

Shedding Light on Atoms Episode 1: The Dawn of Modern Chemistry Name: _____

- Part B** Part A
1. Everything on Earth is made of _____.
 2. The ancient Greeks believed that all matter is composed of only four elements: _____, _____, _____, and _____.
 3. What does the word “atom” mean?

- Part C**
4. What is the modern definition of an element?

 5. Use a Periodic Table to complete the tables below.

Element Name	Element Symbol
Neon	
Nitrogen	
Helium	
Vanadium	
Sodium	
Copper	
Carbon	

Element Name	Element Symbol
	Sc
	Sr
	Si
	S
	Se
	Mg
	Mn

6. What is a compound?

7. State the type and number of atoms that make up the following compounds. The first one has been done for you.
 - (a) Water, H₂O, is made of 2 hydrogen atoms and 1 oxygen atom bonded together.
 - (b) carbon dioxide, CO₂

 - (c) ammonia, NH₃,

 - (d) Chloromethane. CH₃Cl,

8. What is a mixture? Give two examples.

- Part D**
9. When was carbon dioxide discovered? _____
 10. The chemical equation for the reaction between limestone and hydrochloric acid can be written as:

(Word Equation) _____

(Symbol Equation) _____

11. List the reactants in the reaction above: _____
12. List the products of the reaction above: _____

- Part E**
13. When was oxygen discovered? _____
 14. The chemical equation for the reaction where hydrogen peroxide decomposes to produce water and oxygen can be written as:

(Word Equation) _____

(Symbol Equation) _____

15. The manganese dioxide did not chemically react but instead acted as a “catalyst”. What is a catalyst?

16. To start a fire, you need three things:

(a) A fuel. List three examples. _____

(b) Oxygen, and _____

(c) _____ List three examples. _____

17. What is the “ignition temperature” of a fuel?

18. Why is water so good at putting out wood fires? (There are two reasons)

Skill-Building Exercise: Writing Chemical Equations

19. Use the information below to write word equations.

(a) Methane chemically reacts with oxygen (when it burns) to produce carbon dioxide and water.

(b) Calcium hydroxide and hydrogen are produced when calcium chemically reacts with water.

20. Use the information below to write word and symbol equations.

Copper carbonate (CuCO_3) breaks apart and produces carbon dioxide (CO_2) and copper oxide (CuO). (This occurs when it is heated.)

(Word Equation) _____

(Symbol Equation) _____

21. Tin oxide (SnO_2) is produced when tin (Sn) chemically reacts with oxygen (O_2).

(Word Equation) _____

(Symbol Equation) _____

Skill-Building Exercise: Balancing Chemical Equations

The balanced chemical equation for the hydrogen peroxide reaction above is $2\text{H}_2\text{O}_2 \rightarrow \text{O}_2 + 2\text{H}_2\text{O}$.

22. The expression $2\text{H}_2\text{O}$ in the chemical equation indicates two separate water molecules are produced which represents a total of _____ H atoms and _____ O atoms.

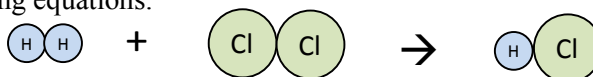
23. The expression $2\text{H}_2\text{O}_2$ in the chemical equation indicates two separate hydrogen peroxide molecules which represents a total of _____ H atoms and _____ O atoms.

When balancing equations, it's best simply to balance the first atom you come across first and then the second atom and so on. Balance the following equations.

24. _____ H_2 + _____ $\text{Cl}_2 \rightarrow$ _____ HCl

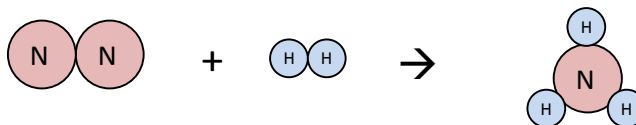
(Draw extra diagrams if you need to)

(If you only need 1 of something, you don't need to write the number in)



25. _____ N_2 + _____ $\text{H}_2 \rightarrow$ _____ NH_3

(Draw extra diagrams if you need to)



26. _____ Li + _____ $\text{S} \rightarrow$ _____ Li_2S

27. _____ K + _____ $\text{Cl}_2 \rightarrow$ _____ KCl

28. _____ Ca + _____ $\text{O}_2 \rightarrow$ _____ CaO

29. _____ Na + _____ $\text{O}_2 \rightarrow$ _____ Na_2O

Note: Why do H_2O , CaO , and CO_2 exist, while there is no such thing as H_3O , HO_2 , C_2O or CaO_2 for example? The reason that atoms bond together only in certain combinations has not been covered yet. But it will be!