

Systems and Scale Unit Practice Test

1. When a log burns, there is heat and light energy in the flame. Where does the heat and light energy come from? Select True or False for the following statements.

Some heat and light energy:

- T F *comes from the air*
- T F *is created by the flame*
- T F *comes from the log*
- T F *comes from the person who lit the log*

Which ONE of the following do you think provides the MOST energy to the flame?

- a. Energy stored in the air
- b. Energy created by the flame
- c. Energy stored in the log
- d. Energy from the person who started the fire

Explain your choices. Where does the heat and light energy in the flame come from? (*Describe what type of energy it is, where it is stored and which molecule contains that energy*)

2. What happens to matter when octane burns? After a car runs for a while, the gasoline in its tank weighs less. What happened to some of the matter that used to be in the gasoline? Select True or False for the following statements.

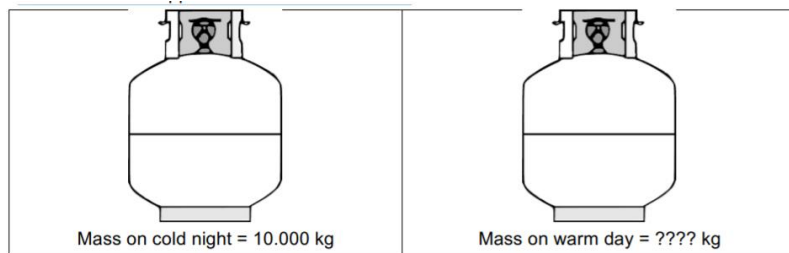
Some matter from the gasoline was converted into:

- T F motion energy
- T F carbon dioxide
- T F heat energy
- T F water vapor

Which ONE of the following do you think MOST of the matter in the burning gasoline was converted into?

- a. Motion energy
- b. Carbon dioxide
- c. Heat energy
- d. Water vapor

Explain your choices. What happened to the matter in the gasoline as it burned? ? (*Be sure to name the type of molecules the gasoline was converted into and where they went*)



2. What happens to the mass? Think about a propane tank sitting outside with its valve closed, so no molecules can get into or out of the tank. On a cold night, almost all the propane in the tank condenses into a liquid. Its mass on the cold night is exactly 10.000 kg. The next day is warmer, so some of the liquid propane evaporates, but the propane gas stays inside the tank. What will happen to the mass of the tank? Mass on cold night = 10.000 kg Mass on warm day = ??? kg

Here are three predictions about what will happen to the mass:

A student, Samantha, claims: "Some of the heavier liquid propane changed into a lighter gas, so the mass of the tank will be a little bit less than 10.000 kg." Circle one: AGREE DISAGREE

Another student, Latoya, claims: "No matter entered or left the tank, so the mass will stay exactly the same: 10.000 kg." Circle one: AGREE DISAGREE

Another student, Maria, claims: "Some heat energy was added to the tank, so the mass during the day will be a little bit more than 10.000 kg." Circle one: AGREE DISAGREE

Explain your reasoning for your choices.

Explain your reasoning for your choices. (*Explain EACH choice and why you agree or disagree – use your atom and energy rules*)

Samantha:

Latoya

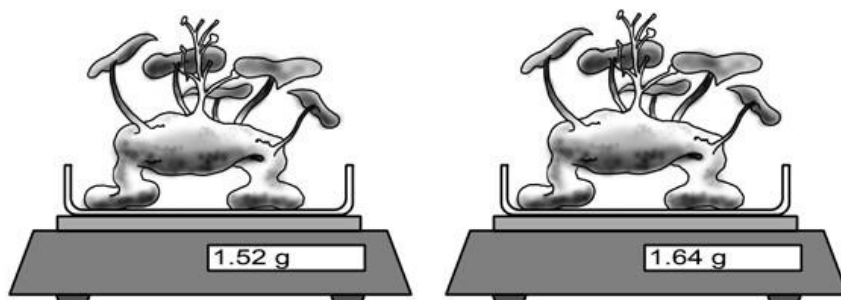
Maria:

Choose ONE claim for which you agree with from above. Explain how this claim could be further tested to offer evidence that better supports the claim. (*Describe what type of investigation you could do or what other measurements you need to take*)

3. A scientist has discovered a new living organism: the glubex. He put a glubex on the scale, weighed it, and then returned it to its habitat for one day. The next day he weighed it again. Here is what he found:

Original mass of the glubex: 1.52 grams

Mass of the glubex after one day: 1.64 grams



Decide if you agree or disagree with each of the students below.

A student, Patrick, claims: “The **chemical energy** stored in the glubex’s fat **was used** to make new **atoms**. These new atoms caused the increase in the mass of the glubex.”

Circle one: AGREE DISAGREE

Another student, Joaquin, claims: The increase in the mass came from the **movement of atoms from outside the glubex to inside the glubex.**”

Circle one: AGREE DISAGREE

Another student, Devin, claims: **The glubex didn’t have to take in atoms or make new atoms** in order to grow. Instead the glubex grew because its cells grew and divided.

Circle one: AGREE DISAGREE

Explain your reasoning for your choices. (*Explain EACH choice and why you agree or disagree – use your atom and energy rules*)

Patrick:

Joaquin:

Devin:

Choose ONE claim for which you agree with from above. Explain how this claim could be further tested to offer evidence that better supports the claim. (*Describe what type of investigation you could do or what other measurements you need to take*)

4. A scientist started sorting materials into two groups. Here are the first materials that she put into each group:

Group A: Gasoline, alcohol, wood

Group B: Sand, water, steel, carbon dioxide

a. How would the scientist sort the following materials?

Salt	Group A	Group B
Sugar	Group A	Group B
Pork	Group A	Group B
Soil minerals that help plants grow	Group A	Group B
Leaves from a living tree	Group A	Group B

b. Explain how you decided. How are the materials in Group A different from the materials in Group B? (Label the groups as inorganic or organic AND describe either molecular structure or the properties of that group)

5. Answer these true-false questions:

True	False	Carbon is a kind of atom.
True	False	Carbon is a kind of molecule.
True	False	There is carbon in pure air. (<i>the atmosphere</i>)
True	False	There is carbon in pure water. (H_2O)
True	False	There is carbon in alcohol. (<i>like Ethanol</i>)
True	False	There is carbon in wood. (<i>like cellulose</i>)
True	False	There is carbon in our muscles. (<i>like living organisms</i>)

6. What happens to matter when cellulose burns? Wood is a mixture of different organic compounds, including cellulose (about $C_6000H_{10000}O_{5000}$). Choose whether each of the following can happen in a campfire where wood (with cellulose in it) is burned.

- T F Some of the atoms in the cellulose are incorporated into carbon dioxide in the air.
- T F Some of the atoms in the cellulose are converted into energy that is used in the fire.
- T F Some of the atoms in the cellulose are burned up and disappear.
- T F Some of the atoms in the cellulose are converted into heat.
- T F Some of the atoms in the cellulose are incorporated into water vapor in the atmosphere.

Explain the pattern in your answers. What happens to the cellulose when it's burned in a campfire?
