

Unit 4 Test Writing Questions

Your answers to each question are worth a maximum of ten points each. Points are earned in the following ways:

3 pts: English writing conventions – the student writes complete sentences with proper punctuation and grammar. The question is restated in the context of the answer.

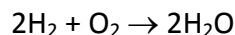
4 pts: The answer addresses ALL PARTS of the question that was asked. Required examples, explanations and illustrations are provided, though they might not be correct.

3 pts: The answer is conceptually correct.

1. A mole of helium atoms and a mole of iron atoms each contain the same number of atoms, 6.02×10^{23} . Explain why a mole of iron atoms has more mass than a mole of helium atoms when there are the same number of atoms in a mole of each element.

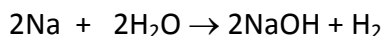
2. Some salts exist as hydrates (with water loosely attached). $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$, known as sodium sulfate decahydrate is one such salt. Explain how, without using a calculator, you can determine whether the salt is more, or less, than 50% water by mass. Show the calculations that you used to determine this.

3. The equation for the formation of water,



shows two moles of hydrogen and one mole of oxygen (3 moles total) reacting to form only two moles of water. What happened to the missing mole? Did mass disappear in this reaction?

4. It is a well-established observation that sodium metal reacts violently with water as shown in the balanced equation below:



If two moles of sodium (Na) reacts with two moles of water, what should be the total MASS IN GRAMS of the combined products? Show your calculations and explain your reasoning.

5. When calculating the mass of ionic compounds, we have repeatedly ignored the fact that atoms have gained or lost electrons in order to form ions. Explain in terms of atomic structure and mass why we can safely ignore the electrons that have been lost or gained when doing our mass calculations.

6. Oxygen is a gas at normal conditions. Scientists report that oxygen is the most common element in the earth's crust. The earth's crust is composed of solids and liquids. Explain this apparent contradiction.