- Examples of 1-credit responses:
- 

15 Allow 1 credit. The position of electrons may vary.

- Examples of 1-credit responses:
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