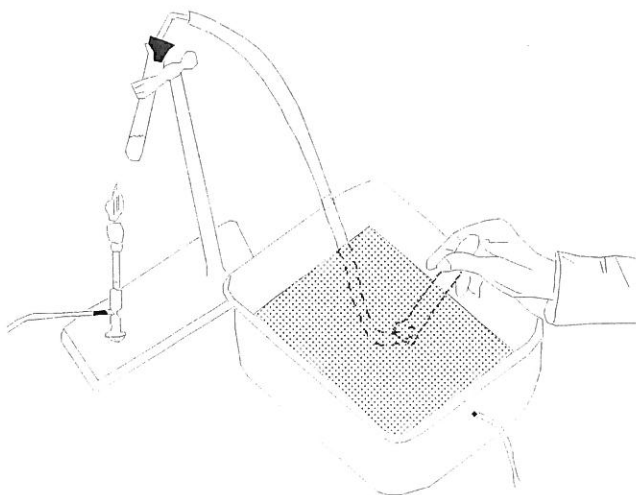


January 23rd 2014 Worksheet

1 While at a flea market, you purchased a ring that was supposedly pure gold, Au. You want to determine experimentally whether it is real gold or not. You already know the density of pure gold.

Explain in detail **in point form** the experimental procedure you will carry out to determine whether the ring is pure gold.

2 During an experiment, a student adds Alka-Seltzer to a test tube containing some water. He proceeds to collect the bubbles of gas produced using the apparatus shown in the diagram below:



The student is told that the gas collected is either oxygen, hydrogen or carbon dioxide. Following two tests with a burning splint placed in the gas, the splint is extinguished both times.

- Predict the nature of the gas and justify it.
- State another characteristic property of the gas that could be used to identify it in the lab.

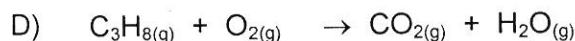
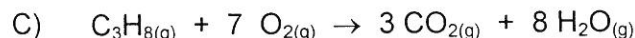
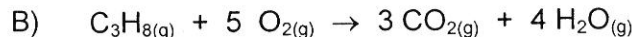
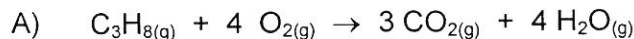
3 During a laboratory experiment, you collected three test tubes of a gas which may be one of the following: carbon dioxide, CO_2 ; oxygen gas, O_2 , or hydrogen gas, H_2 .

Use a chart to indicate the experimental procedures you should use to identify this gas.

4

When propane ($\text{C}_3\text{H}_8(\text{g})$) is used as fuel in car engines, it burns in the presence of oxygen ($\text{O}_2(\text{g})$). This combustion produces carbon dioxide ($\text{CO}_2(\text{g})$) and water vapour ($\text{H}_2\text{O}(\text{g})$).

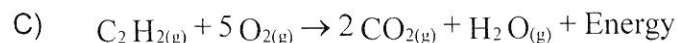
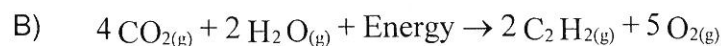
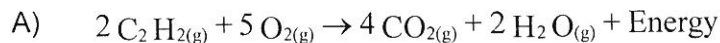
Which of the following equations corresponds to the balanced equation for this reaction?



5

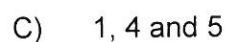
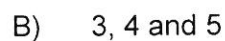
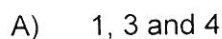
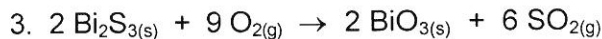
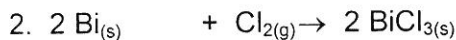
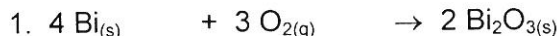
To solder two pieces of metal, a solderer uses acetylene gas (C_2H_2) that is reacted with dioxygen (O_2). The combustion produces two gases, carbon dioxide (CO_2) and water vapour (H_2O), as well as a lot of heat.

Which balanced equation represents this reaction?



6

Which of the following chemical equations are correctly balanced?



7

The reaction caused by the burning of butane in air is represented by the following equation:



During a laboratory experiment, you react 29 g of butane (C_4H_{10}) in the presence of oxygen (O_2). You observe that 88 g of carbon dioxide (CO_2) and 45 g of water vapour (H_2O) form.

What mass of oxygen did you use in this experiment?

- A) 59 g
- B) 104 g
- C) 133 g
- D) 162 g

8

Which of the following sets of results can be used to verify the Law of Conservation of Mass?

1.	$2\text{Mg}_{(\text{s})}$	+	$\text{O}_{2(\text{g})}$	\rightarrow	$2 \text{MgO}_{(\text{s})}$
Mass :	12 g		8 g		20 g
2.	$2 \text{Na}_{(\text{s})}$	+	$\text{Cl}_{2(\text{g})}$	\rightarrow	$2 \text{NaCl}_{(\text{s})}$
Mass:	4.6 g		7.0 g		11.6 g
3.	$4 \text{Fe}_{(\text{s})}$	+	$3 \text{O}_{2(\text{g})}$	\rightarrow	$2 \text{Fe}_2\text{O}_{3(\text{s})}$
Mass :	28 g		12 g		40 g
4.	$\text{HNO}_{3(\text{aq})}$	+	$\text{NaOH}_{(\text{aq})}$	\rightarrow	$\text{NaNO}_{3(\text{aq})} + \text{H}_2\text{O}_{(\text{l})}$
Mass :	63 g		40 g		85 g 20 g
5.	$2 \text{H}_2\text{O}_{(\text{l})} \rightarrow$	$2 \text{H}_{2(\text{g})}$	+	$\text{O}_{2(\text{g})}$	
Mass :	9 g		1 g		8 g

- A) 1, 3, 4 and 5
- B) 2, 3, 4 and 5
- C) 1, 2, 3 and 4
- D) 1, 2, 3 and 5

9

Which of the following properties of stainless steel explain why stainless steel posts may be used to cook food?

1. Not easily distorted
2. Average conductor of electricity
3. Good conductor of heat
4. Does not corrode
5. High density
6. High melting point

A) 1, 2 and 3

C) 2, 4 and 5

B) 1, 5 and 6

D) 3, 4 and 6

10

You observed and noted the properties of a solid substance.

Property	Observation
Mass	8.90 g
Volume	1.13 cm ³
Magnetic	Yes
Conducts electricity	Yes

Given the observations above and the information in the table below, you are to identify the substance you have observed.

Substance	Density	Conducts Electricity	Magnetic
Cobalt, Co	8.90 g/cm ³	Yes	Yes
Copper, Cu	8.95 g/cm ³	Yes	No
Iron, Fe	7.87 g/cm ³	Yes	Yes
Sulfur, S	2.07 g/cm ³	No	No

Which substance did you observe? Justify.

11

The following are the properties of an unknown gas:

Colour	Colourless
Mass	8.9 g
Reaction to a flame	None
Reaction to a glowing splint	None
Volume	5.0 L

Given the properties above and the information below, you are to identify the unknown gas.

GAS	PROPERTIES
Ammonia	Colourless, density of 0.76 g/L
Argon	Colourless, inert
Hydrogen	Colourless, combustible
Oxygen	Colourless, brings about combustion

Which of the four above gases is the unknown gas? Justify.

12

Which of the following properties of stainless steel explain why stainless steel posts may be used to cook food?

1. Not easily distorted
2. Average conductor of electricity
3. Good conductor of heat
4. Does not corrode
5. High density
6. High melting point

A) 1, 2 and 3

C) 2, 4 and 5

B) 1, 5 and 6

D) 3, 4 and 6

13 To remove the wallpaper in her room, Stephanie uses an appliance that produces a spray of steam.

Which statement explains the change that takes place?

- A) This is a chemical change because the steam burns the wallpaper.
- B) This is a physical change because the steam burns the wallpaper.
- C) This is a chemical change because the steam dissolves the glue holding the wallpaper on the wall.
- D) This is a physical change because the steam dissolves the glue holding the wallpaper on the wall.

14 For each of the following, state whether the change is chemical or physical.

- a) The formation of acid-rain from the gaseous emissions of coal-burning industries
- b) The disappearance of snow in the spring
- c) The aeration of the water in an aquarium
- d) The tarnishing of a coin

15 From among the following phenomena, identify which represent a physical change. Phenomena

- 1- Milk that goes sour _____
- 2- The water cycle _____
- 3- Leaves turning colour in the fall _____
- 4- Casting aluminium _____
- 5- A camp fire _____
- 6- Writing with a lead pencil _____

16

Matthew suggests the following steps as a method of obtaining water vapour.

1. He takes an ice cube from the freezer and lets it melt at room temperature.
2. He carries out electrolysis of the water in order to produce hydrogen (H_2) and oxygen (O_2).
3. He mixes both gases together in a container.
4. He uses an electric spark to make the gaseous mixture explode and thus obtain the water vapour.

Which of Matthew's steps involve chemical changes and which involve physical changes?

- A) Chemical changes : 1 and 2; physical changes : 3 and 4
- B) Chemical changes : 2 and 4; physical changes : 1 and 3
- C) Chemical changes : 1 and 3; physical changes : 2 and 4
- D) Chemical changes : 3 and 4; physical changes : 1 and 2

17

In winter, we observe many changes resulting from the variations in temperature and from the use of salt on the roads.

Listed below are some of these changes.

1. The transformation of water into ice
2. The corrosion of automobile metal
3. The anti-freeze that vaporizes from the windshield
4. The combustion of gasoline
5. The formation of frost on the windows of automobiles

Which of the following includes only physical changes?

- A) 1, 2 and 3
- B) 1, 2 and 4
- C) 1, 3 and 5
- D) 2, 4 and 5

18 Classify the following changes as physical or chemical.

1. A burning candle _____
2. A metal sheet that has rusted _____
3. A pencil lead that has broken _____
4. Carbon dioxide gas bubbling from a soft drink _____
5. A plant producing its food by photosynthesis _____
6. A desalination factory removing the salt from sea-water to produce drinking water _____
7. A rock split by the action of ice _____
8. A compass deflected by a magnet _____
9. The leaves changing color in the autumn _____
10. A candle melted by the sun _____

19 In the laboratory, you obtain two gases by the electrolysis of a liquid. You attempt to decompose the two gases further, but despite all your efforts you are unable to.

Use this information to determine the type of change that occurred during the electrolysis. Also identify the nature of the substances involved

TYPE OF CHANGE	INITIAL SUBSTANCE (liquid)	FINAL SUBSTANCES (gases)
A) physical	element	compounds
B) physical	compound	elements
C) chemical	element	compounds
D) chemical	compound	elements

20 For breakfast, Robert takes a loaf of bread out of the freezer.

1. He lets the loaf defrost on the counter.
2. He cuts several slices of bread.
3. He toasts the slices in the toaster.
4. He spreads them with butter, which quickly melts on the hot toast.

In which step did a chemical change occur?

21

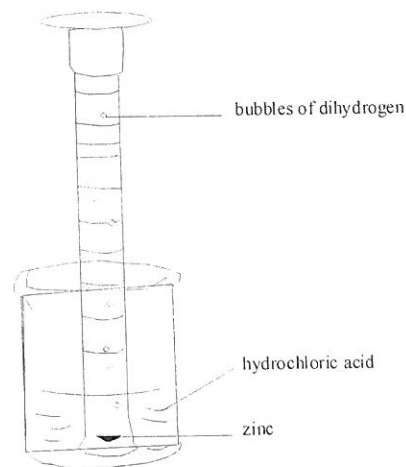
A burning splint is used to test for hydrogen gas. Hydrogen gas, H_2 , reacts with oxygen gas, O_2 , to form water, H_2O .

Which of the following statements is TRUE?





- A) This water is a pure substance consisting of elements that are chemically bonded.
- B) This water is a pure substance consisting of compounds that are chemically bonded.
- C) This water is a pure substance consisting of a mixture of two compounds that are chemically bonded.
- D) This water is a pure substance consisting of a mixture of elements.

22

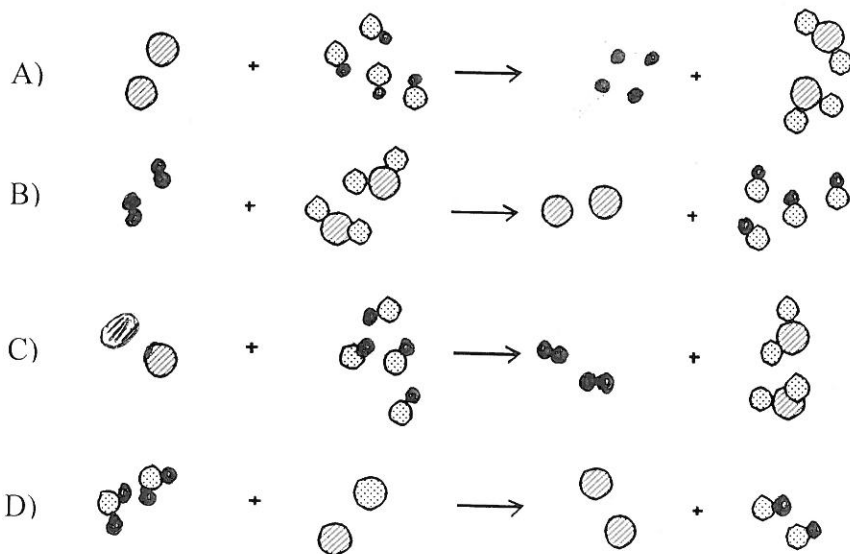
During an experiment, a student drops a small piece of zinc into hydrochloric acid. Bubbles of hydrogen form and rise to the surface. Further analysis shows the presence of zinc chloride in the solution.



Use the table to answer the question below.

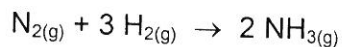
REACTANTS AND PRODUCTS	MODELS
Zinc is an element. _____	→ 
Hydrochloric acid is composed of one hydrogen atom and one chlorine atom. _____	→ 
The molecule of hydrogen gas contains two atoms of hydrogen. _____	→ 
Zinc chloride is formed from one atom of zinc and two atoms of chlorine. _____	→ 

Among the models of reactants and products, which illustration best represents the foregoing reaction?



23

One litre of nitrogen (N_2) reacts with three litres of hydrogen (H_2) to produce two litres of ammonia, according to the following equation :



Which of the following models best describes the chemical change that occurs?

