Atoms & Molecule Worksheet

<table>
<thead>
<tr>
<th>MARSHMALLOW COLOR</th>
<th>CHEMICAL SYMBOL</th>
<th>ELEMENT</th>
<th>NUMBER OF BONDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>H</td>
<td>Hydrogen</td>
<td>1</td>
</tr>
<tr>
<td>Pink</td>
<td>O</td>
<td>Oxygen</td>
<td>2</td>
</tr>
<tr>
<td>Orange</td>
<td>C</td>
<td>Carbon</td>
<td>4</td>
</tr>
<tr>
<td>Green</td>
<td>Cl</td>
<td>Chloride</td>
<td>1</td>
</tr>
<tr>
<td>Yellow</td>
<td>Na</td>
<td>Sodium</td>
<td>1</td>
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MOLECULE SHAPE
- Linear: straight bond
- Angular: bonds with angle
- Tetrahedron: bonds with branches
- Pyramid: bonds in 3-D

Water
Molecule shape
Found where?

Chlorine
Molecule shape
Found where?

Carbon Dioxide
Molecule shape
Found where?

Methane
Molecule shape
Found where?

Sodium Bicarbonate
Molecule shape
Found where?

Sodium Chloride
Molecule shape
Found where?

Acetic Acid
Molecule shape
Found where?

Diamond
Molecule shape
Found where?

Edible Molecules Worksheet
Atoms & Molecule Worksheet

**Answer Sheet**

<table>
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<tr>
<th>Marshmallow Color</th>
<th>Chemical Symbol</th>
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<th>Number of Bonds</th>
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**Water**

- Molecule shape: $H_2O$
- Found where?: Lakes, rivers, oceans

**Chlorine**

- Molecule shape: $Cl_2$
- Found where?: Bleach, swimming pool

**Carbon Dioxide**

- Molecule shape: $CO_2$
- Found where?: Air, exhaled breath

**Methane**

- Molecule shape: $CH_4$
- Found where?: Natural gas

**Sodium Bicarbonate**

- Molecule shape: $NaHCO_3$
- Found where?: Baking soda

**Sodium Chloride**

- Molecule shape: $NaCl$
- Found where?: Table salt

**Acetic Acid**

- Molecule shape: $CH_3COOH$ or $C_2H_4O_2$
- Found where?: Vinegar

**Diamond**

- Molecule shape: $C_6$
- Found where?: Stones

Edible Molecules

Rev 10/12/10
Atoms & Molecule Evaluation

1. How many atoms make up each molecule?
   Water = _________  Sodium Bicarbonate = _________
   Chlorine = _________  Sodium Chloride = _________
   Carbon Dioxide = _________  Acetic Acid = _________
   Methane = _________  Diamond = _________

2. How many bonds does each molecule need?
   Water = _________  Sodium Bicarbonate = _________
   Chlorine = _________  Sodium Chloride = _________
   Carbon Dioxide = _________  Acetic Acid = _________
   Methane = _________  Diamond = _________

3. How does the number of atoms bonded to the central atom affect the molecule?
   
4. What is the difference between an atom and an element?
   
5. What is the difference between a molecule and a compound?
   
6. Why does CO₂ need two toothpicks between each oxygen atom and the carbon atom?
   
Edible Molecules Worksheet
1. How many atoms make up each molecule?

   Water = 3
   Chlorine = 2
   Carbon Dioxide = 3
   Methane = 5
   Sodium Bicarbonate = 6
   Sodium Chloride = 2
   Acetic Acid = 8
   Diamond = 5

2. How many bonds does each molecule need?

   Water = 2
   Chlorine = 1
   Carbon Dioxide = 4
   Methane = 4
   Sodium Bicarbonate = 6
   Sodium Chloride = 1
   Acetic Acid = 8
   Diamond = 10

3. How does the number of atoms bonded to the central atom affect the molecule? *It creates the shape of the molecule*

4. What is the difference between an atom and an element? *Atoms may be different from each other, but an element is a substance in which all the atoms are the same kind.*

5. What is the difference between a molecule and a compound?

   *Molecule* = atoms of elements held together by chemical bonds.
   *Compound* = substance in which molecular elements combine with each other.

6. Why does CO$_2$ need two toothpicks between each oxygen atom and the carbon atom?

   *To satisfy the bonding rule, a double bond is needed between each oxygen and the carbon.*
Challenge Work

**Molecules and Compounds Worksheet**

Atoms - Building Blocks

<table>
<thead>
<tr>
<th>Atoms</th>
<th>Color</th>
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<tbody>
<tr>
<td>Hydrogen (H)</td>
<td>Blue</td>
</tr>
<tr>
<td>Carbon (C)</td>
<td>Yellow</td>
</tr>
<tr>
<td>Oxygen (O)</td>
<td>Red</td>
</tr>
<tr>
<td>Nitrogen (N)</td>
<td>Black</td>
</tr>
<tr>
<td>Sodium (Na)</td>
<td>White</td>
</tr>
<tr>
<td>Chlorine (Cl)</td>
<td>Green</td>
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</table>

Chemical Formula of Common Compounds

<table>
<thead>
<tr>
<th>Compound</th>
<th>Formula</th>
</tr>
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<tbody>
<tr>
<td>Sand</td>
<td>SiO₂</td>
</tr>
<tr>
<td>Sugar</td>
<td>C₆H₁₂O₆</td>
</tr>
<tr>
<td>Rust</td>
<td>FeO₃</td>
</tr>
<tr>
<td>Gasoline</td>
<td>C₈H₁₈</td>
</tr>
<tr>
<td>Salt</td>
<td>NaCl</td>
</tr>
<tr>
<td>Water</td>
<td>H₂O</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>C₆H₈O₆</td>
</tr>
<tr>
<td>Aspirin</td>
<td>C₉H₈O₄</td>
</tr>
<tr>
<td>Advil</td>
<td>C₁₃H₁₈O₂</td>
</tr>
<tr>
<td>Baking Soda</td>
<td>NaHCO₃</td>
</tr>
<tr>
<td>Ruby</td>
<td>Al₂O₃</td>
</tr>
<tr>
<td>Emerald</td>
<td>Be₃Al₂SiO₆</td>
</tr>
<tr>
<td>Caffeine</td>
<td>C₈H₁₀N₄O₂</td>
</tr>
<tr>
<td>Peppermint</td>
<td>C₁₀H₇O</td>
</tr>
</tbody>
</table>

My compound is __________________, and the chemical formula is ________________.

Count the atoms in one molecule

- H atoms
- C atoms
- O atoms
- N atoms
- Na atoms

How many atoms are in one molecule of your compound? __________________

Now to determine the identity of a mystery compound, we must count the number and types of atoms in a molecule.

Count the atoms in one molecule

- H atoms
- C atoms
- O atoms
- N atoms
- Na atoms

How many atoms are in one molecule of your compound? __________________

The chemical formula of the mystery compound is __________________,

which means it can only be __________________.

If you take away any atom from one of the molecules, will it still be the same compound? Yes / No
**Molecules and Compounds Worksheet**

**Atoms - Building Blocks**

**Color Chart**

- Hydrogen (H): Blue
- Carbon (C): Yellow
- Oxygen (O): Red
- Nitrogen (N): Black
- Sodium (Na): White
- Chlorine (Cl): Green
- Sand: SiO₂
- Sugar: C₆H₁₂O₆
- Rust: FeO₃
- Gasoline: C₈H₁₈
- Salt: NaCl
- Water: H₂O
- Vitamin C: C₆H₈O₆
- Aspirin: C₉H₈O₄
- Advil: C₁₃H₁₈O₂
- Baking Soda: NaHCO₃
- Ruby: Al₂O₃
- Emerald: Be₃Al₂Si₆O₁₆
- Caffeine: C₈H₁₀N₄O₂
- Peppermint: C₁₀H₁₇O

---

My compound is **Baking Soda**, and the chemical formula is **NaHCO₃**.

Count the atoms in one molecule:

- H atoms: 1
- C atoms: 1
- O atoms: 3
- N atoms: 0
- Na atoms: 1

How many atoms are in one molecule of your compound? **6**

Now to determine the identity of a mystery compound, we must count the number and types of atoms in a molecule.

Count the atoms in one molecule:

- H atoms: 7
- C atoms: 10
- O atoms: 1
- N atoms: 0
- Na atoms: 0

How many atoms are in one molecule of your compound? **18**

The chemical formula of the mystery compound is **C₁₀H₁₇O**, which means it can only be **Peppermint**.

If you take away any atom from one of the molecules, will it still be the same compound? **Yes/No**