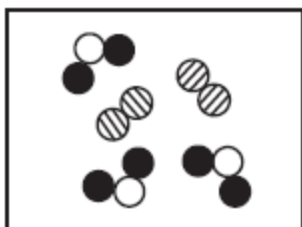
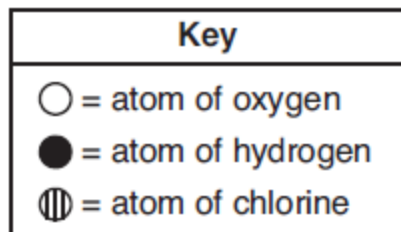


## Chemical Bonds & Formulas After School Regents Review Practice

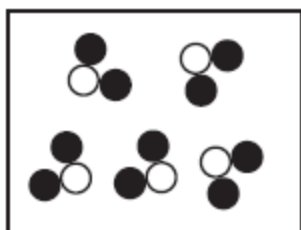
1. Ice,  $\text{H}_2\text{O}(\text{s})$ , is classified as

- A) an ionic compound
- B) a molecular compound**
- C) a homogeneous mixture
- D) a heterogeneous mixture

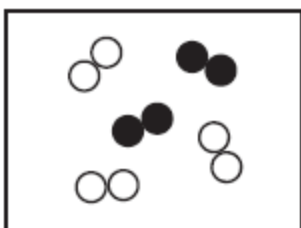
2. Which two particle diagrams each represent a sample of one substance?



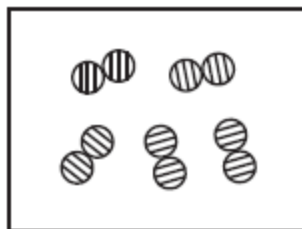
I



II



III



IV

- A) I and II
- B) I and III
- C) II and III
- D) II and IV**

3. Which sample of matter represents a mixture?

- A) aqueous ammonia**
- B) gaseous ethane
- C) liquid mercury
- D) solid iodine

4. A compound is a substance composed of two or more elements that are

- A) physically mixed in a fixed proportion
- B) physically mixed in a variable proportion
- C) chemically combined in a fixed proportion**
- D) chemically combined in a variable proportion

5. Which change is most likely to occur when a molecule of  $\text{H}_2$  and a molecule of  $\text{I}_2$  collide with proper orientation and sufficient energy?

- A) a chemical change, because a compound is formed**
- B) a chemical change, because an element is formed
- C) a physical change, because a compound is formed
- D) a physical change, because an element is formed

6. What is the chemical formula for ammonium sulfide?

- A)  $(\text{NH}_4)_2\text{S}$**
- B)  $(\text{NH}_4)_2\text{SO}_3$
- C)  $(\text{NH}_4)_2\text{SO}_4$
- D)  $(\text{NH}_4)_2\text{S}_2\text{O}_3$

7. What is the chemical formula for sodium sulfate?

- A)  $\text{Na}_2\text{SO}_4$**
- B)  $\text{Na}_2\text{SO}_3$
- C)  $\text{NaSO}_4$
- D)  $\text{NaSO}_3$

8. What is the chemical formula for lead(IV) oxide?

- A)  $\text{PbO}_2$**
- B)  $\text{PbO}_4$
- C)  $\text{Pb}_2\text{O}$
- D)  $\text{Pb}_4\text{O}$

9. Which group on the Periodic Table of the Elements contains elements that react with oxygen to form compounds with the general formula  $X_2\text{O}$ ?

- A) Group 1**
- B) Group 2
- C) Group 14
- D) Group 18

10. What is the total number of different elements present in  $\text{NH}_4\text{NO}_3$ ?

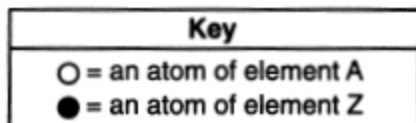
- A) 7
- B) 9
- C) 3**
- D) 4

11. What is the chemical formula of titanium(II) oxide?

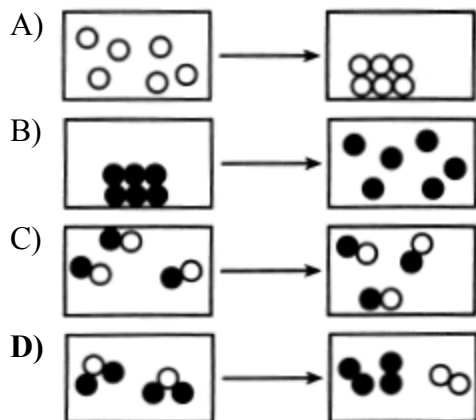
- A)  $\text{TiO}$**
- B)  $\text{Ti}_2\text{O}$
- C)  $\text{TiO}_2$
- D)  $\text{Ti}_2\text{O}_3$

## Chemical Bonds & Formulas After School Regents Review Practice

12. Given the key:



Which particle model diagram represents a chemical change?



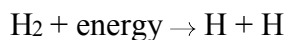
13. Given the equation representing a reaction:



Which statement describes the changes that occur as the oxygen molecule is produced?

- A) Energy is absorbed as bonds are broken.
- B) Energy is absorbed as bonds are formed.
- C) Energy is released as bonds are broken.
- D) Energy is released as bonds are formed.**

14. Given the balanced equation representing a reaction:



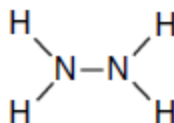
What occurs as bonds are broken in one mole of  $\text{H}_2$  molecules during this reaction?

- A) Energy is absorbed and one mole of unbonded hydrogen atoms is produced.
- B) Energy is absorbed and two moles of unbonded hydrogen atoms are produced.**
- C) Energy is released and one mole of unbonded hydrogen atoms is produced.
- D) Energy is released and two moles of unbonded hydrogen atoms are produced.

15. Which diatomic molecule is formed when the two atoms share six electrons?

- A)  $\text{H}_2$
- B)  $\text{N}_2$**
- C)  $\text{O}_2$
- D)  $\text{F}_2$

16. Given the formula for hydrazine:



How many pairs of electrons are shared between the two nitrogen atoms?

- A) 1**
- B) 2
- C) 3
- D) 4

17. Which atom in the ground state has a stable valence electron configuration?

- A) Ar**
- B) Al
- C) Si
- D) Na

18. Which property is used to determine the degree of polarity between two bonded atoms?

- A) density
- B) electronegativity**
- C) pressure
- D) temperature

19. What is the most likely electronegativity value for a metallic element?

- A) 1.3**
- B) 2.7
- C) 3.4
- D) 4.0

20. Which term refers to how strongly an atom of an element attracts electrons in a chemical bond with an atom of a different element?

- A) entropy
- B) electronegativity**
- C) activation energy
- D) first ionization energy

21. What occurs when potassium reacts with chlorine to form potassium chloride?

- A) Electrons are shared and the bonding is ionic.
- B) Electrons are shared and the bonding is covalent.
- C) Electrons are transferred and the bonding is ionic.**
- D) Electrons are transferred and the bonding is covalent.

## Chemical Bonds & Formulas After School Regents Review Practice

22. Which element reacts with oxygen to form ionic bonds?

- A) calcium                      B) hydrogen  
C) chlorine                      D) nitrogen

23. The table below shows properties of two compounds at standard pressure.

Selected Properties of Two Compounds

Compound	Melting Point (°C)	Boiling Point (°C)	Electrical Conductivity
1	775	1935	good as a liquid or in an aqueous solution
2	-112.1	46	poor as a liquid

Which statement classifies the two compounds?

- A) Both compounds are ionic.  
B) Both compounds are molecular.  
**C) Compound 1 is ionic, and compound 2 is molecular.**  
D) Compound 1 is molecular, and compound 2 is ionic.

24. Which statement describes a multiple covalent bond?

- A) Two electrons are shared.  
**B) Four electrons are shared.**  
C) Two electrons are transferred.  
D) Four electrons are transferred.

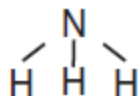
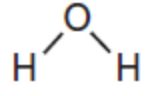
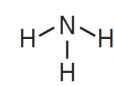
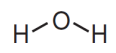
25. A molecular compound is formed when a chemical reaction occurs between atoms of

- A) chlorine and sodium  
B) chlorine and yttrium  
**C) oxygen and hydrogen**  
D) oxygen and magnesium

26. The particle diagram below represents a solid sample of silver.



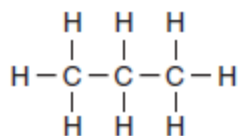
Which type of bonding is present when valence electrons move within the sample?

- A) **Metallic bonding**    B) hydrogen bonding  
C) covalent bonding    D) ionic bonding
27. Which type of bonding is present in a sample of an element that is malleable?
- A) ionic                      **B) metallic**  
C) nonpolar covalent    D) polar covalent
28. Which bond is most polar?
- A) C-O    **B) H-O**    C) N-O    D) S-O
29. Which formula represents a nonpolar molecule containing polar covalent bonds?
- A) H-H                      **B) O=C=O**  
C)                       D) 
30. Which molecule has a nonpolar covalent bond?
- A) H-H                      B)   
C)                       D) H-Cl
31. Which phrase describes the molecular polarity and distribution of charge in a molecule of carbon dioxide, CO<sub>2</sub>?
- A) polar and symmetrical  
B) polar and asymmetrical  
**C) nonpolar and symmetrical**  
D) nonpolar and asymmetrical

## Chemical Bonds & Formulas After School Regents Review Practice

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32. Given the formula representing a molecule:



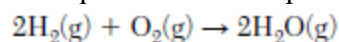
Which statement explains why the molecule is nonpolar?

- A) Electrons are shared between the carbon atoms and the hydrogen atoms.
  - B) Electrons are transferred from the carbon atoms to the hydrogen atoms.
  - C) The distribution of charge in the molecule is symmetrical**
  - D) The distribution of charge in the molecule is asymmetrical.
33. A molecule must be nonpolar if the molecule

- A) is linear
- B) is neutral
- C) has ionic and covalent bonding
- D) has a symmetrical charge distribution**

Base your answers to questions **34** through **36** on the information below and on your knowledge of chemistry

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



34. Compare the strength of attraction for electrons by a hydrogen atom to the strength of attraction for electrons by an oxygen atom within a water molecule.
35. Draw a Lewis electron-dot diagram for a water molecule.
36. State the change in energy that occurs in order to break the bonds in the hydrogen molecules.
-

**Answer Key**  
**Review Chemical Bonds/Formulas(36)**

1. **B**
2. **D**
3. **A**
4. **C**
5. **A**
6. **A**
7. **A**
8. **A**
9. **A**
10. **C**
11. **A**
12. **D**
13. **D**
14. **B**
15. **B**
16. **A**
17. **A**
18. **B**
19. **A**
20. **B**
21. **C**
22. **A**
23. **C**
24. **B**
25. **C**
26. **A**
27. **B**
28. **B**
29. **B**
30. **A**
31. **C**
32. **C**
33. **D**

34. — The oxygen atom has a stronger attraction for electrons than a hydrogen atom. — The electronegativity of oxygen is 3.4 and hydrogen is 2.2. — The H atom has a weaker attraction for electrons.

35.



36. — Energy is absorbed when bonds are broken. — Breaking the bond in H<sub>2</sub> is endothermic, — PE increases.