

## Activity 2.4: Grading the Atoms and Molecules Quiz

*This tool has “grading” in the title because at this point, students can be held accountable for correct answers. Level 4 (correct) responses to the questions are in **blue bold italics** below. There are also comments about common Level 2 and Level 3 responses to help you with grading and making decisions about what to emphasize in future lessons.*

*Red italics suggest ways to grade student responses by giving them points for correct or partially correct answers. There are 11 points total on this quiz.*

You have studied three important facts about atoms:

1. Atoms last forever.
2. Atoms make up the mass of all materials.
3. Atoms are bonded to other atoms in molecules.

Use these facts and what you have learned about Powers of Ten to answer these questions.

1. These questions are about a glass of soda water that is fizzing.

a. Do you think that the **oxygen atoms** in the water will still exist as oxygen atoms a million years from now?

Circle one: **YES** NO MAYBE

*This is an application of fact 1 above.*

*1 point for correct answer*

b. Do you think that the **water molecules** will still exist as water molecules a million years from now? Circle one: YES **NO** MAYBE

*Your students could not know this on the basis of what they have studied so far, though, so either “no” or “maybe” should be counted as correct.*

*1 point for correct answer*

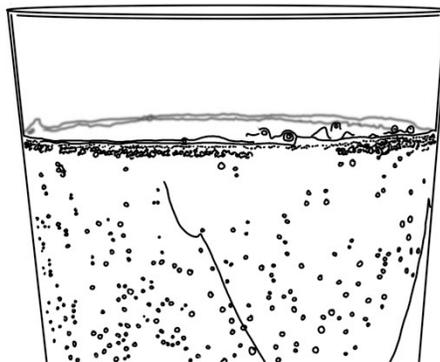
c. Explain your answers. Use the facts about atoms if they are helpful.

**Level 4 responses will refer to rule 1 above (atoms last forever) to explain their response to the question about oxygen atoms. Level 4 responses may suggest that they are “not sure” or “can’t know” if the water molecules will still exist. Many water molecules will last for a million years, but some (for example, those used in photosynthesis) will be broken up into H and O atoms. Level 3 responses may not recognize that although atoms last forever, molecules can be taken apart and cease to exist. Level 2 responses may suggest that the materials will disappear or die.**

*1 point for using Fact 1 to justify why oxygen atoms will still exist a million years from now*

*1 point for distinguishing between oxygen atoms (part a) and water molecules (part b)*

*2 points total*



2. For each material, decide whether it a kind of **atom**, a kind of **molecule**, or **both**. Circle the correct description.

Water                      ...is an atom    **...is a molecule**    ...is both an atom and a molecule

Carbon                    **...is an atom**    ...is a molecule    ...is both an atom and a molecule

Nitrogen                ...is an atom    ...is a molecule    **...is both an atom and a molecule**

Carbon dioxide        ...is an atom    **...is a molecule**    ...is both an atom and a molecule

*1 point for each correct answer. 4 points total*

3. Explain what the difference is between an oxygen **atom** and an oxygen **molecule**.

**Level 4 responses should explain that an oxygen molecule (O<sub>2</sub>) consists of 2 oxygen atoms.**

*1 point for correct answer*

4. Someone said that if a boy gains mass, then he **MUST** have added atoms as part of his body. Do you agree? Circle one: **YES** NO MAYBE

*1 point for correct answer*

Explain your reasoning. What is the connection between adding mass and adding atoms?

**Level 4 responses should refer to fact 2 above: Atoms make up the mass of all materials. So no system can gain or lose mass unless atoms move into it or out of it. Lower level responses may suggest that the boy gained weight because he grew, but without making the connection to the addition of atoms to the body.**

*1 point for using Fact 2 to justify response*