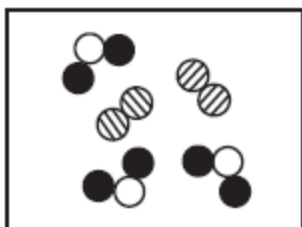
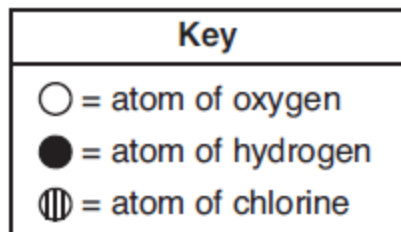


Chemical Bonds & Formulas After School Regents Review Practice

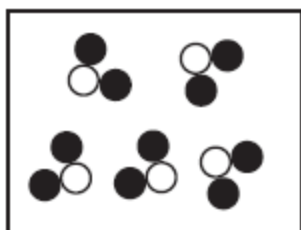
1. Ice, $\text{H}_2\text{O}(\text{s})$, is classified as

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

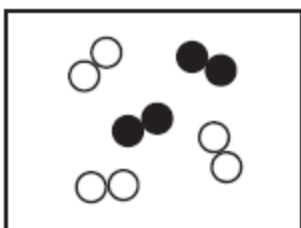
2. Which two particle diagrams each represent a sample of one substance?



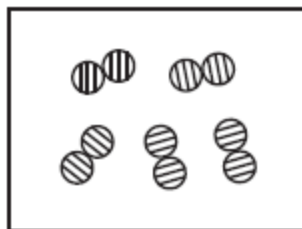
I



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 H_2 and a molecule of 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) Na_2SO_4
- B) Na_2SO_3
- C) NaSO_4
- D) NaSO_3

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

- A) PbO_2
- B) PbO_4
- C) Pb_2O
- D) Pb_4O

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 NH_4NO_3 ?

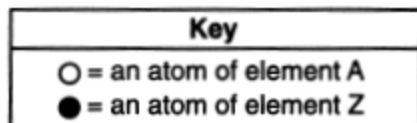
- A) 7
- B) 9
- C) 3
- D) 4

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

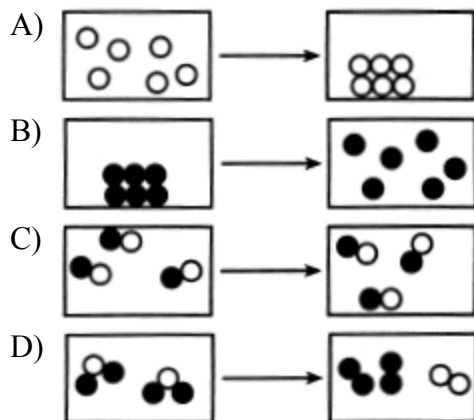
- A) TiO
- B) Ti_2O
- C) TiO_2
- D) Ti_2O_3

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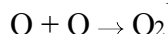
12. Given the key:



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:



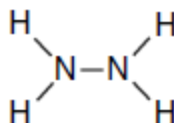
What occurs as bonds are broken in one mole of H_2 molecules during this reaction?

- 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) H_2
- B) N_2
- C) O_2
- D) 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.

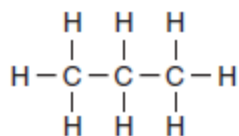


Which type of bonding is present when valence electrons move within the sample?

- 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) $\text{H}-\text{H}$ B) $\text{O}=\text{C}=\text{O}$
C) $\begin{array}{c} \text{N} \\ / \quad | \quad \backslash \\ \text{H} \quad \text{H} \quad \text{H} \end{array}$ D) $\begin{array}{c} \text{O} \\ / \quad \backslash \\ \text{H} \quad \text{H} \end{array}$
30. Which molecule has a nonpolar covalent bond?
- A) $\text{H}-\text{H}$ B) $\begin{array}{c} \text{H}-\text{N}-\text{H} \\ | \\ \text{H} \end{array}$
C) $\text{H}-\text{O}-\text{H}$ D) $\text{H}-\text{Cl}$
31. Which phrase describes the molecular polarity and distribution of charge in a molecule of carbon dioxide, CO_2 ?
- A) polar and symmetrical
B) polar and asymmetrical
C) nonpolar and symmetrical
D) nonpolar and asymmetrical

Chemical Bonds & Formulas After School Regents Review Practice

32. Given the formula representing a molecule:



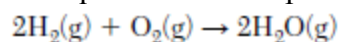
Which statement explains why the molecule is nonpolar?

- 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.
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