**SURVIVAL SCIENCE** **LESSON 1a CHEM**

# MATTER: WATER

Ready Answer

Vol 1: Lesson 1a - **Level 3**
Chemistry: Elements & Molecules/Water
**Devotion 1: Genesis 1:1-3** In the Beginning, God…

SURVIVAL SCIENCE

**Survival Challenge:** 1) Why is water essential to survival? 2) How do its properties promote life? And 3) How can I take advantage of these properties?

**INSTRUCTIONS**
1. Complete Lesson 1 Chem Levels 1-2
2. Challenge – Learn to Seek and Find Answers
3. Share ways God's blessings/provisions are readily seen

## FOUNDATIONS

**GENESIS 1:1-2**[1]*In the beginning, God created the heavens and the earth.* [2]*And the earth was without form, and void; darkness was upon the face of the deep. And the Spirit of God moved upon the face of the waters.*
**2 Peter 3:5b** …*earth was formed out of water and by water.*

1. **CREATED:** Verse 1 is considered an introduction to the 6-days of Creation – the topic sentence which summarizes the "rest of the story." The verb, created, indicates action/energy was used. The Hebrew word "bara" meaning a NEW CREATION suggests it never existed before or it was created "out of nothing."

Look up the Latin expression *ex nihilo* & define: _____ _____ _____

2. **FORMLESS:** Based on verses 1 & 2, would you assume that the earth was destroyed and recreated, or that verse 2 is simply telling how God formed the earth?

3. **MOVED UPON:** Truth and insights were wrapped in these 2 verses. Science reveals 2 primary essentials are needed to build any substance. These are form and energy. Without them, there is only emptiness – a void. Is it coincidence that both are included in these verses? Y / N

## APOLOGETICS

**Survival Tips**

1. Learn from your environment.
2. Practice SEEKING OUT – finding resources & knowledge.
3. Experiment to find out what works.

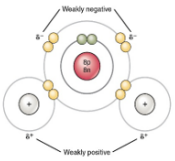
**2 COR 10:5 We demolish arguments and every pretense that sets itself up against the knowledge of God, and we take captive every thought to make it obedient to Christ.**

Science is the quest for knowledge. Seeking answers is a God-given pursuit. "Seek and you will find. Knock and the door will be opened to you." Mathew 7:7 "Beloved, do not believe every spirit, but test the spirits to see whether they are from God, for many false prophets have gone out into the world." John 4:1

Finding answers through seeking and testing isn't unique to the "field" of science, rather it's the route to discovery for all. Therefore, we shouldn't dismiss things labeled "science" as something scientists do. The word science (Latin scientia) simply means knowledge. As a person of faith, our knowledge is shaped by our ability to test arguments or pretenses that are "against our knowledge of God," from God's Word.

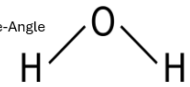
## CHEMISTRY: MATTTER/WATER

**ATOMIC STRUCTURES USED IN CHEMISTRY (WATER)**
**Find Examples of These in Your Lab**




1. **Structural Formulas** - 2-D atom drawings, shells, electrons and bonding (note **2 electrons** complete the inner shell, **8 electrons** fill the outer shell) Both oxygen & hydrogen have filled their outer shells.

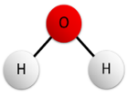
2. **Skeletal Formulas** (Line-Angle Formula) - the standard in organic chemistry.




3. Lewis **Structures** H : O : H - Dots and Element Symbols

Lewis structure

4. **Ball & Stick Models** – 3-D models use spheres for atoms, sticks for bonds






5. **Space-Filling Models** – Fused spheres (no space)

A water molecule is **made from 2 DIFFERENT elements (a compound)**, hydrogen and oxygen. To illustrate molecular bonds, we often use atomic structure drawings (left). To review:

1. **ELEMENTS:** What two elements make water?

_____& _____

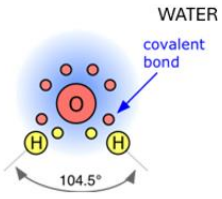
2. **MOLECULES**: How is a molecule different than a single atom ($O_3$, $N_2$, $H_2O$ molecules)?

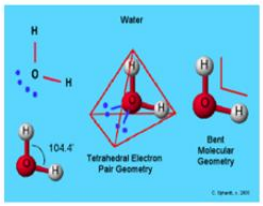
3. Define a **COMPOUND:**

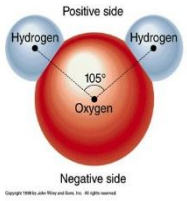
**ILLUSTRATION #1**

**Polarity:**

Notice the 104.5-105° angle (and 255.5-255° angle) of the atomic structure of a water molecule. The positive hydrogen side and the negative oxygen side serve to attract other atoms.

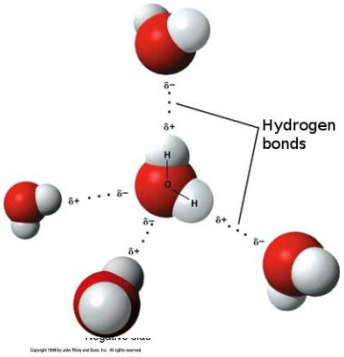



Due to water's polarity, $H_2O$ acts as a solvent, breaking molecular bonds, attracting mineral ions and distributing them throughout our body.

This property can be observed when salt **dissolves** in water. Water molecules' **charged poles** not only dissolve but they attract/repel. Strong covalent bonds hold water molecules together, but their polarity makes other water molecules attract each other. These are the hydrogen bonds seen in the image to the left.




### SURVIVAL TIPS

Because water is a polar molecule, it has "electrical" properties which can transfer electrical charges. Salt water has even higher electrical properties. Both freshwater and salt/ocean water can be dangerous in thunderstorms (lightning). Like a magnetic pole (North/South), water can attract lightning.

During lightning storms, it's essential to seek shelter that is insulated from the attractive properties of water (even water puddles and wet ground). Never seek shelter on metal platforms. **Good insulators are: GLASS WOOD RUBBER PLASTIC**

**What ARE NOT good insulators? Name 2**

To remove impurities dissolved in water, activated charcoal/carbon filters are often used. When a carbon web (coconut shells/wood strands + coal) is heated to extreme temperatures & steam in absence of oxygen, carbon develops tine pores and lots of additional surface are that attract and filter out impurities. Increased surface area provides more sites for both chemical and mechanical attraction. **Which form of salt has greater surface area to react with water? Table Salt Rock Salt**